ingaged by a man—yis, he was a rubbish-carter—to help him to fill his cart, and then we shot it on some new garden grounds, and had to shovel it about to make the grounds livil, afore the top soil was put on, for the bhutiful flowers and the gravel walks. Tim—yis, he was a counthryman of mine, but a Cor-rk man—said he'd made a bad bargain, for he was bad off, and he only clared 4*d.* a load, and he'd divide it wid me. We did six loads in a day, and I got 1*s.* every night for a wake. This was a rise. But one Sunday evening I was standing talking with people as lived in the same coort, and I tould how I was helping Tim. And two Englishmen came to find four men as they wanted for work, and ould Ragin (Regan) tould them what I was working for. And one of 'em said, I was 'a b —— Irish fool,' and ould Ragin said so, and words came on, and thin there was a fight, and the pelleece came, and thin the fight was harder. I was taken to the station, and had a month. I had two black eyes next morning, but was willin' to forget and forgive. No, I'm not fond of fightin'. I'm a paceable man, glory be to God, and I think I was put on. Oh, yis, and indeed thin, your honour, it was a fair fight."

I inquired of an English rubbish-carter as to these fair fights. He knew nothing of the one in question, but had seen such fights. They were usually among the Irish themselves, but sometimes Englishmen were "drawn into them." "Fair fights! sir," he said, "why the Irishes don't stand up to you like men. They don't fight like Christians, sir; not a bit of it. They kick, and scratch, and bite, and tear, like devils, or cats, or women. They're soon settled if you can get an honest knock at them, but it isn't easy."

"I sarved my month," continued my Irish informant, "and it ain't a bad place at all, the prison. I tould the gintleman that had charge of us, that I was a Roman Catholic, God be praised, and couldn't go to his prayers. 'O very well, Pat,' says he. And next day the praste came, and we were shown in to him, and very angry he was, and said our conduc' was a disgrace to religion, and to our counthry, and to him. Do I think he was right, sir? God knows he was, or he wouldn't have said so.

"I hadn't been out of prison two hours before I was hired for a job, at 10*s.* a week. It was in the city, and I carried old bricks and rubbish along planks, from the inside of a place as was pulled down; but the outside, all but the roof, was standin' until the windor frames, and the door posts, and what other timbers there was, was sould. It was dreadful hard work, carrying the basket of rubbish on your back to the cart. The dust came through, and stuck to my neck, for I was wet all over wid sweatin' so. Every man was allowed a pint of beer a day, and I thought nivver anything was so sweet. I don't know who gave it. The masther, I suppose. Will, thin, sir, I don't know who was the masther; it was John Riley as ingaged me, but *he's* no masther. Yis, thin, and I've been workin' that way ivver since. I've sometimes had 14*s.* a week, and sometimes 10*s.*, and sometimes 12*s.* A man like me must take what he can get, and I will take it. I've been out of work sometimes, but not so much as some, for I'm young and strong. No, I can't save no money, and I have nothing just now to save it for. When I'm out of work, I sell fruit in the streets."

This statement, then, as regards the Irish labourers, shows the quality of the class employed. The English labourers, working on the same terms, are of the usual class of men so working,—broken-down men, unable, or accounting themselves unable, to "do better," and so accepting any offer affording the means of their daily bread.

Of the London Chimney-Sweepers.

Chimney-Sweepers are a consequence of two things—chimneys and the use of coals as fuel; and these are both commodities of comparatively recent introduction.

It is generally admitted that the earliest mention of *chimneys* is in an Italian MS., preserved in Venice, in which it is recorded that chimneys were thrown down in that city from the shock of an earthquake in 1347. In England, down even to the commencement of the reign of Elizabeth, the greater part of the houses in our towns had no chimneys; the fire was kindled on a hearth-stone on the floor, or on a raised grate against the wall or in the centre of the apartment, and the smoke found its way out of the doors, windows, or casements.

During the long, and—as regards civil strife—generally peaceful, reign of Elizabeth, the use of chimneys increased. In a Discourse prefixed to an edition of Holinshed's "Chronicles," in 1577, Harrison, the writer, complains, among other things, "marvellously altered for the worse in England," of the multitude of chimneys erected of late. "Now we have many chimneys," he says, "and our tenderlings complain of rheums, catarrhs, and poses. Then we had none but *rere-doses*, and our heads did never ache."* He demurs, too, to the change in the material of which the houses were constructed: "Houses were once builded of willow, then we had oaken men; but now houses are made of oak, and our men not only become willow, but a great many altogether of straw, which is a sore alteration."

* "Reredos, dossel (*retable*, Fr.; *postergale*, Ital.)," according to Parker's Glossary of Architecture, was "the wall or screen at the back of an altar, seat, &c.; it was usually ornamented with panelling, &c., especially behind an altar, and sometimes was enriched with a profusion of niches, buttresses, pinnacles, statues, and other decorations, which were often painted with brilliant colours.

"The open fire-hearth, frequently used in ancient domestic halls, was likewise called a reredos.

"In the description of Britain prefixed to Holinshed's 'Chronicles,' we are told that formerly, before chimneys were common in mean houses, 'each man made his fire against a reredosse in the hall, where he dined and dressed his meat.'"

The original word would appear to be *dosel* or *rere-dosel;* for Kelham, in his "Norman Dictionary," explains the word *doser* or *dosel* to signify a hanging or canopy of silk, silver, or gold work, under which kings or great personages sit; also the back of a chair of state (the word being probably a derivative of the Latin *dorsum*, the back. *Dos*, in slang, means a *bed*, a "dossing crib" being a sleeping-place, and has clearly the same origin) A *rere-dos* or *rere-dosel* would thus appear to have been a *screen* placed *behind* anything. I am told, that in the old houses in the north of England, erections at the back of the fire may, to this day, occasionally be seen, with an aperture behind for the insertion of plates, and such other things as may require warming.

A correspondent says there is "a 'reredos,' or open fire-hearth, now to be seen in the extensive and beautiful ruins of the Abbey of St. Agatha, in the North Riding of Yorkshire. The ivy now hangs over and partially conceals this reredos; but its form is tolerably perfect, and the stones are still coloured by the action of the fire, which was extinguished, I need hardly say, by the cold water thrown on such places by Henry VIII."

In Shakespeare's time, the chimney-sweepers seem to have become a recognised class of public cleansers, for in "Cymbeline" the poet says—

> "Fear no more the heat o' the sun,
> Nor the furious winter's rages;
> Thou thy worldly task hast done,
> Home art gone, and ta'en thy wages:
> Golden lads and girls all must,
> *As chimney-sweepers* come to dust."

In this beautiful passage there is an intimation, by the "chimney-sweepers" being contrasted with the "golden lads and girls," that their employment was regarded as of the meanest, a repute it bears to the present day.

But chimneys seem, like the "sweeps" or "sweepers," to have been a necessity of a change of fuel. In the days of "rere-dosses," our ancestors burnt only wood, so that they were not subjected to so great an inconvenience as we should be were our fires kindled without the vent of the chimney. Our fuel is coal, which produces a greater quantity of soot, and of black smoke, which is the result of imperfect combustion, than any other fuel, the smoke from wood being thin and pure in comparison.

The first mention of the use of coal as fuel occurs in a charter of Henry III., granting licence to the burgesses of Newcastle to dig for coal. In 1281 Newcastle is said to have had some slight trade in this article. Shortly afterwards coal began to be imported into London for the use of smiths, brewers, dyers, soap-boilers, &c. In 1316, during the reign of Edward I., its use in London was prohibited because of the supposed injurious influence of the smoke. In 1600 the use of coal in the metropolis became universal; about 200 vessels were employed in the London trade, and about 200,000 chaldrons annually imported.

In 1848, however, there were, besides the railway-borne coals, 12,267 cargoes imported, or 3,418,340 tons. The London coal trade now employs 2700 vessels and 21,600 seamen, and constitutes one-fourth of the whole general trade of the Thames.

To understand the *necessity* for chimney-sweepers, and the extent of the work for them to do, that is to say, the quantity of soot deposited in our chimneys during the combustion of the three and a half millions of tons of coals that are now annually consumed in London, we must first comprehend the conditions upon which the evolution of soot depends, soot being simply the fine carbonaceous particles condensed from the smoke of coal fuel, and deposited against the sides of the chimneys during its ascent between the walls to the tops of our houses. These conditions appear to have been determined somewhat accurately during the investigations of the Smoke Prevention Committee.

There are two kinds of smoke from the ordinary materials of combustion—(A) *Opaque*, or black smoke; (B) *Transparent*, or invisible smoke.

A. The *Opaque* smoke, though the most offensive and annoying from its dirtying properties, is, like the muddiest water, the least injurious to animal or vegetable health. It consists of the particles of unconsumed carbon which have not been deposited in the form of soot in the flue or chimney. This is the black smoke which will be further described.

B. *Transparent* smoke is composed of gases which are for the most part invisible, such as carbonic acid and carbonic oxide; also of sulphurous acid, but smokes with that component are both visible and invisible. The sulphurous acid is said by Professor Brande to destroy vegetation, for it has long been a cause of wonder why vegetation in towns did not flourish, since carbonic acid (which is so largely produced from the action of our fires) is the vital air of trees, shrubs, and plants*.

* It has been notorious for many years, that flowers will not bloom in any natural luxuriance, and that fruit will not properly ripen, in the heart of the city. Whilst this is an unquestionable fact, it is also a fact, that greatly as suburban dwellings have increased, and truly as London may be said to have "gone into the country," the greater quantity of the large, excellent, unfailing, and cheap supply of the fruits and vegetables in the London "green" markets are grown within a circle of from ten to twelve miles from St. Paul's. In the course of my inquiries (in the series of letters on Labour and the Poor in the *Morning Chronicle*) into the supply, &c., to the "green markets" of the metropolis, I was told by an experienced market-gardener, who had friends and connections in several of the suburbs, that he fancied, and others in the trade were of the same opinion, that no gardening could be anything but a failure if attempted within "where the fogs went." My informant explained to me that the fogs, so peculiar to London, did not usually extend beyond three or four miles from the heart of the city. He was satisfied, he said, that within half a mile or so of this reach of fog the gardener's labours might be crowned with success. He knew nothing of any scientific reason for his opinion, but as far as a purely London fog extended (without regard to any mist pervading the whole country as well as the neighbourhood of the capital), he thought it was the boundary within which there could be no proper growth of fruit or flowers. That the London fog has its *limits* as regards the manifestation of its greatest density, there can be no doubt. My informant was frequently asked, when on his way home, by omnibus drivers and others whom he knew, and met on their way to town a few miles from it: "How's the fog, sir? *How far?*"

The extent of the London fog, then, if the information I have cited be correct, may be considered as indicating that portion of the metropolis where the population, and consequently the smoke, is the thickest, and within which agricultural and horticultural labours cannot meet with success. "The nuisance of a November fog in London," Mr. Booth stated to the Smoke Committee, "is most assuredly increased by the smoke of the town, arising from furnaces and private fires. It is vapour saturated with particles of carbon which causes all that uneasiness and pain in the lungs, and the uneasy sensations which we experience in our heads. I have no doubt of the density of these fogs arising from this carbonaceous matter."

The loss from the impossibility of promoting vegetation in the district most subjected to the fog is nothing, as the whole ground is already occupied for the thousand purposes of a great commercial city. The matter is, however, highly curious, as a result of the London smoke.

Concerning the frequency of fogs in the district of the immediate neighbourhood of the metropolis, it is stated in Weale's "London," that fogs "appear to be owing, 1st,

I may here observe, that several of the scientific men who gave the results of years of observation and study in their evidence to the Committee of the House of Commons, remarked on the popular misunderstanding of what smoke was, it being generally regarded as something *visible*. But in the composition of smoke, it appears, one product may be visible, and another invisible, and both offensive; while "occasionally you may have from the same materials varieties of products, all invisible, according to the manner to which they are supplied with air."

The Committee requested Dr. Reid to prepare a definition of "smoke," and more especially of "black smoke." The following is the substance of the doctor's definition, or rather description:—

1. *Black Smoke* consists essentially of carbon separated by heat from coal or other combustible bodies. If this smoke be produced at a very high temperature, the carbon forms a loose and powdery soot, comparatively free from other substances; while the lower the temperature at which black soot is formed, the larger is the amount of other substances with which it is mingled, among which are the following:—carbon, water, resin, oily and other inflammable products of various volatilities, ammonia, and carbonate of ammonia.

When the carbon, oils, resin, and water are associated together in certain proportions, they constitute *tar*. *Soft pitch* is produced if the tar be so far heated that the water is expelled; and *hard pitch* (resin blackened by carbon) when the oils are volatilized.

In all cases of ordinary combustion, carbonic acid is formed by the red-hot cinders, or by gases or other compounds containing carbon, acting on the oxygen of the air. This carbonic acid is discharged in general as an *invisible* gas. If the carbonic acid pass through red-hot cinders, or any carbonaceous smoke at a high temperature, it loses one particle of oxygen, and becomes carbonic oxide gas. The lost oxygen, uniting with carbon, forms an additional amount of carbonic oxide gas, which passes to the external atmosphere as an invisible gas, unless kindled in its progress, or at the top of the chimney, when its temperature is sufficiently elevated by the action of air. Carbonic oxide gas burns with a blue flame, and produces carbonic acid gas.

Black smoke is always associated with carburetted hydrogen gases. These may be mechanically blended with the oils and resins, but must be carefully distinguished from them. They form more essentially, when in a state of combustion, the inflammable matters that constitute flame.

2. *Smoke from Charcoal, Coke, and Anthracite*, is always invisible if the material be dry. A flame may appear, however, if carbonic oxide be formed.

3. *Wood or Pyroligneous Smoke* is rarely black. Water and carbonic acid are the products of the full combustion of wood, omitting the consideration of the ash that remains.

4. *Sulphurous Smokes.* Tons of sulphur are annually evolved in various conditions from copper-works. Offensive sulphurous smokes are often evolved from various chemical works, as gas-works, acid-works, &c.

5. *Hydrochloric Acid Smoke* is evolved in general in large quantities from alkali works.

6. *Metallic Smokes*—when ores of lead, copper, arsenic, &c., are used—often contain offensive matter in a minute state of division, and suspended in the smoke evolved from the furnaces.

7. *Putrescent Smokes*, loaded with the products of decayed animal and vegetable matter, are evolved at times from drains in visible vapours, more especially in damp weather. The fœtid particles, when associated with moisture in this smoke, are entirely decomposed when subjected to heat.

Dr. Ure says, speaking of the cause of the ordinary black smoke above described, "The inevitable conversion of atmospheric air into carbonic acid has been hitherto the radical defect of almost all furnaces. The consequence is, that this gaseous matter is mixed with an atmosphere containing far too little oxygen, and instead of burning the carbon and hydrogen, which constitute the coal gases, the carbon is deposited partly in a pulverized form, constituting smoke or soot, and a great deal of the carbon gets half-burnt, and forms what is well known under the name of carbonic oxide, which is half-burnt charcoal."

"The ordinary smoke," Professor Faraday said, in his examination before the Committee, "is the visible black part of the products, the unburnt portions of the carbon. If you prevent the production of carbonic oxide or carbonic acid, you increase the production of smoke. You must with coal fuel either have carbonic acid or oxide, or else black smoke.

"Which is the least noxious?" he was asked, and answered, "As far as regards health, carbonic acid and carbonic oxide are most noxious to health; but it is not so much a question of health as of cleanliness and comfort, because I

to the presence of the river; and, 2ndly, to the fact that the superior temperature of the town produces results precisely similar to those we find to occur upon rivers and lakes. The cold damp currents of the atmosphere, which cannot act upon the air of the country districts, owing to the equality of their specific gravity, when they encounter the warmer and lighter strata over the town, displace the latter, intermixing with it and condensing the moisture. Fogs thus are often to be observed in London, whilst the surrounding country is entirely free from them. The peculiar colour of the London fogs appears to be owing to the fact that, during their prevalence, the ascent of the coal smoke is impeded, and that it is thus mixed with the condensed moisture of the atmosphere. As is well known, they are often so dense as to require the gas to be lighted in midday, and they cover the town with a most dingy and depressing pall. They also frequently exhibit the peculiarity of increasing density after their first formation, which appears to be owing to the descent of fresh currents of cold air towards the lighter regions of the atmosphere.

"They do not occur when the wind is in a dry quarter, as for instance when it is in the east; notwithstanding that there may be very considerable difference in the temperature of the air and of the water or the ground. The peculiar odour which attends the London fogs has not yet been satisfactorily explained; although the uniformity of its recurrence, and its very marked character, would appear to challenge elaborate examination."

believe that this town is as healthy as other places where there are not these fires.

"It is partly the impure coal gas evolved after the fresh charge of coal which originates the smokes, when not properly supplied with air; but it is a very mixed question. When a fresh charge of coal is put upon the fire, a great quantity of evaporable matter, which would be called impure coal gas according to the language of the question, is produced; and as that matter travels on in the heated place, if there be a sufficient supply of air, both the hydrogen and the carbon are entirely burnt. But if there be an insufficient supply of air, the hydrogen is taken possession of first, and the carbon is set free in its black and solid form; and if that goes into the cool part of the chimney before fresh air gets to it, that carbon is so carried out into the atmosphere and is the smoke in question. Generally speaking, the great rush of smoke is when coal is first put on the fire; and that from the want of a sufficient supply of oxygen at the right time, because the carbon is cooled so low as not to take fire."

This eminent chemist stated also that there was no difference in the ultimate chemical effect upon the air between a wood fire and a coal fire, but with wood there was not so much smoke set free in the heated place, which caused a difference in the gaseous products of wood combustion and of coal combustion. He thought that perhaps wood was the fuel which would be most favourable to health as affecting the atmosphere, inasmuch as it produced more water, and less carbonic acid, as the product of combustion.

What may be called the *peculiarities* of a smoky and sooty atmosphere are of course more strongly developed in London than elsewhere, as the following curious statements show:—

Dr. Reid, in describing metropolitan smoke, spoke of "those black portions of soot that every one is familiar with, which annoy us, for instance, at the Houses of Parliament to such an extent that I have been under the necessity of putting up a veil, about 40 feet long and 12 feet deep, on which, on a single evening, taking the worst kind of weather for the production of soot, we can count occasionally 200,000 visible portions of soot excluded at a single sitting. We count with the naked eye the number of pieces entangled upon a square inch. I have examined the amount deposited on different occasions in different parts of London at the tops of some houses; and on one occasion at the Horse Guards the amount of soot deposited was so great, that it formed a complete and continuous film, so that when I walked upon it I saw the impression of my foot left as distinctly on that occasion as when snow lies upon the ground. The film was exceedingly thin, but I could discover no want of continuity. On other occasions I have noticed in London that the quantity that escapes into individual houses is so great that in a single night I have observed a mixture of soot and of hoar frost collecting at the edge of the door, and forming a stripe three-quarters of an inch in breadth, and bearing an exact resemblance to a pepper and salt grey cloth. Those that I refer to are extreme occasions."

Mr. Booth mentioned, that one of the gardeners of the Botanic Garden in the Regent's-park, could tell the number of days sheep had been in the park from the blackness of their wool, its oleaginous power retaining the black.

Dr. Ure informed the Committee that a column of smoke might be seen extending in different directions round London, according to the way of the wind, for a distance of from 20 to 30 miles; and that Sir William Herschel had told him that when the wind blew from London he could not use his great telescope at Slough.

It was stated, moreover, that when a respirator is washed, the water is rendered dirty by the particles of soot adhering to the wire gauze, and which, but for this, would have entered the mouth.

Professor Brande said, on the subject of the public health being affected by smoke, "I cannot say that my opinion is that smoke produces any unhealthiness in London; it is a great nuisance certainly; but I do not think we have any good evidence that it produces disease of any kind."

"This Committee," said Mr. Beckett, "have been told that, by the mechanical effects of smoke upon the chest and lungs, disease takes place; that is, by swallowing a certain quantity of smoke the respiratory organs are injured; can you give any opinion upon that?"—"One would conceive," replied the Professor, "that that is the case; but when we compare the health of London with that of any other town or place where they are comparatively free or quite free from smoke, we do not find that difference which we should expect in regard to health."

Mr. E. Solly, lecturer on chemistry at the Royal Institution, expressed his opinion of the effect of smoke upon the health of towns:—

"My impression is," he said, "that it produces decided evil in two or three ways: first, mechanically; the solid black carbonaceous matter produces a great deal of disease; it occasions dirt amongst the lower orders, and, if they will not take pains to remove it, it engenders disease. If we could do away the smoke nuisance, I believe a great deal of that disease would be put an end to. But there is another point, and that is, the bad effects produced by the gases, sulphurous acid and other compounds of that nature, which are given out. If we do away with smoke, we shall still have those gases; and I have no doubt that those gases produce a great part of the disease that is produced by smoke."

On the other hand Dr. Reid thought that smoke was more injurious from the dirt it created than from causing impurity in the atmosphere, although "it was obvious enough that the inspiration of a sooty atmosphere must be injurious to persons of a delicate constitution." Dr. Ure pronounced smoke, in the common sense of visible black smoke, unwholesome, but "not so eminently as the French imagine."

Many witnesses stated their conviction that where poor people resided amongst smoke they

felt it impossible to preserve cleanliness in their persons or their dwellings, and that made them careless of their homes and indifferent to a decency of appearance, so that the public-house, and places where cleanliness and propriety were in no great estimation, became places of frequent resort, on the plain principle that if a man's home were uncomfortable, he was not likely to stay in it.

"I think," said Mr. Booth, "one great effect of the evil of smoke is upon the dwellings of the poor; it renders them less attentive to their personal appearance, and, in consequence, to their social condition."

It was also stated that there were "certain districts inhabited by the poor, where they will not hang out their clothes to be cleansed; they say it is of no use to do it, they will become dirty as before, and consequently they do not have their clothes washed." The districts specified as presenting this characteristic are St. George's-in-the East and the neighbourhood of Old-street, St. Luke's.

It must not be lost sight of, that whatever evils, moral or physical, without regarding merely pecuniary losses, are inflicted by the excess of smoke, they fall upon the poor, and almost solely on the poor. It is the poor who must reside, as was said, and with a literality not often applicable to popular phrases, "in the thick of it," and consequently there must either be increased washing or increased dirt.

To effect the mitigation of the nuisance of smoke, two points were considered:—

A. The substitution of some other material, containing less bituminous matter, for the "Newcastle coal."

B. The combustion of the smoke, before its emission into the atmospheric air, by means of mechanical contrivances founded on scientific principles.

As regards the first consideration (A) it was recommended that anthracite, or stone Welsh coal, which is a smokeless fuel, should be used instead of the Newcastle coal. This coal is almost the sole fuel in Philadelphia, a city of Quaker neatness beyond any in the United States of North America, and sometimes represented as the cleanest in the world. The anthracite coal is somewhat dearer than Newcastle coal in London, but only in a small degree.

Coke was also recommended as a substitute for coal in private dwellings.

"Are you of opinion," Dr. Reid was asked, "that smoke may be in a great measure prevented by extending the use of gas and coke?" He answered, "In numerous cities, where large quantities of gas are produced, coke is very frequently the principal fuel of the poor, and the difficulty of lighting that coke, and the difficulty of having heat developed by it in sufficient quantity, necessarily led me to look at the construction of the fire-places adapted for it. And on a general review of the question, I do entertain the opinion, that if education were more extended amongst the humblest classes with respect to the economy of their own fireside (I mean, literally, the fire-place, at present), and if gas were greatly extended, so that they did not drain the coal of the gas-works of the last dregs of gaseous matter, which are of very little use as gas, and more to be considered as adding to the bulk for sale than as valuable gas, that a coke might be left which would be easily accendible, which would be economical, and which, if introduced into fire-places where an open fire is desired, would *entirely remove the necessity of sweeping chimneys even with machines*, and would at the same time give as economical a fire as any ordinary fire-place can produce, for an ordinary coal fire rarely is powerful in its calorific emanations till the mass of gas has been expelled, and we see the cherry-red fire. The amount of gas that has escaped previously to the production or coking of the fire, is the gas that is valuable in a manufactory, and if therefore the individual consumer could have, not the hard-burnt stony coke, but the soft coke, in the condition that would give at once a cherry-red fire, we should attain the two great objects—of economising gas, and at the same time of having a lively cheerful fire. Then this led me to look particularly at the price of a gas lamp for a poor man. In a poor man's family, where the breakfast, the tea and dinner, require the principal attention, and he has some plain cooking utensils, in the heat of summer I believe that he will produce as much heat as he wants for those purposes from a single burner, which can be turned on and left all day, which shall not risk any boiling over, and by having this pure heat directed to the object to be warmed, instead of having a heavy iron grate, this plan would, if gas were generally introduced even into the humblest apartments, prove a great source of economy in summer."

Dr. Reid also told the Committee that there was a great prejudice against the use of coke, many persons considering that it produced a sulphurous smell; but as all ordinary coal coked itself, or became coke in an open fire, and was never powerfully calorific till it became coke, the prejudice would die away.

Very little is said in the Report about the smoke of private houses; an allusion, however, is made to that portion of the investigation:—"Your Committee have received the most gratifying assurances of the confident hope entertained by several of the highest scientific authorities examined by them, that the black smoke proceeding from fires in private dwellings, and all other places, may eventually be entirely prevented, either by the adoption of stoves and grates formed for a perfect combustion of the common bituminous coal, or by the use of coke, or of anthracite; but they are of opinion that the present knowledge on that subject is not such as to justify any legislative interference with these smaller fires."

"I should, in prospect," Professor Faraday said to the Committee, "look forward to the possibility of a great reduction of the smoke from coal fire in houses; but my impression is, that, in the present state of things, it would be tyrannical to determine that that must be done which at present we do not know can be done. Still, I think there

"OLD SARAH," THE WELL-KNOWN HURDY-GURDY PLAYER.

[*From a Photograph.*]

is reason to believe that it can be effected in a very high degree."

Dr. Ure also thought that to extend any smoke enactment to private dwellings might be tyrannical in the present state of the chimneys, but he had no doubt that smoke might be consumed in fires in private dwellings.

Such, then, are the causes and remedies for smoke, and consequently of soot, for smoke, or rather opaque smoke, consists, as we have seen, of merely the gases of combustion with minute particles of carbon diffused throughout them; and as smoke is the result of the imperfect burning of our coals, it follows that chimney-sweepers are but a consequence of our ignorance, and that, as we grow wiser in the art of economising our fuel, we shall be gradually displacing this branch of labourers—the means of preventing smoke being simply the mode of displacing the chimney-sweepers—and this is another of the many facts to teach us that not only are we doubling our population in forty years, but we are likewise learning every year how to do our work with a less number of workers, either by inventing some piece of mechanism that will enable one "hand" to do as much as one hundred, or else doing away with some branch of labour altogether. Here lies the great difficulty of the time. A new element—science, with its offspring, steam—has been introduced into our society within the last century, decreasing labour at a time when the number of our labourers has been increasing at a rate unexampled in history; and the problem is, how to reconcile the new social element with the old social institutions, doing as little injury as possible to the community.

Suppose, for instance, the "smoke nuisance" entirely prevented, and that Professor Faraday's prophecy as to the great reduction of the smoke from coal fires in houses were fulfilled, and that the expectations of the sanguine and intense Committee, who tell us that they have "received *the most gratifying* assurances of the *confident* hope entertained by several of *the highest scientific* authorities, that the black smoke proceeding from fires in private dwellings and all other places may be eventually *entirely* prevented,"—suppose that these expectations, I say, be realized (and there appears to be little doubt of the matter), what is to become of the 1000 to 1500 "sweeps" who live, as it were, upon this very smoke? Surely the whole community should not suffer for them, it will be said. True; but unfortunately the same argument is being applied to each particular section of the labouring class,—and the labourers make up by far the greater part of the community. If we are daily displacing a thousand labourers by the annihilation of this process, and another thousand by the improvement of that, what is to be the fate of those we put on one side? and where shall we find employment for the hundred thousand new "hands" that are daily coming into existence among us? This is the great problem for earnest thoughtful men to work out!

But we have to deal here with the chimney-sweepers as they are, and not as they may be in a more scientific age. And, first, as to *the quantity of soot* annually deposited at present in the London chimneys.

The quantity of soot produced in the metropolis every year may be ascertained in the following manner:—

The larger houses are swept in some instances once a month, but generally once in three months, and yield on an average six bushels of soot per year. A moderate-sized house, belonging to the "middle class," is usually swept four times a year, and gives about five bushels of soot per annum; while houses occupied by the working and poorer classes are seldom swept more than twice, and sometimes only once, in the twelvemonth, and yield about two bushels of soot annually.

The larger houses — the residences of noblemen and the more wealthy gentry—may, then, be said to produce an average of six bushels of soot annually; the houses of the more prosperous tradesmen, about five bushels; while those of the humbler classes appear to yield only two bushels of soot per annum. There are, according to the last returns, in round numbers, 300,000 inhabited houses at present in the metropolis, and these, from the "reports" of the income and property tax, may be said to consist, as regards the average rentals, of the proportions given in the next page.

Here we see that the number of houses whose average rental is above 50*l.* is 53,840; while those whose average rental is above 30*l.*, and below 50*l.*, are 90,002 in number; and those whose rental is below 30*l.* are as many as 163,880; the average rental for all London, 40*l.* Now, adopting the estimate before given as to the proportionate yield of soot from each of these three classes of houses, we have the following items:—

	Bushels of Soot per Annum.
53,840 houses at a yearly rental above 50*l.*, producing 6 bushels of soot each per annum . . .	323,040
90,002 houses at a yearly rental above 30*l.* and below 50*l.*, producing 5 bushels of soot each per annum .	450,010
163,880 houses at a yearly rental below 30*l.*, producing 2 bushels of soot each per annum . . .	327,760
Total number of bushels of soot annually produced throughout London .	1,100,810

This calculation will be found to be nearly correct if tried by another mode. The quantity of soot depends greatly upon the amount of volatile or bituminous matter in the coals used. By a table given at p. 169 of the second volume of this work it will be seen that the proportion of volatile matter contained in the several kinds of coal are as follows:—

Cannel or gas coals contain 40 to 60 per cent of volatile matter.

TABLE SHOWING THE NUMBER OF HOUSES, AT DIFFERENT AVERAGE RENTALS, THROUGHOUT THE METROPOLIS.

Number of Houses whose Average Rental is above £50.			Number of Houses whose Average Rental is above £30 and below £50.			Number of Houses whose Average Rental is below £30.		
	Average Rental.	Number of Houses.		Average Rental.	Number of Houses.		Average Rental.	Number of Houses.
	£			£			£	
Hanover-square, May Fair	150	8,795	Poplar	44	6,882	Chelsea	29	7,629
St. James's	128	3,460	Pancras	41	18,731	Wandsworth	29	8,299
St. Martin's	119	2,323	Hampstead	40	1,719	St. Luke's	28	6,421
London City	117	7,329	Kensington	40	17,292	Lambeth	28	20,520
Marylebone	71	15,955	Clerkenwell	38	7,259	Lewisham	27	5,936
Strand	66	3,938	East London	38	4,785	Whitechapel	26	8,832
West London	65	2,745	St. Saviour's	36	4,613	Hackney	25	9,861
St. Giles's	60	4,778	Westminster	36	6,647	Camberwell	25	9,417
Holborn	52	4,517	St. Olave's	35	2,365	Rotherhithe	23	2,834
			Islington	35	13,558	St. George's, Southwark	22	7,005
		53,840	St. George's-in-the-East	32	6,151	Newington	22	10,468
						Greenwich	22	14,423
					90,002	Shoreditch	20	15,433
						Stepney	20	16,346
						Bermondsey	18	7,035
						Bethnal Green	9	13,370
								163,880

Newcastle or "house" coals, about 37 per cent.

Lancashire and Yorkshire coals, 35 to 40 per cent.

South Welsh or "steam" coals, 11 to 15 per cent.

Anthracite or "stone" coals, none.

The house coals are those chiefly used throughout London, so that every ton of such coals contains about 800 lbs. of volatile matter, a considerable proportion of which appears in the form of smoke; but what proportion and what is the weight of the carbonaceous particles or soot evolved in a given quantity of smoke, I know of no means of judging. I am informed, however, by those practically acquainted with the subject, that a ton of ordinary house coals will produce between a fourth and a half of a bushel of soot*. Now there are, say, 3,500,000 tons of coal consumed annually in London; but a large proportion of this quantity is used for the purposes of gas, for factories, breweries, chemical works, and steam-boats. The consumption of coal for the making of gas in London, in 1849, was 380,000 tons; so that, including the quantity used in factories, breweries, &c., we may, perhaps, estimate the domestic consumption of the metropolis at 2,500,000 tons yearly, which, for 300,000 houses, would give eight tons per house. And when we remember the amount used in large houses and in hotels, as well as by the smaller houses, where each room often contains a different family, this does not appear to be too high an average. Mr. M'Culloch estimates the domestic consumption at one ton per head, men, women, and children; and since the number of persons to each house in London is 7·5, this would give nearly the same result. Estimating the yield of soot to be three-eighths of a bushel per ton, we have, in round numbers, 1,000,000 bushels of soot as the gross quantity deposited in the metropolitan chimneys every year.

Or, to check the estimate another way, there are 350 master sweepers throughout London. A master sweeper in a "large way of business" collects, I am informed, one day with another, from 30 to 40 bushels of soot; on the other hand, small master, or "single-handed" chimney-sweeper is able to gather only about 5 bushels, and scarcely that. One master sweeper said that about 10 bushels a day would, he thought, be a fair average quantity for all the masters, reckoning one day with another; so that at this rate we should have 1,095,500 bushels for the gross quantity of soot annually collected throughout the metropolis.

We may therefore assume the aggregate yield of soot throughout London to be 1,000,000 bushels per annum. Now what is done with this immense mass of refuse matter? Of what use is it?

The soot is purchased from the masters, whose perquisite it is, by the farmers and dealers. It is used by them principally for meadow land, and frequently for land where wheat is grown; not so much, I understand, as a manure, as for some quality in it which destroys slugs and other insects injurious to the crops*. Lincolnshire is one of the great marts for the London soot, whither it is transported by railway. In Hertfordshire, Cambridge, Norfolk, Suffolk, Essex, and Kent, however, and many other parts, London soot is used in large quantities; there are persons who have large stores for its reception, who purchase it from the master sweepers, and afterwards sell it to the farmers and send it as per order, to its destination. These are generally the manure-merchants, of whom the Post-Office Directory gives 26 names, eight being marked as dealers in guano. I was told by a sweeper in a large way of business that he thought these men bought from a half to three-quarters of the soot; the remainder being bought by the land-cultivators in the neighbourhood of London. Soot is often used by gardeners to keep down the insects which infest their gardens.

The value of the Soot collected throughout London is the next subject to engage our attention. Many sweepers have represented it as a very curious fact, and one for which they could advance no sufficient reason, that the price of a bushel of soot was regulated by the price of the quartern loaf, so that you had only to know that the quartern loaf was 5*d.* to know that such was the price of a bushel of soot. This, however, is hardly the case at present; the price of the quartern loaf (not regarding the "seconds," or inferior bread), is now, at the end of December, 1851, 5*d.* to 6*d.* according to quality. The price of soot per bushel is but 5*d.*, and sometimes but 4½*d.*, but 5*d.* may be taken as an average.

Now 1,000,000 bushels of soot, at 5*d.*, will be found to yield 20,833*l.* 6*s.* 8*d.* per annum. But the whole of this quantity is not collected by the chimney-sweepers, for many of the poorer persons seldom have their chimneys swept; and by the table given in another place, it will be seen that not more than 800,000 bushels are obtained in the course of the year by the London "sweeps." Hence we may say, that there are 800,000 bushels of soot annually collected from the London chimneys, and that this is worth not less than 16,500*l.* per annum.

The next question is, how many people are employed in collecting this quantity of refuse matter, and how do they collect it, and what do they get, individually and collectively, for so doing?

To begin with the number of master and journeymen sweepers employed in removing these 800,000 bushels of soot from our chimneys: according to the Census returns, the number of "sweeps" in the metropolis in the years 1841 and 1831 were as follows:—

Chimney-sweepers.	1841.	1831.	Increase in ten years.
Males, 20 years and upwards	619	421	198
„ under 20 years	370	no returns.	
Females, 20 years & upwards	44	„	
	1033		

But these returns, such as they are, include both employers and employed, in one confused mass. To disentangle the economical knot, we must endeavour to separate the number of master sweepers from the journeymen. According to the Post-Office Directory the master sweepers amount to no more than 32, and thus there would be one more than 1000 for the number of the metropolitan journeymen sweepers; these statements, however, appear to be very wide of the truth.

In 1816 it was represented to the House of Commons, that there were within the bills of mortality, 200 masters, all—except the "great gentlemen," as one witness described them, who were about 20 in number—themselves working at the business, and that they had 150 journeymen and upwards of 500 apprentices, so that there must then have been 850 working sweepers altogether, young and old.

These numbers, it must be borne in mind, were comprised in the limits of the bills of mortality 34 years ago. The parishes in the old bills of mortality were 148; there are now in the metropolis proper 176, and, as a whole, the area is much more densely covered with dwelling-houses. Taking but the last ten years, 1841 to 1851, the inhabited houses have increased from 262,737 to 307,722, or, in round numbers, 45,000.

Now in 1811 the number of inhabited houses in the metropolis was 146,019, and in 1821 it was 164,948; hence in 1816 we may assume the inhabited houses to have been about 155,000; and since this number required 850 working sweepers to cleanse the London chimneys, it is but a rule of three sum to find how many would have been required for the same purpose in 1841, when the inhabited houses had increased to 262,737; this, according to Cocker, is about 1400; so that we must come to the conclusion either that the number of working sweepers had not kept pace with the increase of houses, or that the returns of the census were as defective in this respect as we have found them to be concerning the street-sellers, dustmen, and scavagers. Were we to pursue the same mode of calculation, we should find that if 850 sweepers were required to cleanse the chimneys of 155,000 houses, there should be 1687 such labourers in London now that the houses are 307,722 in number.

But it will be seen that in 1816 more than one-half (or 500 out of 850) of the working chimney-sweepers were apprentices, and in 1841 the chimney-sweepers under 20 years of age, if we are to believe the census, constituted more than one-third of the whole body (or 370 out of 1033). Now as the use of climbing boys was prohibited in 1842, of course this large proportion of the

* The quantity of soot deposited depends greatly on the length, draught, and irregular surface of the chimney. The kitchen flue yields by far the most soot for an equal quantity of coals burnt, because it is of greater length. The quantity above cited is the average yield from the several chimneys of a house. It will be seen hereafter that the quantity collected is only 800,000 bushels; a great proportion of the chimneys of the poor being seldom swept, and some cleansed by themselves.

* Soot of coal is said, by Dr. Ure, in his admirable Dictionary of Arts and Manufactures, to contain "sulphate and carbonate of ammonia along with bituminous matter."

trade has been rendered useless; so that, estimating the master and journeymen sweepers at 250 in 1816, it would appear that about 500 would be required to sweep the chimneys of the metropolis at present. To these, of course, must be added the extra number of journeymen necessary for managing the machines. And considering the journeymen to have increased threefold since the abolition of the climbing boys, we must add 300 to the above number, which will make the sum total of the individuals employed in this trade to amount to very nearly 800.

By inquiries throughout the several districts of the metropolis, I find that there are altogether 350 master sweepers at present in London; 106 of these are large masters, who seldom go out on a round, but work to order, having a regular custom among the more wealthy classes; while the other 244 consist of 92 small masters and 152 "single-handed" masters, who travel on various rounds, both in London and the suburbs, seeking custom. Of the whole number, 19 reside within the City boundaries; from 90 to 100 live on the Surrey side, and 235 on the Middlesex side of the Thames (without the City boundaries). A large master employs from 2 to 10 men, and 2 boys; and a small one only 2 men or sometimes 1 man and a boy, while a single-handed master employs no men nor boys at all, but does all the work himself.

The 198 masters employ among them 12 foremen, 399 journeymen, and 62 boys, or 473 hands, and adding to them the single-handed master-men who work at the business themselves, we have 823 working men in all; so that, on the whole, there are not less than between 800 and 900 persons employed in cleansing the London chimneys of their soot.

The next point that presents itself in due order to the mind is, as to the *mode of working among the chimney-sweepers;* that is to say, how are the 800,000 bushels of soot collected from the 300,000 houses by these 820 working sweepers? But this involves a short history of the trade.

Of the Sweepers of Old, and the Climbing Boys.

Formerly the chimneys used to be cleansed by the house servants, for a person could easily stand erect in the huge old-fashioned constructions, and thrust up a broom as far as his strength would permit. Sometimes, however, straw was kindled at the mouth of the chimney, and in that way the soot was consumed or brought down to the ground by the action of the fire. But that there were also regular chimney-sweepers in the latter part of the sixteenth century is unquestionable; for in the days of the First James and Charles, poor Piedmontese, and more especially Savoyards, resorted to England for the express purpose. How long they laboured in this vocation is unknown. The Savoyards, indeed, were then the general showmen and sweeps of Europe, and so they are still in some of the cities of Italy and France.

As regards the first introduction of English children into chimneys—the establishment of the use of climbing boys—nothing appears, according to the representations made to Parliament on several occasions, to be known; and little attention seems to have been paid to the condition of these infants—some were but little better—until about 1780, when the benevolent Jonas Hanway, who is said, but not uncontradictedly, to have been the first person who regularly used an umbrella in the streets of London, called public attention to the matter. In 1788 Mr. Hanway and others brought a bill into Parliament for the better protection of the climbing boys, requiring, among other provisions, all master sweepers to be licensed, and the names and ages of all their apprentices registered. The House of Lords, however, rejected this bill, and the 28th George III., c. 48, was passed in preference. The chief alterations sought to be effected by the new Act were, that no sweeper should have more than six apprentices, and that no boy should be apprenticed at a tenderer age than eight years. Previously there were no restrictions in either of those respects.

These provisions were, however, very generally violated. By one of those "flaws" or omissions, so very common and so little creditable to our legislation, it was found that there was no prohibition to a sweeper's employing his own children at what age he pleased; and "some," or "several," for I find both words used, employed their sons, and occasionally their daughters, in chimney climbing at the ages of six, five, and even between four and five years! The children of others, too, were continually being apprenticed at illegal ages, for no inquiry was made into the lad's age beyond the statement of his parents, or, in the case of parish apprentices, beyond the (in those days) no more trustworthy word of the overseers. Thus boys of six were apprenticed—for apprenticeship was almost universal—as boys of eight, by their parents; while parish officers and magistrates consigned the workhouse orphans, as a thing of course, to the starvation and tyranny which they must have known were very often in store for them when apprenticed to sweepers.

The following evidence was adduced before Parliament on the subject of infant labour in this trade:—

Mr. John Cook, a master sweeper, then of Great Windmill-street and Kentish-town, the first who persevered in the use of the machine years before its use was compulsory, stated that it was common for parents in the business to employ their own children, under the age of seven, in climbing; and that as far as he knew, he himself was only between six and seven when he "came to it;" and that almost all master sweepers had got it in their bills that they kept "small boys for register-stoves, and such like as that."

Mr. T. Allen, another master sweeper, was between four and five when articled to an uncle.

Mr. B. M. Forster, a private gentleman, a member of the "Committee to promote the Superseding of Climbing Boys," said, "Some are put to the

employment very young; one instance of which occurred to a child in the neighbourhood of Shoreditch, who was put to the trade at four and a quarter years, or thereabouts. The father of a child in Whitechapel told me last week, that his son began climbing when he was four years and eight months old. I have heard of some still younger, but only from vague report."

This sufficiently proves at what infantine years children were exposed to toils of exceeding painfulness. The smaller and the more slenderly formed the child, the more valuable was he for the sweeping of flues, the interior of some of them, to be ascended and swept, being but seven inches square.

I have mentioned the employment of female children in the very unsuitable labour of climbing chimneys. The following is all the information given on the subject.

Mr. Tooke was asked, "Have you ever heard of female children being so employed?" and replied, "I have heard of cases at Hadley, Barnet, Windsor, and Uxbridge; and I know a case at Witham, near Colchester, of that sort."

Mr. B. M. Foster said, "Another circumstance, which has not been mentioned to the Committee, is, that there are several little girls employed; there are two of the name of Morgan at Windsor, daughters of the chimney-sweeper *who is employed to sweep the chimneys of the Castle;* another instance at Uxbridge, and at Brighton, and at Whitechapel (which was some years ago), and at Headley near Barnet, and Witham in Essex, and elsewhere." He then stated, on being asked, "Do you not think that girls were employed from their physical form being smaller and thinner than boys, and therefore could get up narrower flues?" "The reason that I have understood was, because their parents had not a sufficient number of boys to bring up to the business." Mr. Foster did not know the ages of these girls.

The inquiry by a Committee of the House of Commons, which led more than any other to the prohibition of this infant and yet painful labour in chimney-sweeping, was held in 1817, and they recommended the "preventing the further use of climbing boys in sweeping of chimneys;" a recommendation not carried into effect until 1832. The matter was during the interval frequently agitated in Parliament, but there were no later investigations by Committees.

I will adduce, specifically, the grievances, according to the Report of 1817, of the climbing boys; but will first present the following extract from the evidence of Mr. W. Tooke, a gentleman who, in accordance with the Hon. Henry Grey Bennet, M.P., and others, exerted himself on the behoof of the climbing boys. When he gave his evidence, Mr. Tooke was the secretary to a Society whose object was to supersede the necessity of employing climbing boys. He said:—

"In the year 1800, the Society for Bettering the Condition of the Poor took up the subject, but little or nothing appears to have been done upon that occasion, except that the most respectable master chimney-sweepers entered into an association and subscription for promoting the cleanliness and health of the boys in their respective services. The Institution of which I am treasurer, and which is now existing, was formed in February, 1803. In consequence of an anonymous advertisement, a large meeting was held at the London Coffee House, and the Society was established; immediate steps were then taken to ascertain the state of the trade; inspectors were appointed to give an account of all the master chimney-sweepers within the bills of mortality, their general character, their conduct towards their apprentices, and the number of those apprentices. It was ascertained, that the total number of master chimney-sweepers, within the bills of mortality, might be estimated at 200, who had among them 500 apprentices; that not above 20 of those masters were reputable tradesmen in easy circumstances, who appeared generally to conform to the provisions of the Act; and which 20 had, upon an average, from four to five apprentices each. We found about 90 of an inferior class of master chimney-sweepers who averaged three apprentices each, and who were extremely negligent both of the health, morals, and education of those apprentices; and about 90, the remainder of the 200 masters, were a class of chimney-sweepers recently journeymen, who took up the trade because they had no other resource; they picked up boys as they could, who lodged with themselves in huts, sheds, and cellars, in the outskirts of the town, occasionally wandering into the villages round, where they slept on soot-bags, and lived in the grossest filth."

The grievances I have spoken of were thus summed up by the Parliamentary Committee. After referring to the ill-usage and hardships sustained by the climbing boys (the figures being now introduced for the sake of distinctness) it is stated:—

"It is in evidence that (1) they are stolen from" [and sold by] "their parents, and inveigled out of workhouses; (2) that in order to conquer the natural repugnance of the infants to ascend the narrow and dangerous chimneys to clean which their labour is required, blows are used; that pins are forced into their feet by the boy that follows them up the chimney, in order to compel them to ascend it, and that lighted straw has been applied for that purpose; (3) that the children are subject to sores and bruises, and wounds and burns on their thighs, knees, and elbows; and that it will require many months before the extremities of the elbows and knees become sufficiently hard to resist the excoriations to which they are at first subject."

1. With regard to the *stealing or kidnapping of children*—for there was often a difficulty in procuring climbing boys—I find mention in the evidence, as of a matter, but not a very frequent matter, of notoriety. One stolen child was sold to a master sweeper for 8*l.* 8*s.* Mr. G. Revely said:—

"I wish to state to the Committee that case in particular, because it comes home to the better sort of persons in higher life. It seems that the

child, upon being asked various questions, had been taken away: the child was questioned how he came into that situation; he said all that he could recollect was (as I heard it told at that time), that he and his sister, with another brother, were together somewhere, but he could not tell where; but not being able to run so well as the other two, he was caught by a woman and carried away and was sold, and came afterwards into the hands of a chimney-sweeper. He was not afterwards restored to his family, and the mystery was never unravelled; but he was advertised, and a lady took charge of him.

"This child, in 1804, was forced up a chimney at Bridlington in Yorkshire, by a big boy, the younger boy being apparently but four years old. He fell and bruised his legs terribly against the grate. The Misses Auckland of Boynton, who had heard of the child, and went to see him, became interested by his manners, and they took him home with them; the chimney-sweeper, who perhaps got alarmed, being glad to part with him. "Soon after he got to Boynton, the seat of Sir George Strickland, a plate with something to eat was brought him; on seeing a silver fork he was quite delighted, and said, 'Papa had such forks as those.' He also said the carpet in the drawing-room was like papa's; the housekeeper showed him a silver watch, he asked what sort it was—'Papa's was a gold watch;' he then pressed the handle and said, 'Papa's watch rings, why does not yours?' Sir George Strickland, on being told this circumstance, showed him a gold repeater, the little boy pressed the spring, and when it struck, he jumped about the room, saying, 'Papa's watch rings so.' At night, when he was going to bed, he said he could not go to bed until he had said his prayers; he then repeated the Lord's Prayer, almost perfectly. The account he gave of himself was that he was gathering flowers in his mamma's garden, and that the woman who sold him to the sweeper, came in and asked him if he liked riding? He said, 'Yes,' and she told him he should ride with her. She put him on a horse, after which they got into a vessel, and the sails were put up, 'and away we went.' He had no recollection of his name, or where he lived, and was too young to think his father could have any other name than that of papa. He started whenever he heard a servant in the family at Boynton called George, and looked as if he expected to see somebody he knew; on inquiry, he said he had an uncle George, whom he loved dearly. He says his mamma is dead, and it is thought his father may be abroad. From many things he says, he seems to have lived chiefly with an uncle and aunt, whom he invariably says were called Mr. and Mrs. Fiembrough. From various circumstances, it is thought impossible he should be the child of the woman who sold him, his manners being 'very civilized,' quite those of a child well educated; his dialect is good, and that of the south of England. This little boy, when first discovered, was conjectured to be about four years old, and is described as having beautiful black eyes and eyelashes, a high nose, and a delicate soft skin."

Mr. J. Harding, a master sweeper, had a fellow apprentice who had been enticed away from his parents. "It is a case of common occurrence," he said, "for children stolen, to be employed in this way. Yes, and children in particular are enticed out of workhouses: there are a great many who come out of workhouses."

The following cases were also submitted to the Committee:—

"A poor woman had been obliged by sickness to go into an hospital, and while she was there her child was stolen from her house, taken into Staffordshire, and there apprenticed to a chimney-sweeper. By some happy circumstance she learned his fate; she followed him, and succeeded in rescuing him from his forlorn situation. Another child, who was an orphan, was tricked into following the same wretched employment by a chimney-sweeper, who gave him a shilling, and made him believe that by receiving it he became his apprentice; the poor boy, either discovering or suspecting that he had been deceived, anxiously endeavoured to speak to a magistrate who happened to come to the house in which he was sweeping chimneys, but his master watched him so closely that he could not succeed. He at last contrived to tell his story to a blind soldier, who determined to right the poor boy, and by *great exertions* succeeded in procuring him his liberty."

It was in country places, however, that the stealing and kidnapping of children was the most frequent, and the threat of "the sweeps will get you" was often held out, to deter children from wandering. These stolen infants, it is stated, were usually conveyed to some distance by the vagrants who had secured them, and sold to some master sweeper, being apprenticed as the child of the vendors, for it was difficult for sweepers in thinly-peopled places to get a supply of climbing boys. It was shown about the time of the Parliamentary inquiry, in the course of a trial at the Lancaster assizes, that a boy had been apprenticed to a sweeper by two travelling tinkers, man and woman, who informed him that the child was stolen from another "traveller," 80 miles away, who was "too fond of it to make it a sweep." The *price* of the child was not mentioned.

Respecting the sale of children to be apprentices to sweepers, Mr. Tooke was able to state that, although in 1816, the practice had very much diminished of late, parents in many instances still *sold their children for three, four, or five guineas.* This sum was generally paid under the guise of an apprentice fee, but it was known to be and was called a "sale," for the parents, real or nominal, never interfered with the master subsequently, but left the infant to its fate.

2. I find the following account of the *means resorted to, in order to induce, or more frequently compel, these wretched infants to work.*

The boy in the first instance went for a month, or any term agreed upon, "on trial," or "to see how he would suit for the business." During this period of probation he was usually well treated and well fed (whatever the character of the master), with little to do beyond running

errands, and observing the mode of work of the experienced climbers. When, however, he was "bound" as an apprentice, he was put with another lad who had been for some time at the business. The new boy was sent first up the chimney, and immediately followed by the other, who instructed him how to ascend. This was accomplished by the pressure of the knees and the elbows against the sides of the flue. By pressing the knees tightly the child managed to raise his arms somewhat higher, and then by pressing his elbows in like manner he contrived to draw up his legs, and so on. The inside of the flue presented a smooth surface, and there were no inequalities where the fingers or toes could be inserted. Should the young beginner fall, he was sure to light on the shoulders of the boy beneath him, who always kept himself firmly fixed in expectation of such a mishap, and then the novice had to commence anew; in this manner the twain reached the top by degrees, sweeping down the soot, and descended by the same method. This practice was very severe, especially on new boys, whose knees and elbows were torn by the pressure and the slipping down continually—the skin being stripped off, and frequently breaking out in frightful sores, from the constant abrasions, and from the soot and dirt getting into them.

In his evidence before Parliament in 1817 (for there had been previous inquiries), Mr. Cook gave an account of the training of these boys, and on being asked:—"Do the elbows and knees of the boys, when they first begin the business, become very sore, and afterwards get callous, and are those boys employed in sweeping chimneys during the soreness of those parts?" answered, "It depends upon the sort of master they have got; some are obliged to put them to work sooner than others; you must keep them a little at it, or they will never learn their business, even during the sores." He stated further, that the skin broke generally, and that the boys could not ascend chimneys during the sores without *very* great pain. "The way that I learn boys is," he continued, "to put some cloths over their elbows and over their knees till they get the nature of the chimney—till they get a little used to it: we call it *padding* them, and then we take them off, and they get very little grazed indeed after they have got the art; but very few will take that trouble. Some boys' flesh is far worse than others, and it takes more time to harden them." He was then asked:—"Do those persons still continue to employ them to climb chimneys?" and the answer was: "Some do; it depends upon the character of the master. None of them of that class keep them till they get well; none. They are obliged to climb with those sores upon them. I never had one of my own apprentices do that." This system of padding, however, was but little practised; but in what proportion it *was* practised, unless by the respectable masters, who were then but few in number, the Parliamentary papers, the only information on the subject now attainable, do not state. The inference is, that the majority, out of but 20 of these masters, with some 80 or 100 apprentices, did treat them well, and what was so accounted. The customary way of training these boys, then, was such as I have described; some even of the better masters, whose boys were in the comparison well lodged and fed, and "sent to the Sunday school" (which seems to have comprised all needful education), considered "padding and such like" to be "new-fangled nonsense."

I may add also, that although the boy carried up a brush with him, it was used but occasionally, only when there were "turns" or defects in the chimney, the soot being brought down by the action of the shoulders and limbs. The climber wore a cap to protect his eyes and mouth from the soot, and a sort of flannel tunic, his feet, legs, and arms being bare. Some of these lads were surprisingly quick. One man told me that, when in his prime as a climbing boy, he could reach the top of a chimney about as quickly as a person could go up stairs to the attics.

The following is from the evidence of Mr. Cook, frequently cited as an excellent master:—

"What mode do you adopt to get the boy to go up the chimney in the first instance?—We persuade him as well as we can; we generally practise him in one of our own chimneys first; one of the boys who knows the trade goes up behind him, and when he has practised it perhaps ten times, though some will require twenty times, they generally can manage it. The boy goes up with him to keep him from falling; after that, the boy will manage to go up with himself, after going up and down several times with one under him: we do this, because if he happens to make a slip he will be caught by the other.

"Do you find many boys show repugnance to go up at first?—Yes, most of them.

"And if they resist and reject, in what way do you force them up?—By telling them we must take them back again to their father and mother, and give them up again; and their parents are generally people who cannot maintain them.

"So that they are afraid of going back to their parents for fear of being starved?—Yes; they go through a deal of hardship before they come to our trade.

"Did you use any more violent means?—Sometimes a rod.

"Did you ever hear of straw being lighted under them?—Never.

"You never heard of any means being made use of, except being beat and being sent home?—No; no other.

"You are aware, of course, that those means being gentle or harsh must depend very much upon the character of the individual master?—It does.

"Of course you must know that there are persons of harsh and cruel disposition; have you not often heard of masters treating their apprentices with great cruelty, particularly the little boys, in forcing them to go up those small flues, which the boys were unwilling to ascend?—Yes; I have forced up many a one myself.

"By what means?—By threatenings, and by giving them a kick or a slap."

It was also stated that the journeymen used the boys with greater cruelty than did the masters—indeed a delegated tyranny is often the worst—that for very little faults they kicked and slapped the children, and sometimes flogged them with a cat, "made of rope, hard at each end, and as thick as your thumb."

Mr. John Fisher, a master chimney-sweeper, said:—"Many masters, are very severe with their children. To make them go up the chimneys I have seen them make them strip themselves naked; I have been obliged myself to go up a chimney naked."

As respects the cruelties of driving boys up chimneys by kindling straw beneath their feet, or thrusting pins into the soles of their feet, I find the following statements given on the authority of B. M. Forster, Esq., a private gentleman residing in Walthamstow:—

"A lad was ordered to sweep a chimney at Wandsworth; he came down after endeavouring to ascend, and this occurred several times before he gave up the point; at last the journeyman took some straw or hay, and lighted it under him to drive him up: when he endeavoured to get up the last time, he found there was a bar across the chimney, which he could not pass; he was obliged n consequence to come down, and the journeyman eat him so cruelly, to use his own expression, that he could not stand for a fortnight.

"In the whole city of Norwich I could find only nine climbing boys, two of whom I questioned on many particulars; one was with respect to the manner in which they are taught to climb; they both agreed in that particular, that a larger boy was sent up behind them to prick their feet, if they did not climb properly. I purposely avoided mentioning about pricking them with pins, but asked them how they did it; they said that they thrust the pins into the soles of their feet. A third instance occurred at Walthamstow; a man told me that some he knew had been taught in the same way; I believe it to be common, but I cannot state any more instances from authority."

3. On the subject of the *sores, bruises, wounds, burns, and diseases*, to which chimney-sweepers in their apprenticeships were not only exposed, but, as it were, condemned, Mr. R. Wright, a surgeon, on being examined before the Committee, said, "I shall begin with *Deformity*. I am well persuaded that the deformity of the spine, legs, arms, &c., of chimney-sweepers, generally, if not wholly, proceeds from the circumstance of their being obliged not only to go up chimneys at an age when their bones are in a soft and growing state, but likewise from their being compelled by their too merciless masters and mistresses to carry bags of soot (and those very frequently for a great length of distance and time) by far too heavy for their tender years and limbs. The knees and ancle joints mostly become deformed, in the first instance, from the position they are obliged to put them in, in order to support themselves, not only while climbing up the chimney, but more particularly so in that of coming down, when thev rest solely on the lower extremities.

"*Sore eyes and eyelids*, are the next to be considered. Chimney-sweepers are very subject to inflammation of the eyelids, and not unfrequently weakness of sight, in consequence of such inflammation. This I attribute to the circumstance of the soot lodging on the eyelids, which first produces irritability of the part, and the constantly rubbing them with their dirty hands, instead of alleviating, increases the disease; for I have observed in a number of cases, when the patient has ceased for a time to follow the business, and of course the original cause has been removed, that with washing and keeping clean they were soon got well.

"*Sores*, for the same reasons, are generally a long time in healing.

"*Cancer* is another and a most formidable disease, which chimney-sweepers in particular are liable to, especially that of the scrotum; from which circumstance, by way of distinction, it is called the 'chimney-sweeper's cancer.' Of this sort of cancer I have seen several instances, some of which have been operated on; but, in general, they are apt to let them go too far before they apply for relief. Cancers of the lips are not so general as cancers of the scrotum. I never saw but two instances of the former, and several of the latter."

The "chimney-sweep's cancer" was always lectured upon as a separate disease at Guy's and Bartholomew's Hospitals, and on the question being put to Mr. Wright: "Do the physicians who are intrusted with the care and management of those hospitals think that disease or such common occurrence, that it is necessary to make it a part of surgical education?"—he replied: "Most assuredly; I remember Mr. Cline and Mr. Cooper were particular on that subject; and having one or two cases of the kind in the hospital, it struck my mind very forcibly. With the permission of the Committee I will relate a case that occurred lately, which I had from one of the pupils of St. Thomas's Hospital; he informed me that they recently had a case of a chimney-sweeper's cancer, which was to have been operated on that week, but the man 'brushed' (to use their expression) or rather walked off; he would not submit to the operation: similar instances of which I have known myself. They dread so much the knife, in consequence of foolish persons telling them it is so formidable an operation, and that they will die under it. I conceive without the operation it is death; for cancers are of that nature that unless you extricate them entirely they will never be cured."

Of the chimney-sweeper's cancer, the following statement is given in the Report: "Mr. Cline informed your Committee by letter, that this disease is rarely seen in any other persons than chimney-sweepers, and in them cannot be considered as frequent; for during his practice in St. Thomas's hospital, for more than 40 years, the number of those could not exceed 20. But your Committee have been informed that the dread of the operation which it is necessary to perform, deters many from submitting to it· and from the evidence of persons engaged in the trade, it appears to be much more common than Mr. Cline seems to be aware of.

"*Cough and Asthma.*—Chimney-sweepers are, from their being out at all hours and in all weathers, very liable to cough and inflammation of the chest.

"*Burns.*—They are very subject to burns, from their being forced up chimneys while on fire, or soon after they have been on fire, and while overheated; and however they may cry out, their inhuman masters pay not the least attention, but compel them, too often with horrid imprecations, to proceed.

"*Stunted growth*, in this unfortunate race of the community, is attributed, in a great measure, to their being brought into the business at a very early age."

To *accidents* they were frequently liable in the pursuit of their callings, and sometimes these accidents were the being jammed or fixed, or, as it was called in the trade, "stuck," in narrow and heated flues, sometimes for hours, and until death.

Among these hapless lads were indeed many deaths from accidents, cruelty, privation, and exhaustion, but it does not appear that the number was ever ascertained. There were also many narrow escapes from dreadful deaths. I give instances of each:—

"On Monday morning, the 29th of March, 1813, a chimney-sweeper of the name of Griggs, attended to sweep a small chimney in the brewhouse of Messrs. Calvert and Co., in Upper Thames-street; he was accompanied by one of his boys, a lad of about eight years of age, of the name of Thomas Pitt. The fire had been lighted as early as two o'clock the same morning, and was burning on the arrival of Griggs and his little boy at eight; the fire-place was small, and an iron pipe projected from the grate some little distance, into the flue; this the master was acquainted with (having swept the chimneys in the brewhouse for some years) and therefore had a tile or two taken from the roof, in order that the boy might descend the chimney. He had no sooner extinguished the fire than he suffered the lad to go down; and the consequence, as might be expected, was his almost immediate death, in a state, no doubt, of inexpressible agony. The flue was of the narrowest description, and must have retained heat sufficient to have prevented the child's return to the top, even supposing he had not approached the pipe belonging to the grate, which must have been nearly red-hot; this, however, was not clearly ascertained on the inquest, though the appearance of the body would induce an opinion that he had been unavoidably pressed against the pipe. Soon after his descent, the master, who remained on the top, was apprehensive that something had happened, and therefore desired him to come up; the answer of the boy was, 'I cannot come up, master; I must die here.' An alarm was given in the brewhouse, immediately, that he had stuck in the chimney, and a bricklayer who was at work near the spot attended, and after knocking down part of the brickwork of the chimney, just above the fire-place, made a hole sufficiently large to draw him through. A surgeon attended, but all attempts to restore life were ineffectual. On inspecting the body, various burns appeared; the fleshy part of the legs, and a great part of the feet more particularly, were injured; those parts, too, by which climbing boys most effectually ascend or descend chimneys, viz., the elbows and knees, seemed burnt to the bone; from which it must be evident that the unhappy sufferer made some attempts to return as soon as the horrors of his situation became apparent."

"In the improvement made some years since by the Bank of England, in Lothbury, a chimney, belonging to a Mr. Mildrum, a baker, was taken down, but before he began to bake, in order to see that the rest of the flue was clear, a boy was sent up, and after remaining some time, and not answering to the call of his master, another boy was ordered to descend from the top of the flue and to meet him half-way; but this being found impracticable, they opened the brickwork in the lower part of the flue, and found the first-mentioned boy dead. In the mean time the boy in the upper part of the flue called out for relief, saying, he was completely jammed in the rubbish and was unable to extricate himself. Upon this a bricklayer was employed with the utmost expedition, but he succeeded only in obtaining a lifeless body. The bodies were sent to St. Margaret's Church, Lothbury, and a coroner's inquest, which sat upon them, returned the verdict—Accidental Death."

"In the beginning of the year 1808, a chimney-sweeper's boy being employed to sweep a chimney in Marsh-street, Walthamstow, in the house of Mr. Jeffery, carpenter, unfortunately, in his attempt to get down, stuck in the flue and was unable to extricate himself. Mr. Jeffery, being within hearing of the boy, immediately procured assistance. As the chimney was low, and the top of it easily accessible from without, the boy was taken out in about ten minutes, the chimney-pot and several rows of bricks having been previously removed; if he had remained in that dreadful situation many minutes longer, he must have died. His master was sent for, and he arrived soon after the boy had been released; he abused him for the accident, and, after striking him, sent him with a bag of soot to sweep another chimney. The child appeared so very weak when taken out that he could scarcely stand, and yet this wretched being, who had been up ever since three o'clock, had before been sent by his master to Wanstead, which with his walk to Marsh-street made about five miles."

"In May, 1817, a boy employed in sweeping a chimney in Sheffield got wedged fast in one of the flues, and remained in that situation near two hours before he could be extricated, which was at length accomplished by pulling down part of the chimney."

On one occasion a child remained above two hours in some danger in a chimney, rather than

venture down and encounter his master's anger. The man was held to bail, which he could not procure.

As in the cases I have described (at Messrs. Calvert's, and in Lothbury), the verdict was usually "Accidental Death," or something equivalent.

It was otherwise, however, where wilful cruelty was proven.

The following case was a subject of frequent comment at the time:—

"On Friday, 31st May, 1816, William Moles and Sarah his wife, were tried at the Old Bailey for the wilful murder of John Hewley, alias Haseley, a boy about six years of age, in the month of April last, by cruelly beating him. Under the direction of the learned judge, they were acquitted of the crime of murder, but the husband was detained to take his trial as for a misdemeanor, of which he was convicted upon the fullest evidence, and sentenced to two years' imprisonment. The facts, as proved in this case, are too shocking in detail to relate: the substance of them is, that he was forced up the chimney on the shoulder of a bigger boy, and afterwards violently pulled down again by the leg and dashed upon a marble hearth; his leg was thus broken, and death ensued in a few hours, and on his body and knees were found scars arising from wounds of a much older date."

This long-continued system of cruelties, of violations of public and private duties, bore and ripened its natural fruits. The climbing boys grew up to be unhealthy, vicious, ignorant, and idle men, for during their apprenticeships their labour was over early in the day, and they often passed away their leisure in gambling in the streets with one another and other children of their stamp, as they frequently had halfpence given to them. They played also at "chuck and toss" with the journeymen, and of course were stripped of every farthing. Thus they became indolent and fond of excitement. When a lad ceased to be an apprentice, although he might be but 16, he was too big to climb, and even if he got employment as a journeyman, his remuneration was wretched, only 2*s.* a week, with his board and lodging. There were, however, far fewer complaints of being insufficiently fed than might have been expected, but the sleeping places were execrable: "They sleep in different places," it was stated, "sometimes in sheds, and sometimes in places which we call barracks (large rooms), or in the cellar (where the soot was kept); some never sleep upon anything that can be called a bed; some do."

Mr. T. Allen, a master sweeper for 22 years, gave the Committee the following account of *the men's earnings and* (what may be called) *the General Perquisites of the trade* under the exploded system:—

"If a man be 25 years of age, he has no more than 2*s.* a week; he is not clothed, only fed and lodged in the same manner as the boys. The 2*s.* a week is not sufficient to find him clothes and other necessaries, certainly not; it is hardly enough to find him with shoe-leather, for they walk over a deal of ground in going about the streets. The journeyman is able to live upon those wages, for he gets halfpence given him: supposing he is 16 or 20 years of age, he gets the boys' pence from them and keeps it; and if he happens to get a job for which he receives a 1*s.*, he gets 6*d.* o that, and his master the other 6*d.* The boys' pen. are what the boys get after they have been doin, their master's work; they get a 1*d.* or so, and the journeyman takes it from them, and 'licks' them if they do not give it up." [These "jobs," after the master's work had been done, were chance jobs, as when a journeyman on his round was called on by a stranger, and unexpectedly, to sweep a chimney. Sometimes, by arrangement of the journeyman and the lad, the proceeds never reached the master's pocket. Sometimes, but rarely, such jobs were the journeyman's rightful perquisite.] "Men," proceeds Mr. Allen, "who are 22 and 23 years of age will play with the young boys and win their money. That is, they get half the money from them by force, and the rest by fraud. They are driven to this course from the low wages which the masters give them, because they have no other means to get anything for themselves, not even the few necessaries which they may want; for even what they want to wash with they must get themselves. As to what becomes of the money the boys get on May-day, when they are in want of clothes, the master will buy them, as check shirts or handkerchiefs. These masters get a share of the money which the boys collect on May-day. The boys have about 1*s.* or 1*s.* 6*d.*; the journeyman has also his share; then the master takes the remainder, which is to buy the boys' clothes and other necessaries, as they say. I cannot exactly tell what the average amount is that a boy will get on the May-day; the most that my boy ever got was 5*s.* But I think that the boys get more than that; I should think they get as much as 9*s.* or 10*s.* apiece. The Christmas-boxes are generally, I believe, divided among themselves (among the boys); but I cannot say rightly. It is spent in buying silk handkerchiefs, or Sunday shoes, I believe; but I am not perfectly sure."

Of the condition and lot of the operatives who were too big to go up chimneys, Mr. J. Fisher, a master sweeper, gave the following account:—"*They get into a roving way, and go about from one master to another, and they often come to no good end at last.* They sometimes go into the country, and after staying there some time, they come back again; I took a boy of that sort very lately and kept him like my own, and let him go to school; he asked me one Sunday to let him go to school, and I was glad to let him go, and I gave him leave; he accordingly went, and I have seen nothing of him since; before he went he asked me if I would let him come home to see my child buried; I told him to ask his schoolmaster, but he did not come back again. I cannot tell what has become of him; he was to have served me for twelve months. I did not take him from the parish; he came to me. He said his parents were dead. *The effect of the roving habit of the large boys when they become too large to climb, is, that they get one with another and learn bad habits from one another; they never will stop long in any one place.* They frequently go into the country and get various places; perhaps they stop a month at each; some try to get masters themselves, and some will get into bad company, which very often happens. *Then they turn thieves, they get lazy, they won't work, and people do not like to employ them lest they should take anything out of their houses. The generality of them never settle in any steady business.* They generally turn loose characters, and people will not employ them lest they should take anything out of the house."

The criminal annals of the kingdom bear out the foregoing account. Some of these boys, indeed, when they attained man's estate, became, in a great measure, through their skill in climbing, expert and enterprising burglars, breaking into places where few men would have cared to venture. One of the most daring feats ever attempted and accomplished was the escape from Newgate by a sweeper about 15 years ago. He climbed by the aid of his knees and elbows a height of nearly 80 feet, though the walls, in the corner of the prison-yard, where this was done, were nearly of an even surface; the slightest slip could not have failed to have precipitated the sweeper to the bottom. He was then under sentence of death for highway robbery.

"His name was Whitehead, and he done a more wonderfuller thing nor that," remarked an informant, who had been his master. "We was sweeping the bilers in a sugar-house, and he went from the biler up the flue of the chimney, it was nearly as high as the Monument, that chimney; I should say it was 30 or 40 feet higher nor the sugar-house. He got out at the top, and slid down the bare brickwork on the outside, on to the roof of the house, got through an attic window in the roof, and managed to get off without any one knowing what became of him. That was the most wonderfullest thing I ever knowed in my life. I don't know how he escaped from being killed, but he was always an oudacious feller. It was nearly three months after afore we found him in the country. I don't know where they sent him to after he was brought back to Newgate, but I hear they made him a turnkey in a prison somewhere, and that he 's doing very well now." The feat at the sugar-house could be only to escape from his apprenticeship.

In the course of the whole Parliamentary evidence the sweepers, reared under the old climbing system, are spoken of as a "short-lived" race, but no statistics could be given. Some died old men in middle age, in the workhouses. *Many were mere vagrants at the time of their death.*

I took the statement of a man who had been what he called a "climbing" in his childhood, but as he is now a master sweeper, and has indeed gone through all grades of the business, I shall give it in my account of the present condition of the sweepers.

Climbing is still occasionally resorted to, especially when repairs are required, "but the climbing boys," I was told, "are now men." These are slight dwarfish men, whose services are often in considerable request, and cannot at all times be commanded, as there are only about twenty of them in London, so effectually has climbing been suppressed. These little men, I was told, did pretty well, not unfrequently getting 2*s.* or 2*s.* 6*d.* for a single job.

As regards the *labour question*, during the existence of the climbing boys, we find in the Report the following results:—

The *nominal* wages to the journeymen were 2*s.* a week, with board and lodging. The apprentices received no wages, their masters being only required to feed, lodge, and clothe them.

The *actual* wages were the same as the nominal, with the addition of 1*s.* as perquisites in money. There were other perquisites in liquor or broken meat.

In the Reports are no accounts of the duration of labour throughout the year, nor can I obtain from master sweepers, who were in the business during the old mode, any sufficient data upon which to found any calculations. The employment, however, seems to have been generally *continuous*, running through the year; though in the course of the twelvemonth one master would have four and another six different journeymen, but only one at a time. The vagrant propensities of the class is a means of accounting for this.

The *nominal* wages of those journeymen who resided in their own apartments were generally 14*s.* a week, and their *actual* about 2*s.* 6*d.* extra in the form of perquisites. Others resided "on the premises," having the care of the boys, with board and lodgings and 5*s.* a week in money *nominally*, and 7*s.* 6*d.* *actually*, the perquisites being worth 2*s.* 6*d.*

Concerning the *general* or average wages of the whole trade, I can only present the following computation.

Mr. Tooke, in his evidence before the House of Commons, stated that the Committee, of which he was a member, had ascertained that one boy on an average swept about four chimneys daily, at prices varying from 6*d.* to 1*s.* 6*d.*, or a medium return of about 10*d.* per chimney, exclusive of the soot, then worth 8*d.* or 9*d.* a bushel. "It appears," he said, "from a datum I have here, that those chimney-sweepers who keep six boys (the greatest number allowed by law) gain, on an average, nearly 270*l.*; five boys, 225*l.*; four boys, 180*l.*; three boys, 135*l.*; two boys, 90*l.*; and one boy 45*l.* (yearly), exclusive of the soot, which is, I should suppose, upon an average, from half a bushel to a bushel every time the chimney is swept."

"Out of the profits you mention," he was then asked, "the master has to maintain the boys?"—"Yes," was the answer, "and when the expenses of house and cellar rent, and the wages of journeymen, and the maintenance of apprentices, are

taken into the account, the number of master chimney-sweepers is not only more than the trade will support, but exceeds, by above one-third, what the public exigency requires. The Committee also ascertained that the 200 master chimney-sweepers in the metropolis were supposed to have in their employment 150 journeymen and 500 boys."

The matter may be reduced to a tabular form, expressing the amount in money—for it is not asserted that the masters generally gained on the charge for their journeymen's board and lodging—as follows :—

EXPENDITURE OF MASTER CHIMNEY-SWEEPERS UNDER THE CLIMBING-BOY SYSTEM.

	Yearly.
20 journeymen at individual wages, 14*s.* each weekly	£780
30 ditto, say 12*s.* weekly . . .	936
100 ditto, 10*s.* ditto . . .	2,600
Board, Lodging, and Clothing of 500 boys, 4*s.* 6*d.* weekly . . .	5,850
Rent, 20 large traders, 10*s.* . .	520
Do. 30 others, 7*s.*	546
Do. 150 do., 3*s.* 6*d.* . . .	1,365
20 horses (keep), 10*s.* . . .	520
General wear and tear . . .	200
	£13,317

It appears that about 180 of the master chimey-sweepers were themselves working men, in the same way as their journeymen.

The following, then, may be taken as the—

YEARLY RECEIPTS OF THE MASTER SWEEPERS UNDER THE CLIMBING-BOY SYSTEM.

	Yearly.
Payment for sweeping 624,000 chimneys (4 daily, according to evidence before Parliament, by each of 500 boys), 10*d.* per chimney, or yearly	£26,000
Soot (according to same account), say 5*d.* per chimney . . .	13,000
Total . . .	£39,000
Yearly expenditure . . .	13,317
Yearly profit . .	£25,683

This yielded, then, according to the information submitted to the House of Commons Select Committee, as the profits of the trade prior to 1817, an individual yearly gain to each master sweeper of 128*l.*; but, taking Mr. Tooke's average yearly profit for the six classes of tradesmen, 270*l.*, 225*l.*, 180*l.*, 135*l.*, 90*l.*, and 45*l.* respectively, the individual profit averages above 157*l.*

The capital, I am informed, would not average above two guineas per master sweeper, nothing being wanted beyond a few common sacks, made by the sweepers' wives, and a few brushes. Only about 20 had horses, but barrows were occasionally hired at a busy time.

In the foregoing estimates I have not included any sums for apprentice fees, as I believe there would be something like a balance in the matter, the masters sometimes paying parents such premiums for the use of their children as they received from the parishes for the *tuition* and maintenance of others.

Of the *morals, education, religion, marriage*, &c., of sweepers, under the two systems, I shall speak in another place.

It may be somewhat curious to conclude with a word of the extent of chimneys swept by a climbing boy. One respectable master-sweeper told me that for eleven years he had climbed five or six days weekly. During this period he thought he had swept fifteen chimneys as a week's average, each chimney being at least 40 feet in height; so traversing, in ascending and descending, 686,400 feet, or 130 miles of a world of soot. This, however, is little to what has been done by a climber of 30 years' standing, one of the little men of whom I have spoken. My informant entertained no doubt that this man had, for the first 22 years of his career, climbed half as much again as he himself had; or had traversed 2,059,200 feet of the interior of chimneys, or 390 miles. Since the new Act this man had of course climbed less, but had still been a good deal employed; so that, adding his progresses for the last 9 years to the 22 preceding, he must have swept about 456 miles of chimney interiors.

OF THE CHIMNEY-SWEEPERS OF THE PRESENT DAY.

THE chimney-sweepers of the present day are distinguished from those of old by the use of machines instead of climbing boys, for the purpose of removing the soot from the flues of houses.

The chimney-sweeping machines were first used in this country in the year 1803. They were the invention of Mr. Smart, a carpenter, residing at the foot of Westminster-bridge, Surrey. On the earlier trials of the machine (which was similar to that used at present, and which I shall shortly describe), it was pronounced successful in 99 cases out of 100, according to some accounts, but failing where sharp angles occurred in the flue, which arrested its progress.

"Means have been suggested," said Mr. Tooke, formerly mentioned, in his evidence before a Committee of the House of Commons, "for obviating that difficulty by fixed apparatus at the top of the flue with a jack-chain and pulley, by which a brush could be worked up and down, or it could be done as is customary abroad, as I have repeatedly seen it at Petersburgh, and heard of its being done universally on the Continent, by letting down a bullet with a brush attached to it from the top; but to obviate the inconvenience, which is considerable, from persons going upon the roof of a house, Mr. John White, junior, an eminent surveyor, has suggested the expediency of putting iron shutters or registers to each flue, in the roof or cockloft of each house; by opening which, and working the machine upwards and downwards, or letting down the bullet, which is the most compendious manner, the chimney will be most effectually cleansed; and, by its aperture at bottom being kept well closed, it would be done with the least possible dirt and inconvenience to the family."

The Society for the supersedence of the labour of climbing boys promoted the adoption of the machines by all the means in their power, presenting the new instrument gratuitously to several master sweepers who were too poor to purchase it. Experiments were made and duly published as to the effectual manner in which the chimneys at Guildhall, the Mansion House, the then new Custom House, Dulwich College, and in other public edifices, had been cleansed by the machine. But these statements seem to have produced little effect. People thought, perhaps, that the mechanical means which might very well cleanse the chimneys of large public buildings—and it was said that the chimneys of the Custom House were built with a view to the use of the machine—might not be so serviceable for the same purposes in small private dwellings. Experiments continued to be made, often in the presence of architects, of the more respectable sweepers, and of ladies and gentlemen who took a philanthropic interest in the question, between the years 1803 and 1817, but with little influence upon the general public, for in 1817 Mr. Smart supposed that there were but 50 or 60 machines in general use in the metropolis, and those, it appeared from the evidence of several master sweepers, were used chiefly in gentlemen's houses, many of those gentlemen having to be authoritative with their servants, who, if not controlled, always preferred the services of the climbing boys. Most servants had perquisites from the master sweepers, in the largest and most profitable ways of business, and they seemed to fear the loss of those perquisites if any change took place.

The opposition in Parliament, and in the general indifference of the people, to the efforts of "the friends of the climbing boy" to supersede his painful labours by the use of machinery, was formidable enough, but that of the servants appears to have been more formidable still. Mr. Smart showed this in his explanations to the Committee. The whole result of his experience was that servants set their faces against the introduction of the machine, grumbling if there were not even the appearance of dirt on the furniture after its use. "The first winter I went out with this machine," said Mr. Smart, "I went to Mr. Burke's in Token-house Yard, who was a friend of mine, with a man to sweep the chimneys, and after waiting above an hour in a cold morning, the housekeeper came down quite in a rage, that we should presume to ring the bell or knock at the door; and when we got admittance, she swore she wished the machine and the inventor at the devil; she did not know me. We swept all the chimneys, and when we had done I asked her what objection she had to it now; she said, a very serious one, that if there was a thing by which a servant could get any emolument, some d——d invention was sure to take it away from them, for that she received perquisites."

This avowal of Mr. Burke's housekeeper, as brusque as it was honest, is typical of the feelings of the whole class of servants.

The opposition in Parliament, as I have intimated, continued. One noble lord informed the House of Peers that he had been indisposed of late and had sought the aid of calomel, the curative influence of which had pervaded every portion of his frame; and that it as far surpassed the less searching powers of other medicines, as the brush of the climbing boy in cleansing every nook and corner of the chimney, surpassed all the power of the machinery, which left the soot unpurged from those nooks and corners.

The House of Commons, however, had expressed its conviction that as long as master chimney-sweepers were permitted to employ climbing boys, the natural result of that permission would be the continuance of those miseries which the Legislature had sought, but which it had failed, to put an end to; and they therefore recommended that the use of climbing boys should be prohibited altogether; and that the age at which the apprenticeship should commence should be extended from eight to fourteen, putting this trade upon the same footing as others which took apprentices at that age.

This resolution became law in 1829. The employment of climbing boys in any manner in the interior of chimneys was prohibited under penalties of fine and imprisonment; and it was enacted that the new measure should be carried into effect in three years, so giving the master sweepers that period of time to complete their arrangements. During the course of the experiments and inquiry, the sweepers, as a body, seem to have thrown no obstacles, or very few and slight obstacles, in the way of the "Committee to promote the Superseding of the Labour of Climbing Boys;" while the most respectable of the class, or the majority of the respectable, aided the efforts of the Committee.

This manifestation of public feeling probably modified the opposition of the sweepers, and unquestionably influenced the votes of members of Parliament. The change in the operations of the chimney-sweeping business took place in 1832, as quietly and unnoticedly as if it were no change at all.

The machine now in use differs little from that invented by Mr. Smart, the first introduced, but lighter materials are now used in its manufacture. It has not been found necessary, however, to complicate its use with the jack-chain and pulley, and bullet with a brush attached, and the iron shutters or registers in the roof or cockloft, of which Mr. Tooke spoke.

The machine is formed of a series of hollow rods, made of a supple cane, bending and not breaking in any sinuosity of the flues. This cane is made of the same material as gentlemen's walking-sticks. The first machines were made of wood, and were liable to be broken; and to enable the sweeps on such occasions to recover the broken part, a strong line ran from bottom to top through the centre of the sticks, which were bored for the purpose, and strung on this cord. The cane machine, however, speedily and effectually superseded these imperfect instruments; and there are now none of them to be met with. To

the top tube of the machine is attached the "brush," called technically "the head," of elastic whalebone spikes, which "give" and bend, in accordance with the up or down motion communicated by the man working the machine, so sweeping what was described to me as "both ways," up and down.

Some of these rods, which fit into one another by means of brass screws, are 4 feet 6 inches long, and diminish in diameter to suit their adjustment. Some rods are but 3 feet 6 inches long, and 4 feet is the full average length; while the average price at the machine maker's is 2*s.* 6*d.* a rod, if bought separately. The head costs 10*s.*, on an average, if bought separately. It is seldom that a machine is required to number beyond 17 rods (extending 68 feet), and the better class of sweepers are generally provided with 17 rods. The cost of the entire machine, for every kind of chimney-work, when purchased new, as a whole, is, when of good quality, from 30*s.* to 5*l.*, according to the number of rods, duplicate rods, &c. Mr. Smart stated, in 1817, that the average price of one of his machines was then 2*l.* 3*s.*

The sweepers who labour chiefly in the poorer localities—and several told me how indifferent many people in those parts were as to their chimneys being swept at all—rarely use a machine to extend beyond 40 feet, or one composed of 10 or 11 rods; but some of the inferior class of sweepers buy of those in a superior way of trade worn machines, at from a third to a half of the prime cost. These machines they trim up themselves. One portion of the work, however, they cannot repair or renew—the broken or worn-out brass screws of the rods, which they call the "ferules." These, when new, are 1*s.* each. There were, when the machine-work was novel, I was informed, street-artizans who went about repairing these screws or ferules; but their work did not please the chimney-sweepers, and this street-trade did not last above a year or two.

The rods of the machine, when carefully attended to, last a long time. One man told me that he was still working some rods which he had worked since 1842 (nine years), with occasional renewal of the ferules. The head is either injured or worn down in about two years; if not well made at first, in a year. The diameter of this head or brush is, on the average, 18 inches. One of my informants had himself swept a chimney of 80 feet, and one of his fellow-workers had said that he once swept a chimney of 120 feet high; in both cases by means of the machine. My informant, however, thought such a feat as the 120-feet sweep was hardly possible, as only one man's strength can be applied to the machine; and he was of opinion that no man's muscular powers would be sufficient to work a machine at a height of 120 feet. The labour is sometimes very severe; "enough," one strongly-built man told me, "to make your arms, head, and heart ache."

The old-fashioned chimneys are generally 12 by 14 inches in their dimensions in the interior; and for the thorough sweeping of such chimneys—the opinion of all the sweepers I saw according on the subject—a head (it is rarely called brush in the trade) of 18 inches diameter is insufficient, yet they are seldom used larger. One intelligent master sweeper, speaking from his own knowledge, told me that in the neighbourhood where he worked numbers of houses had been built since the introduction of the machines, and the chimneys were only 9 inches square, as regards the interior; the smaller flues are sometimes but 7. These 9-inch chimneys, he told me, were frequent in "scamped" houses, houses got up at the lowest possible rate by speculating builders. This was done because the brickwork of the chimneys costs more than the other portions of the masonry, and so the smaller the dimensions of the chimneys the less the cost of the edifice. The machines are sometimes as much crippled in this circumscribed space as they are found of insufficient dimensions in the old-fashioned chimneys; and so the "scamped" chimney, unless by a master having many "heads," is not so cleanly swept as it might be. Chimneys not built in this manner are now usually 9 inches by 14.

In cleansing a chimney with the machine the sweep stands by, or rather in, the fire-place, having first attached a sort of curtain to the mantle to confine the soot to one spot, the operator standing inside this curtain. He first introduces the "head," attached to its proper rod, into the chimney, "driving" it forward, then screws on the next rod, and so on, until the head has been driven to the top of the chimney. The soot which has fallen upon the hearth, within the curtain, is collected into a sack or sacks, and is carried away on the men's backs, and occasionally in carts. The whalebone spikes of the head are made to extend in every direction, so that when it is moved no part of the chimney, if the surface be even, escapes contact with these spikes, if the work be carefully done, as indeed it generally is; for the cleaner the chimney is swept of course the greater amount of soot adds to the profit of the sweeper. One man told me that he thought he had seen in some old big chimneys, a long time unswept, more soot brought down by the machine than, under similar circumstances as to the time the chimney had remained uncleansed, would have been done by the climbing boy.

All the master sweepers I saw concurred in the opinion that the machine was *not* in all respects so effective a sweeper as the climbing boy, as it does not reach the recesses, nooks, crannies, or holes in the chimney, where the soot remains little disturbed by the present process. This want is felt the most in the cleansing of the old-fashioned chimneys, especially in the country.

Mr. Cook, in 1817, stated to the Committee that the cleansing of a chimney by a boy or by a machine occupied the same space of time; but I find the general opinion of the sweepers now to be that it is only the small and straight chimneys which can be swept with as great celerity by a machine as by a climber; in all others the lad was quicker by about 5 minutes in 30, or in that proportion.

ETHIOPIAN SERENADERS.

[From a Photograph.]

I heard sweepers represent that the passing of the Act of Parliament not only deprived them in many instances of the unexpired term of a boy's apprenticeship in his services as a climber, but "threw open the business to any one." The business, however, it seems, was always "open to any one." There was no art nor mystery in it, as regarded the functions of the master; any one could send a boy up a chimney, and collect and carry away the soot he brought down, quite as readily and far more easily than he can work a machine. Nevertheless, men under the old system could hardly (and some say they were forbidden to) embark in this trade unless they had been apprenticed to it; for they were at a loss how to possess themselves of climbing boys, and how to make a connection. When the machines were introduced, however, a good many persons who were able to "raise the price" of one started in the line on their own account. These men have been called by the old hands "leeks" or "green'uns," to distinguish them from the regularly-trained men, who pride themselves not a little on the fact of their having served seven or eight years, "duly and truly," as they never fail to express it. This increase of fresh hands tended to lower the earnings of the class; and some masters, who were described to me as formerly very "comfortable," and some, comparatively speaking, rich, were considerably reduced by it. The number of "leeks" in 1832 I heard stated, with the exaggeration to which I have been accustomed when uninformed men, ignorant of the relative value of numbers, have expressed their opinions, as 1000!

The several classes in the chimney-sweeping trade may be arranged as follows:—

The *Master Chimney-Sweepers*, called sometimes "Governors" by the journeymen, are divisible into three kinds:—

The "large" or "high masters," who employ from 2 to 10 men and 2 boys, and keep sometimes 2 horses and a cart, not particularly for the conveyance of the soot, but to go into the country to a gentleman's house to fulfil orders.

The "small" or "low masters," who employ, on an average, two men, and sometimes but one man and a boy, without either horse or cart.

The "single-handed master-men," who employ neither men nor boys, but do all the work themselves.

Of these three classes of masters there are two subdivisions.

The "leeks" or "green-uns," that is to say, those who have not regularly served their time to the trade.

The "knullers" or "queriers," that is to say, those who solicit custom in an irregular manner, by knocking at the doors of houses and such like.

Of the competition of capitalists in this trade there are, I am told, no instances. "We have our own stations," one master sweeper said, "and if I contract to sweep a genelman's house, here in Pancras, for 25*s.* a year, or 10*s.*, or anythink, my nearest neighbour, as has men and machines to, is in Marrybun; and it wouldn't pay to send his men a mile and a half, or on to two mile, and work at what I can—let alone less. No, sir, I've known bisness nigh 20 year, and there's nothink in the way of that underworking. The poor creeturs as keeps theirselves with a machine, and nothing to give them a lift beyond it, *they'd* undertake work at any figure, but nobody employs or can trust to them, but on chance." The contracts, I am told, for a year's chimney-sweeping in any mansion are on the same terms with one master as with another.

As regards the *Journeymen Chimney-Sweepers* there are also three kinds:—

The "foreman" or "first journeyman" sweeper, who accompanies the men to their work, superintends their labours, and receives the money, when paid immediately after sweeping.

The "journeyman" sweeper, whose duty it is to work the machine, and (where no under-journeyman, or boy, is kept) to carry the machine and take home the soot.

The "under-journeyman" or "boy," who has to carry the machine, take home the soot, and work the machine up the lower-class flues.

There are, besides these, some 20 climbing men, who ascend such flues as the machines cannot cleanse effectually, and, it must, I regret to say, be added, some 20 to 30 climbing boys, mostly under eleven years of age, who are still used for the same purpose "on the sly." Many of the masters, indeed, lament the change to machine-sweeping, saying that their children, who are now useless, would, in "the good old times," have been worth a pound a week to them. It is in the suburbs that these climbing children are mostly employed.

The *hours of labour* are from the earliest morning till about midday, and sometimes later.

There are *no Houses of Call*, trade societies, or regulations among these operatives, but there are low public-houses to which they resort, and where they can always be heard of.

When a chimney-sweeper is out of work he merely inquires of others in the same line of business, who, if they know of any one that wants a journeyman, direct their brother sweeper to call and see the master; but though the chimney-sweepers have no trade societies, some of the better class belong to sick, and others to burial, funds. The lower class of sweepers, however, seem to have no resource in sickness, or in their utmost need, but the parish. There are sweepers, I am told, in every workhouse in London.

There are three *modes of payment common* among the sweepers:—

1, in money;
2, partly in money and partly in kind; and
3, by perquisites.

The great majority of the masters pay the men they employ from 2*s.* to 3*s.*, and a few 4*s.* and 6*s.* per week, together with their board and lodging. It may seem that 3*s.* per week is a small sum, but it was remarked to me that there are few working men who, after supporting themselves, are able to save that sum weekly, while the sweepers have many perquisites of one sort or

other, which sometimes bring them in 1*s.*, 2*s.*, 3*s.*, 4*s.*, and occasionally 5*s.* or 6*s.*, a week additional —a sufficient sum to pay for clothes and washing. The journeymen, when lodged in the house of the master, are single men, and if constantly employed might, perhaps, do well, but they are often unemployed, especially in the summer, when there are not so many fires kept burning. As soon as one of them gets married, or what among them is synonymous, "takes up with a woman," which they commonly do when they are able to purchase some sort of a machine, they set up for themselves, and thus a great number of the men get to be masters on their own account, without being able to employ any extra hands. These are generally reckoned among the "knullers;" they do but little business at first, for the masters long established in a neighbourhood, who are known to the people, and have some standing, are almost always preferred to those who are strangers or mere beginners.

It was very common, but perhaps more common in country towns than in London, for the journeymen, as well as apprentices, in this and many other trades to live at the master's table. But the board and lodging supplied, in lieu of money-wages, to the journeymen sweepers, seems to be one of the few existing instances of such a practice in London. Among slop-working tailors and shoemakers, some unfortunate workmen are boarded and lodged by their employers, but these employers are merely middlemen, who gain their living by serving such masters as "do not like to drive their negroes themselves." But among the sweepers there are no middlemen.

It is not all the journeymen sweepers, however, who are remunerated after this manner, for many receive 12*s.*, and some 14*s.*, and not a few 18*s.* weekly, besides perquisites, but reside at their own homes.

Apprenticeship is now not at all common among the sweepers, as no training to the business is needed. Lord Shaftesbury, however, in July last, gave notice of his intention to bring in a bill to prevent persons who had not been duly apprenticed to the business establishing themselves as sweepers.

The Perquisites of the journeymen sweepers are for measuring, arranging, and putting the soot sold into the purchasers' sacks, or carts; for this is considered extra work. The payment of this perquisite seems to be on no fixed scale, some having 1*s.* for 50, and some for 100 bushels. When a chimney is on fire and a journeyman sweeper is employed to extinguish it, he receives from 1*s.* 6*d.* to 5*s.* according to the extent of time consumed and the risk of being injured. "Chance sweeping," or the sweeping of a chimney not belonging to a customer, when a journeyman has completed his regular round, ensures him 3*d.* in some employments, but in fewer than was once the case. The beer-money given by any customer to a journeyman is also his perquisite. Where a foreman is kept, the "brieze," or cinders collected from the grate, belong to him, and the ashes belong to the journeyman; but where there is no foreman, the brieze and ashes belong to the journeyman solely. These they sell to the poor at the rate of 6*d.* a bushel. I am told by experienced men that, all these matters considered, it may be stated that one-half of the journeymen in London have perquisites of 1*s.* 6*d.*, the other half of 2*s.* 6*d.* a week.

The Nominal Wages to the journeymen, then, are from 12*s.* to 18*s.* weekly, without board and lodging, or from 2*s.* to 6*s.* in money, with board and lodging, represented as equal to 7*s.*

The Actual Wages are 2*s.* 6*d.* a week more in the form of perquisites, and perhaps 4*d.* daily in beer or gin.

The wages to the boys are mostly 1*s.* a week, but many masters pay 1*s.* 6*d.* to 2*s.*, with board and lodging. These boys have no perquisites, except such bits of broken victuals as are given to them at houses where they go to sweep.

The wages of the foreman are generally 18*s.* per week, but some receive 14*s.* and some 20*s.* without board and lodging. In one case, where the foreman is kept by the master, only 2*s.* 6*d.* in money is given to him weekly. The perquisites of these men average from 4*s.* to 5*s.* a week.

The work in the chimney-sweeping trade is more regular than might at first be supposed. The sweepers whose circumstances enable them to employ journeymen send them on regular rounds, and do not engage "chance" hands. If business is brisk, the men and the master, when a working man himself, work later than ordinary, and sometimes another hand is put on and paid the customary amount, by the week, until the briskness ceases; but this is a rare occurrence. There are, however, strong lads, or journeymen out of work, who are *occasionally* employed in "*jobbing*," helping to carry the soot and such like.

The labour of the journeymen, as regards the payment by their masters, is *continuous*, but the men are often discharged for drunkenness, or for endeavouring to "form a connection of their own" among their employers' customers, and new hands are then put on. "Chimneys won't wait, you know, sir," was said to me, "and if I quit a hand this week, there 's another in his place next. If I discharge a hand for three months in a slack time, I have two on when it 's a busy time." Perhaps the average employment of the whole body of operatives may be taken at nine months' work in the year. When out of employment the chief resource of these men is in night-work; some turn street-sellers and bricklayers' labourers.

I am told that a considerable sum of money was left for the purpose of supplying every climbing-boy who called on the first of May at a certain place, with a shilling and some refreshment, but I have not been able to ascertain by whom it was left, or where it was distributed; none of the sweepers with whom I conversed knew anything about it. I also heard, that since the passing of the Act, the money has been invested in some securities or other, and is now accumulating, but to what purpose it is intended to be applied I have no means of learning.

Let us now endeavour to estimate the gross yearly income of the operative sweepers.

There are, then, 399 men employed as journeymen, and of them 147 receive a money wage weekly from their masters, and reside with their parents or at their own places. The remaining 252 are boarded and lodged. This board and lodging are generally computed, as under the old system, to represent 8*s.*, being 1*s.* a day for board and 1*s.* a week for lodging. But, on the average, the board does not cost the masters 7*s.* a week, but, as I shall afterwards show, barely 6*s.*

The men and boys may be said to be all fully employed for nine months in the year; some, of course, are at work all the year through, but others get only six months' employment in the twelve months; so that taking nine months as the average, we have the following table of

WAGES PAID TO THE OPERATIVE SWEEPERS OF LONDON.

						Money wages for nine months. £	s.	d.	Value of board and lodging for nine months estimated at 7*s.* a week. £	s.	d.
	Journeymen.										
	Without board and lodging.										
30	Journeymen	employed by	3	masters, at	18*s.*	per week	1053	0	0		
14	,,	,,	5	,,	16*s.*	,,	436	16	0		
6	,,	,,	3	,,	15*s.*	,,	175	10	0		
27	,,	,,	8	,,	14*s.*	,,	737	2	0		
63	,,	,,	23	,,	12*s.*	,,	1474	4	0		
7	,,	,,	3	,,	10*s.*	,,	136	10	0		
147			45				4013	2	0		
	With board and lodging.										
3	Journeymen	employed by	1	master, at	8*s.* 0*d.*	per week	46	16	0	40	19	0
17	,,	,,	5	,,	6*s.* 0*d.*	,,	198	18	0	232	1	0
1	,,	,,	1	,,	5*s.* 0*d.*	,,	9	15	0	13	13	0
41	,,	,,	14	,,	4*s.* 0*d.*	,,	319	16	0	559	13	0
3	,,	,,	1	,,	3*s.* 6*d.*	,,	20	9	6	40	19	0
80	,,	,,	39	,,	3*s.* 0*d.*	,,	468	0	0	1092	0	0
53	,,	,,	26	,,	2*s.* 6*d.*	,,	258	7	6	723	9	0
44	,,	,,	31	,,	2*s.* 0*d.*	,,	171	12	0	600	9	8
8	,,	,,	4	,,	1*s.* 6*d.*	,,	234	0	0	109	4	0
2	,,	,,	1	,,	1*s.* 0*d.*	,,	3	18	0	27	6	0
252			123				1731	12	0	3439	13	8
	Foremen.										
	Without board and lodging.										
2	Foremen	employed by	1	master, at	20*s.*	per week	78	0	0		
6	,,	,,	4	,,	18*s.*	,,	210	12	0		
1	,,	,,	1	,,	16*s.*	,,	31	4	0		
2	,,	,,	2	,,	14*s.*	,,	54	12	0		
11			8				374	8	0		
	With board and lodging.										
1	,,	,,	1	,,	2*s.* 6*d.*	,,	4	17	6	13	13	0
	Boys.										
	Without board and lodging.										
2	Boys	employed by	1	master, at	10*s.*	per week	39	0	0	Board and lodging estimated at 6*s.* a week.		
	With board and lodging.										
1	,,	,,	1	,,	3*s.* 0*d.*	,,	5	17	0	11	14	0
1	,,	,,	1	,,	2*s.* 6*d.*	,,	4	17	6	11	14	0
14	,,	,,	8	,,	2*s.* 0*d.*	,,	35	2	0	105	6	0
30	,,	,,	14	,,	1*s.* 6*d.*	,,	40	19	0	163	16	0
1	,,	,,	28	,,	1*s.* 0*d.*	,,	58	10	0	351	0	0
4	,,	,,	1	,,	0*s.* 9*d.*	,,	1	9	3	11	14	0
	,,	,,	2	,,	0*s.* 0*d.*	,,				46	16	0
62			54				146	14	9	702	0	0
	Total earnings						6309	14	3			
	Total for board, lodging, &c.						4155	6	8			
	Grand Total						10,465	0	11			

Thus we find that the *constant* or *average casual* wages of the several classes of operative chimney-sweepers may be taken as follows:—

	s.	d.
Journeymen without board and lodging, and with perquisites averaging 2*s.* a week	12	6
Journeymen with board and lodging and 2*s.* a week perquisites	9	10½
Foreman, without board and lodging, and 2*s.* 6*d.* a week perquisites	15	7
Boys, with board and lodging	5	3

The *general* wages of the trade, including foreman, journeymen, and boys, and calculating the perquisites to average 2*s.* weekly, will be 10*s.* 6*d.* a week, the same as the cotton factory operatives.

But if 10,500*l.* be the income of the operatives, what do the employers receive who have to pay this sum?

The charge for sweeping one of the lofty chimneys in the public and official edifices, and in the great houses in the aristocratic streets and squares, is 2*s.* 6*d.* and 3*s.* 6*d.*

The chimneys of moderate-sized houses are swept at 1*s.* to 1*s.* 6*d.* each, and those of the poorer classes are charged generally 6*d.*; some, however, are swept at 3*d.* and 4*d.*; and when soot realized a higher price (some of the present master sweepers *have* sold it at 1*s.* a bushel), the chimneys of poor persons were swept by the poorer class of sweeps merely for the perquisite of the soot. This is sometimes done even now, but to a very small extent, by a sweeper, "on his own hook," and in want of a job, but generally with an injunction to the person whose chimney has been cleansed on such easy terms, not to mention it, as it "couldn't be made a practice on."

Estimating the number of houses belonging to the wealthy classes of society to be 54,000, and these to be swept eight times a year, and the charge for sweeping to be 2*s.* 6*d.* each time; and the number of houses belonging to the middle classes to be 90,000, and each to be swept four times a year, at 1*s.* 6*d.* each time; and the dwellings of the poor and labouring classes to be swept once a year at 6*d.* each time, and the number of such dwellings to be 165,000, we find that the total sum paid to the master chimney-sweepers of London is, in round numbers, 85,000*l.*

The sum obtained for 800,000 bushels of soot collected by the master-sweepers from the houses of London, at 5*d.* per bushel, is 16,500*l.*

Thus the total annual income of the master sweepers of London is 100,000*l.*

Out of this 100,000*l.* per annum, the expenses of the masters would appear to be as follows:—

Yearly Expenditure of the Master Sweepers.

Sum paid in wages to 473 journeymen	£10,500
Rent, &c., of 350 houses or lodgings, at 12*l.* yearly each	4,200
Wear and tear of 1000 machines, 1*l.* each yearly	1,000
Ditto 2000 sacks, at 1*s.* each yearly	100
Keep of 25 horses, 7*s.* weekly each	£455
Wear and tear of 25 carts and harness, 1*l.* each	25
Interest on capital at 10 per cent.	450
Total yearly expenditure of master sweepers employing journeymen	£16,736

The rent here given may seem low at 12*l.* a year, but many of the chimney-sweepers live in parlours, with cellars below, in old out-of-the-way places, at a low rental, in Stepney, Shadwell, Wapping, Bethnal-green, Hoxton, Lock's-fields, Walworth, Newington, Islington, Somers-town, Paddington, &c. The better sort of master sweepers at the West-end often live in a mews.

The gains, then, of the master sweepers are as under:—

Annual income for cleansing chimneys and soot	£100,000
Expenditure for wages, rent, wear, and tear, keep of horses, &c., say	20,000
Annual profit of master chimney-sweepers of London	£80,000

This amount of profit, divided among 350 masters, gives about 230*l.* per annum to each individual; it is only by a few, however, that such a sum is realized, as in the 100,000*l.* paid by the London public to the sweepers' trade, is included the sum received by the men who work single-handed, "on their own hook," as they say, employing no journeymen. Of these men's earnings, the accounts I heard from themselves and the other master sweepers were all accordant, that they barely made journeymen's wages. They have the very worst-paid portion of the trade, receiving neither for their sweeping nor their soot the prices obtained by the better masters; indeed they very frequently sell their soot to their more prosperous brethren. Their general statement is, that they make "eighteen pence a day, and all told." Their receipts then, and they have no perquisites as have the journeymen, are, in a slack time, about 1*s.* a day (and some days they do not get a job); but in the winter they are busier, as it is then that sweepers are employed by the poor; and at that period the "master-men" may make from 15*s.* to 20*s.* a week each; so that, I am assured, the average of their weekly takings may be estimated at 12*s.* 6*d.*

Now, deducting the expenditure from the receipts of 100,000*l.* (for sweeping and soot), the balance, as we have seen, is 80,000*l.*, an amount of profit which, if equally divided among the three classes of the trade, will give the following sums:—

	Yearly, each. £	s.	Yearly, total. £
Profits of 150 single-handed master-men	32	10	4,940
Do. 92 small masters	200	0	18,400
Do. 106 large masters	500	0	53,000
			£76,340

Nor is this estimate of the masters' profits, I am assured, extravagant. One of the smaller sweepers, but a prosperous man in his way, told me that he knew a master sweeper who was "as rich as Crœser, had bought houses, and could not write his own name."

We have now but to estimate the amount of capital invested in the chimney-sweepers' trade, and then to proceed to the characteristics of the men.

	£
1200 machines, 2*l.* 10*s.* each (present average value)	3000
3000 sacks, 2*s.* 6*d.* each	385
25 horses, 20*l.* each	500
25 sets of harness, 2*l.* each	50
25 carts, 12*l.* each	300
	£4235

It may be thought that the sweepers will require the services of more than 25 horses, but I am assured that such is not the case as regards the soot business, for the soot is carted away from the sweepers' premises by the farmer or other purchaser.

It would appear, then, that the facts of the chimney-sweepers' trade are briefly as under:—

The gross quantity of soot collected yearly throughout London is 800,000 bushels. The value of this, sold as manure, at 5*d.* per bushel, is 16,500*l.*

There are 800 to 900 people employed in the trade, 200 of whom are masters employing journeymen, 150 single-handed master-men, and 470 journeymen and under journeymen.

The annual income of the entire number of journeymen is 10,500*l.* without perquisites, or 13,000*l.* with, which gives an average weekly wage to the operatives of 10*s.* 6*d.*

The annual income of the masters and leeks is, for sweeping and soot, 100,000*l.*

The annual expenditure of the masters for rent, keep of horses, wear and tear, and wages, is 20,000*l.*

The gross annual profit of the 350 masters is 80,000*l.*, which is at the rate of about 35*l.* per annum to each of the single-handed men, 200*l.* to each of the smaller masters employing journeymen, and 500*l.* to each of the larger masters.

The capital of the trade is about 5000*l.*

The price charged by the "high master sweepers" for cleaning the flues of a house rented at 150*l.* a year and upwards, is from 1*s.* to 3*s.* 6*d.* (the higher price being paid for sweeping those chimneys which have a hot plate affixed). A small master, on the other hand, will charge from 1*s.* to 3*s.* for the same kind of work, while a single-handed man seldom gets above "a 2*s.* job," and that not very often. The charge for sweeping the flues of a house rented at from 50*l.* to 150*l.* a year, is from 9*d.* to 2*s.* 6*d.* by a large master, and from 8*d.* to 2*s.* by a small master, while a single-handed man will take the job at from 6*d.* to 1*s.* 6*d.* The price charged per flue for a house rented at from 20*l.* a year up to 50*l.* a year, will average 6*l.* a flue, charged by large masters, 4*d.* by small masters, and from 2*d.* to 3*d.* by the single-handed sweepers in some cases; indeed, the poorest class will sweep a flue for the soot only. But the prices charged for sweeping chimneys differ in the different parts of the metropolis. I subjoin a list of the maximum and minimum charge for the several districts.

	d.		s.	d.
Kensington and Hammersmith	4	to	3	0
Westminster	3	,,	2	0
Chelsea	4	,,	2	6
St. George's, Hanover-sq.	6	,,	3	6
St. Martin's and St. Ann's	4	,,	2	6
St. James's, Westminster	3	,,	2	6
Marylebone	4	,,	2	6
Paddington	3	,,	2	0
Hampstead	3	,,	1	6
St. Pancras	4	,,	3	0
Islington	3	,,	1	6
Hackney and Homerton	3	,,	2	0
St. Giles's and St. George's, Bloomsbury	3	,,	3	0
Strand	4	,,	2	6
Holborn	4	,,	2	6
Clerkenwell	3	,,	1	6
St. Luke's	3	,,	1	0
East London	3	,,	1	6
West London	4	,,	2	6
London City	6	to	2	6
Shoreditch	3	,,	1	0
Bethnal Green	3	,,	1	0
Whitechapel	4	,,	1	6
St. George's in the East and Limehouse	3	,,	1	0
Stepney	3	,,	1	6
Poplar	4	,,	2	0
St. George's, St. Olave's, and St. Saviour's, Southwark	3	,,	1	6
Bermondsey	3	,,	0	9
Walworth and Newington	4	,,	1	6
Wandsworth	4	,,	1	6
Lambeth	3	,,	1	0
Camberwell	4	,,	2	0
Clapham, Brixton, and Tooting	4	,,	2	6
Rotherhithe	3	,,	1	6
Greenwich	3	,,	1	6
Woolwich	3	,,	2	6
Lewisham	6	,,	3	0

N.B.—The single-handed and the knullers generally charge a penny less than the prices above given.

There are three different kinds of soot:—the best is produced purely from coal; the next in value is that which proceeds from the combustion of vegetable refuse along with the coal, as in cases where potato peelings, cabbage leaves, and the like, are burnt in the fires of the poorer classes; while the soot produced from wood fires is, I am told, scarcely worth carriage. Wood-soot, however, is generally mixed with that from coal, and sold as the superior kind.

Not only is there a difference in value in the various kinds of soot, but there is also a vast difference in the weight. A bushel of pure coal soot will not weigh above four pounds; that produced from the combustion of coal and vegetable refuse will weigh nearly thrice as much; while that from wood fires is, I am assured, nearly ten times heavier than from coal.

I have not heard that the introduction of free trade has had any influence on the value of soot, or in reducing the wages of the operatives. The same wages are paid to the operatives whether soot sells at a high or low price.

Of the General Characteristics of the Working Chimney-Sweepers.

There are many reasons why the chimney-sweepers have ever been a distinct and peculiar class. They have long been looked down upon as the lowest order of workers, and treated with contumely by those who were but little better than themselves. The peculiar nature of their work giving them not only a filthy appearance, but an offensive smell, of itself, in a manner, prohibited them from associating with other working men; and the natural effect of such proscrip-

A TABLE SHOWING THE NUMBER OF MASTER CHIMNEY SWEEPERS RESIDING IN THE SEVERAL DISTRICTS OF THE METROPOLIS, THE NUMBER OF FOREMEN, OF JOURNEYMEN, AND UNDER JOURNEYMEN EMPLOYED IN EACH DISTRICT DURING THE YEAR, AS WELL AS THE WEEKLY WAGES OF EACH CLASS.

Districts.	No. of Master Sweepers in each District.	No. of Foremen employed.	No. of Journeymen employed in the brisk season.	No. of Journeymen employed in the slack season.	No. of Under Journeymen, or Boys, employed.	No. of Bushels of Soot collected Weekly.	Weekly Wages of each Foreman.	Weekly Wages of each Journeyman.	Weekly Wages of each Under Journeyman.
West Districts.									
Kensington and Hammersmith.	11	2	25	16	2	695	18*s.*	7 at 16*s.* 6 „ 15*s.* 10 „ 14*s.* 1 „ 12*s.*	10*s.*
Westminster	13	1	26	18	1	735	14*s.*	5 at 18*s.* 10 „ 12*s.* 3 „ 4*s.* 4 „ 3*s.* 4 „ 2*s.* } *b*	3*s. b*
Chelsea	22	...	13	11	2	670	...	1 „ 16*s.* 3 „ 12*s.* 4 „ 10*s.* 3 „ 3*s.* 1 „ 2*s.* 6*d* 1 „ 2*s.* } *b*	1 at 2*s. b* 1 *e*
St. George's, Hanover-sq.	10	5	27	25	...	890	4 at 18*s.* 1 „ 16*s.*	5 at 18*s.* 3 „ 16*s.* 2 „ 15*s.* 9 „ 14*s.* 7 „ 12*s.* 1 „ 6*s. b*	.....
St. Martin's and St. Ann's	9	...	16	15	1	415	...	7 at 6*s.* 6 „ 4*s.* 2 „ 3*s.* } *b*	2*s. b*
St. James's, Westminster	7	1	9	6	...	355	14*s.*	5 at 12*s.* 1 „ 10*s.* 1 at 3*s.* 6*d. b*	.....
North Districts.									
Marylebone	18	...	21	16	...	775	...	18*s.*	.....
Paddington	10	1	17	10	3	495	18*s.*	1 at 14*s.* 1 „ 10*s.* 2 „ 4*s.* 8 „ 3*s.* 6*d* 1 „ 2*s.* 6*d* 2 „ 1*s.* } *b*	2 at 2*s.* 1 „ 1*s.* 6*d* } *b*
Hampstead	2	...	2	2	2	60	...	1 at 3*s.* 1 „ 2*s.* } *b*	1 at 1*s.* 6*d* 1 „ 1*s.* } *b*
Islington	9	...	13	12	3	425	...	3 at 4*s.* 2 „ 3*s.* } *b*	1*s.* 6*d. b*
St. Pancras	18	...	33	21	6	920	...	2 at 14*s.* 6 „ 12*s.* 4 „ 10*s.* 6 „ 4*s.* 3 „ 3*s* 6*d* 11 „ 3*s.* 3 „ 2*s* 6*d* 1 „ 2*s.* } *b*	3 at 2*s.* 2 „ 1*s.* 6*d* 1 „ 1*s.* } *b*
Hackney and Homerton	13	...	3	3	4	290	...	2*s. b*	1*s.* 6*d. b*

Districts.	No. of Master Sweepers in each District.	No. of Foremen employed.	No. of Journeymen employed in the brisk season.	No. of Journeymen employed in the slack season.	No. of Under Journeymen, or Boys, employed.	No. of Bushels of Soot collected Weekly.	Weekly Wages of each Foreman.	Weekly Wages of each Journeyman.	Weekly Wages of each Under Journeyman.
Central Districts.									
St. Giles's and St. George's, Bloomsbury.	12	...	9	7	5	435	...	8 at 12*s.* 1 „ 3*s. b*	1*s. b*
Strand	5	...	11	8	2	350	...	4*s. b*	1 at 2*s.* 1 „ 1*s.* } *b*
Holborn	6	2	11	10	...	435	20*s.*	2 at 18*s.* 3 „ 8*s.* 4 „ 4*s.* 2 „ 3*s.* } *b*	.....
Clerkenwell	6	...	9	9	1	310	...	8 at 3*s.* 1 „ 2*s* 6*d.* } *b*	1*s. b*
St. Luke's	6	...	4	3	2	175	...	2*s. b*	1*s. b*
East London	8	...	10	8	...	455	...	3*s. b*	.....
West London	5	...	9	6	...	205	...	3 at 4*s.* 6 „ 3*s.* } *b*	.....
London City	6	...	12	10	2	415	...	6 at 6*s.* 6 „ 4*s.* } *b*	2*s. b*
East Districts.									
Shoreditch	13	...	6	5	1	380	...	2*s. b*	1*s. b*
Bethnal Green	6	...	2	2	...	150	...	1 at 5*s.* 1 „ 2*s. b*	.....
Whitechapel	11	...	1	1	3	330	...	2*s. b*	3*s. e*
St. George's-in-the-East and Limehouse.	14	...	14	10	3	650	...	3 at 3*s.* 4 „ 2*s.* 6*d* 7 „ 2*s.* } *b*	1 at 1*s.* 6*d* 2 „ 1*s.* } *b*
Stepney	9	...	3	2	...	275	..	3*s. b*	.....
Poplar	4	...	1	...	1	110	...	2*s. b*	1*s.* 6*d. b*
South Districts.									
Southwark	17	...	...	...	...	385	...	.....	.....
Bermondsey	8	...	4	4	1	220	...	2*s. b*	1*s. b*
Walworth and Newington	9	...	6	4	4	330	...	2*s. b*	1*s. b*
Wandsworth	6	...	6	5	1	240	...	3 at 3*s.* 3 „ 2*s.* 6*d* } *b*	1*s. b*
Lambeth	16	...	9	9	5	560	...	3 at 3*s.* 6 „ 2*s.* 6*d* } *b*	1 at 1*s.* 6*d* 4 „ 1*s.* } *b*
Camberwell	8	...	8	7	1	315	...	2*s.* 6*d. b*	1*s. b*
Clapton, Brixton, and Tooting	11	...	13	7	1	410	...	2*s.* 6*d. b*	1*s. b*
Rotherhithe	7	...	2	2	...	170	...	2*s. b*	.....
Greenwich	6	...	4	4	1	195	...	1*s.* 6*d. b*	1*s. b*
Woolwich	7	...	17	12	3	515	...	13 at 2*s.* 6*d.* 4 „ 1*s.* 6*d.*	2 at 1*s.* 1 „ 9*d.* } *b*
Lewisham	2	...	5	5	1	160	...	2*s. b*	1*s. b*
Remoneur Company	...	...	18	18	...	450	...	18*s.*	.....
Total	350	12	399	313	62	15350			

Note.—*b* means board and lodging as well as money, or part money and part kind; *e* stands for everything found or all in kind.

These returns have been collected by personal visits to each district:—the name of each master throughout London, together with the number of Foremen, Journeymen, and Under Journeymen employed, and the Wages received by them, as well as the quantity of soot collected, have been likewise obtained; but the names of the masters are here omitted for want of space, and the results alone are given.

tion has been to compel them to herd together apart from others, and to acquire habits and peculiarities of their own widely differing from the characteristics of the rest of the labouring classes.

Sweepers, however, have not from this cause generally been an hereditary race—that is, they have not become sweepers from father to son for many generations. Their numbers were, in the days of the climbing boys, in most intances increased by parish apprentices, the parishes usually adopting that mode as the cheapest and easiest of freeing themselves from a part of the burden of juvenile pauperism. The climbing boys, but more especially the unfortunate parish apprentices, were almost always cruelly used, starved, beaten, and over-worked by their masters, and treated as outcasts by all with whom they came in contact: there can be no wonder, then, that, driven in this manner from all other society, they gladly availed themselves of the companionship of their fellow-sufferers; quickly imbibed all their habits and peculiarities; and, perhaps, ended by becoming themselves the most tyrannical masters to those who might happen to be placed under their charge.

Notwithstanding the disrepute in which sweepers have ever been held, there are many classes of workers beneath them in intelligence. All the tribe of finders and collectors (with the exception of the dredgermen, who are an observant race, and the sewer-hunters, who, from the danger of their employment, are compelled to exercise their intellects) are far inferior to them in this respect; and they are clever fellows compared to many of the dustmen and scavagers. The great mass of the agricultural labourers are known to be almost as ignorant as the beasts they drive; but the sweepers, from whatever cause it may arise, are known, in many instances, to be shrewd, intelligent, and active.

But there is much room for improvement among the operative chimney-sweepers. Speaking of the men generally, I am assured that there is scarcely one out of ten who can either read or write. One man in Chelsea informed me that some ladies, in connection with the Rev. Mr. Cadman's church, made an attempt to instruct the sweepers of the neighbourhood in reading and writing; but the master sweepers grew jealous, and became afraid lest their men should get too knowing for them. When the time came, therefore, for the men to prepare for the school, the masters always managed to find out some job which prevented them from attending at the appointed time, and the consequence was that the benevolent designs of the ladies were frustrated.

The sweepers, as a class, in almost all their habits, bear a strong resemblance to the costermongers. The habit of going about in search of their employment has, of itself, implanted in many of them the wandering propensity peculiar to street people. Many of the better-class costermongers have risen into coal-shed men and greengrocers, and become settled in life; in like manner the better-class sweepers have risen to be masters and, becoming settled in a locality, have gradually obtained the trade of the neighbourhood; then, as their circumstances improved, they have been able to get horses and carts, and become nightmen; and there are many of them at this moment men of wealth, comparatively speaking. The great body of them, however, retain in all their force their original characteristics; the masters themselves, although shrewd and sensible men, often betray their want of education, and are in no way particular as to their expressions, their language being made up, in a great measure, of the terms peculiar to the costermongers, especially the denominations of the various sorts of money. I met with some sweepers, however, whose language was that in ordinary use, and their manners not vulgar. I might specify one, who, although a workhouse orphan and apprentice, a harshly-treated climbing-boy, is now prospering as a sweeper and nightman, is a regular attendant at all meetings to promote the good of the poor, and a zealous ragged-school teacher, and teetotaller.

When such men are met with, perhaps the class cannot be looked upon as utterly cast away, although the need of reformation in the habits of the working sweepers is extreme, and especially in respect of drinking, gambling, and dirt. The journeymen (who have often a good deal of leisure) and the single-handed men are—in the great majority of cases at least—addicted to drinking, beer being their favourite beverage, either because it is the cheapest or that they fancy it the most suitable for washing away the sooty particles which find their way to their throats. These men gamble also, but with this proviso—they seldom play for money; but when they meet in their usual houses of resort—two famous ones are in Back C—— lane and S—— street, Whitechapel—they spend their time and what money they may have in tossing for beer, till they are either drunk or penniless. Such men present the appearance of having just come out of a chimney. There seems never to have been any attempt made by them to wash the soot off their faces. I am informed that there is scarcely one of them who has a second shirt or any change of clothes, and that they wear their garments night and day till they literally rot, and drop in fragments from their backs. Those who are not employed as journeymen by the masters are frequently whole days without food, especially in summer, when the work is slack; and it usually happens that those who are what is called "knocking about on their own account" seldom or never have a farthing in their pockets in the morning, and may, perhaps, have to travel till evening before they get a threepenny or sixpenny chimney to sweep. When night comes, and they meet their companions, the tossing and drinking again commences; they again get drunk; roll home to wherever it may be, to go through the same routine on the morrow; and this is the usual tenour of their lives, whether earning 5*s.* or 20*s.* a week.

The chimney-sweepers generally are fond of drink; indeed their calling, like that of dustmen, is one of those which naturally lead to it. The men declare they are ordered to drink gin and smoke as much as they can, in order to rid the stomach of the soot they may have swallowed during their work.

Washing among chimney-sweepers seems to be much more frequent than it was. In the evidence before Parliament it was stated that some of the climbing-boys were washed once in six months, some once a week, some once in two or three months. I do not find it anywhere stated that any of these children were never washed at all; but from the tenour of the evidence it may be reasonably concluded that such was the case.

A master sweeper, who was in the habit of bathing at the Marylebone baths once and sometimes twice a week, assured me that, although many now eat and drink and sleep sooty, washing is more common among his class than when he himself was a climbing-boy. He used then to be stripped, and compelled to step into a tub, and into water sometimes too hot and sometimes too cold, while his mistress, to use his own word, *scoured* him. Judging from what he had seen and heard, my informant was satisfied that, from 30 to 40 years ago, climbing-boys, with a very few exceptions, were but seldom washed; and then it was looked upon by them as a most disagreeable operation, often, indeed, as a species of punishment. Some of the climbing-boys used to be taken by their masters to bathe in the Serpentine many years ago; but one boy was unfortunately drowned, so that the children could hardly be coerced to go into the water afterwards.

The washing among the chimney-sweepers of the present day, when there are scarcely any climbing-boys, is so much an individual matter that it is not possible to speak with any great degree of certainty on the subject, but that it increases may be concluded from the fact that the number of sweeps who resort to the public baths increases.

The first public baths and washhouses opened in London were in the "north-west district," and situated in George-street, Euston-square, near the Hampstead-road. This establishment was founded by voluntary contribution in 1846, and is now self-supporting.

There are three more public baths: one in Goulston-street, Whitechapel (on the same principle as that first established); another in St. Martin's, near the National Gallery, which are parochial; and the last in Marylebone, near the Yorkshire Stingo tavern, New-road, also parochial. The charge for a cold bath, each being secluded from the others, is 1*d.*, with the use of a towel; a warm bath is 2*d.* in the third class. The following is the return of the number of bathers at the north-west district baths, the establishment most frequented:—

	1847.	1848.	1849.	1850.
Bathers	110,940	111,788	96,726	86,597
Washers, Dryers, Ironers, &c.	39,418	61,690	65,934	73,023
Individuals Washed for	137,672	246,760	263,736	292,092

I endeavoured to ascertain the proportion of sweepers, with other working men, who availed themselves of these baths; but there are unfortunately no data for instituting a comparison as to the relative cleanliness of the several trades. When the baths were first opened an endeavour was made to obtain such a return; but it was found to be distasteful to the bathers, and so was discontinued. We find, then, that in four years there have been 406,051 bathers. The following gives the proportion between the sexes, a portion of 1846 being included:—

Bathers—Males . . .	417,424.
,, Females . . .	47,114
Total bathers . . .	464,538

The falling off in the number of bathers at this establishment is, I am told, attributable to the opening of new baths, the people, of course, resorting to the nearest.

I have given the return of washers, &c., as I endeavoured to ascertain the proportion of washing by the chimney-sweeper's wives; but there is no specification of the trades of the persons using this branch of the establishment any more than there is of those frequenting the baths, and for the same reason as prevented its being done among the bathers. One of the attendants at these washhouses told me that he had no doubt the sweepers' wives did wash there, for he had more than once seen a sweeper waiting to carry home the clothes his wife had cleansed. As no questions concerning their situation in life are asked of the poor women who resort to these very excellent institutions (for such they appear to be on a cursory glance) of course no data can be supplied. This is to be somewhat regretted; but a regard to the feelings, and in some respects to the small prejudices, of the industrious poor is to be commended rather than otherwise, and the managers of these baths certainly seem to have manifested such a regard.

I am informed, however, by the secretary of the north-west district institution, that in some weeks of the summer 80 chimney-sweepers bathed there; always having, he believed, warm baths, which are more effective in removing soot or dirt from the skin than cold. Summer, it must be remembered, is the sweep's "brisk" season. In a winter week as few as 25 or 20 have bathed, but the weekly average of sweeper-bathers, the year through, is about 50; and the number of sweeper-bathers, he thought, had increased since the opening of the baths about 10 per cent. yearly. As in 1850 the average number of bathers of all classes did not exceed 1646 per week, the proportion of sweepers, 50, is high. The number of female bathers is about one-ninth, so that the males would be about 1480; and the 50 sweepers a week constitute about a thirtieth part of the whole of the third-class bathers. The number of sweep-bathers was known because a sweep is known by his appearance.

I was told by the secretary that the sweepers, the majority bathing on Saturday nights, usually

carried a bundle to the bath; this contained their "clean things." After bathing they assumed their "Sunday clothes;" and from the change in their appearance between ingress and egress, they were hardly recognisable as the same individuals.

In the other baths, where also there is no specification of the bathers, I am told, that of sweepers bathing the number (on computation) is 30 at Marylebone, 25 at Goulston-street, and 15 (at the least) at St. Martin's, as a weekly average. In all, 120 sweepers bathe weekly, or about a seventh of the entire working body. The increase at the three baths last mentioned, in sweepers bathing, is from 5 to 10 per cent.

Among the lower-class sweepers there are but few who wash themselves even once throughout the year. They eat, drink, and sleep in the same state of filth and dirt as when engaged in their daily avocation. Others, however, among the better class are more cleanly in their habits, and wash themselves every night.

Between *the appearance of the sweepers* in the streets at the present time and before the abolition of the system of climbing there is a marked difference. Charles Lamb said (in 1823):—

"I like to meet a sweep—understand me, not a grown sweeper—old chimney-sweepers are by no means attractive—but one of those tender novices blooming through their first nigritude, the maternal washings not quite effaced from the cheek—such as come forth with the dawn, or somewhat earlier, with their little professional notes sounding like the *peep peep* of a young sparrow; or liker to the matin lark should I pronounce them, in their aerial ascents not seldom anticipating the sunrise?"

Throughout his essay, Elia throws the halo of poetry over the child-sweepers, calling them "dim specks," "poor blots," "innocent blacknesses," "young Africans of our own growth;" the natural kindliness of the writer shines out through all. He counsels his reader to give the young innocent 2*d.*, or, if the weather were starving, "let the demand on thy humanity rise to a tester" (6*d.*).

The appearance of the little children-sweepers, as they trotted along at the master's or the journeyman's heels, or waited at "rich men's doors" on a cold morning, was pitiable in the extreme. If it snowed, there was a strange contrast between the black sootiness of the sweeper's dress and the white flakes of snow which adhered to it. The boy-sweeper trotted listlessly along; a sack to contain the soot thrown over his shoulder, or disposed round his neck, like a cape or shawl. One master sweeper tells me that in his apprenticeship days he had to wait at the great mansions in and about Grosvenor-square, on some bitter wintry mornings, until he felt as if his feet, although he had both stockings and shoes—and many young climbers were barefoot—felt as if frozen to the pavement. When the door was opened, he told me, the matter was not really mended. The rooms were often large and cold, and being lighted only with a candle or two, no doubt looked very dreary, while there was not a fire in the whole house, and no one up but a yawning servant or two, often very cross at having been disturbed. The servants, however, in noblemen's houses, he also told me, were frequently kind to him, giving him bread and butter, and sometimes bread and jam; and as his master generally had a glass of raw spirit handed to him, the boy usually had a sip when his employer had "knocked off his glass." His employer, indeed, sometimes said, "O, *he's* better without it; it'll only larn him to drink, like it did me;" but the servant usually answered, "O, here, just a thimblefull for him."

The usual dress of the climbing-boy—as I have learned from those who had worn it themselves, and, when masters, had provided it for their boys—was made of a sort of strong flannel, which many years ago was called chimney-sweepers' cloth; but my informant was not certain whether this was a common name for it or not, he only remembered having heard it called so. He remembered, also, accompanying his master to do something to the flues in a church, then (1817) hung with black cloth, as a part of the national mourning for the Princess Charlotte of Wales, and he thought it seemed very like the chimney-sweepers' cloth, which was dark coloured when new. The child-sweep wore a pair of cloth trowsers, and over that a sort of tunic, or tight fitting shirt with sleeves; sometimes a little waistcoat and jacket. This, it must be borne in mind, was only the practice among the best masters (who always had to find their apprentices in clothes); and was the practice among them more and more in the later period of the climbing process, for householders began to inquire as to what sort of trim the boys employed on their premises appeared in. The poorer or the less well-disposed masters clad the urchins who climbed for them in any old rags which their wives could piece together, or in any low-priced garment "picked up" in such places as Rosemary-lane. The fit was no object at all. These ill-clad lads were, moreover, at one time the great majority. The clothes were usually made "at home" by the women, and in the same style, as regarded the seams, &c., as the sacks for soot; but sometimes the work was beyond the art of the sweeper's wife, and then the aid of some poor neighbour better skilled in the use of her scissors and needle, or of some poor tailor, was called in, on the well-known terms of "a shilling (or 1*s.* 6*d.*) a day, and the grub."

The cost of a climbing-boy's dress, I was informed, varied, when new, according to the material of which it was made, from 3*s.* 6*d.* to 6*s.* 6*d.* independently of the cost of making, which, in the hands of a tailor who "whipped the cat" (or went out to work at his customer's houses), would occupy a day, at easy labour, at a cost of 1*s.* 6*d.* (or less) in money, and the "whip-cat's" meals, perhaps another 1*s.* 6*d.*, beer included. As to the cost of a sweeper's second-hand clothing it is useless to inquire; but I was informed by a now

thriving master, that when he was about twelve years old his mistress bought him a "werry tidy jacket, as seemed made for a gen'leman's son," in Petticoat-lane, one Sunday morning, for 1*s.* 6*d.*; while other things, he said, were "in proportionate." Shoes and stockings are not included in the cost of the little sweeper's apparel; and they were, perhaps, always bought second-hand. A few of the best masters (or of those wishing to stand best in their customers' regards), who sent their boys to church or to Sunday schools, had then a non-working attire for them; either a sweeper's dress of jacket and trowsers, unsoiled by soot, or the ordinary dress of a poor lad.

The street appearance of the present race of sweepers, all adults, may every here and there bear out Charles Lamb's dictum, that grown sweepers are by no means attractive. Some of them are broad-shouldered and strongly-built men, who, as they traverse the streets, sometimes look as grim as they are dingy. The chimney-scavager carries the implement of his calling propped on his shoulder, in the way shown in the daguerreotype which I have given. His dress is usually a jacket, waistcoat, and trowsers of dark-coloured corduroy; or instead of a jacket a waistcoat with sleeves. Over this when at work the sweeper often wears a sort of blouse or short smock-frock of coarse strong calico or canvas, which protects the corduroy suit from the soot. In this description of the sweeper's garb I can but speak of those whose means enable them to attain the comfort of warm apparel in the winter; the poorer part of the trade often shiver shirtless under a blouse which half covers a pair of threadbare trowsers. The cost of the corduroy suit I have mentioned varies, I was told by a sweeper, who put it tersely enough, "from 20*s.* *slop*, to 40*s.* *slap*." The average runs, I believe, from 28*s.* to 33*s.*, as regards the better class of the sweepers.

The *diet of the journeymen sweepers and the apprentices*, and sometimes of their working employer, was described to me as generally after the following fashion. My informant, a journeyman, calculated what his food "stood his master," as he had once "kept hisself."

	Daily. *s.*	*d.*
Bread and butter and coffee for breakfast	0	2
A saveloy and potatoes, or cabbage; or a "fagot," with the same vegetables; or fried fish (but not often); or pudding, from a pudding-shop; or soup (a twopenny plate) from a cheap eating-house; average from 2*d.* to 3*d.*	0	2½
Tea, same as breakfast	0	2
	0	6½

On Sundays the fare was better. They then sometimes had a bit of "prime fat mutton" taken to the oven, with "taturs to bake along with it;" or a "fry of liver, if the old 'oman was in a good humour," and always a pint of beer apiece. Hence, as some give their men beer, the average amount of 5*s.* or 6*s.* weekly, which I have given as the cost of the "board" to the masters, is made up. The drunken single-handed mastermen, I am told, live on beer and "a bite of anything they can get." I believe there are few complaints of inefficient food.

The food provided by the large or high master sweepers is generally of the same kind as the master and his family partake of; among this class the journeymen are tolerably well provided for.

In the lower-class sweepers, however, the food is not so plentiful nor so good in kind as that provided by the high master sweepers. The expense of keeping a man employed by a large master sometimes ranges as high as 8*s.* a week, but the average, I am told, is about 6*s.* per week; while those employed by the low-class sweepers average about 5*s.* a week. The cost of their lodging may be taken at from 1*s.* to 2*s.* a week extra.

The sweepers in general are, I am assured, fond of oleaginous food; fat broth, fagots, and what is often called "greasy" meat.

They are considered *a short-lived people*, and among the journeymen, the masters "on their own hook," &c., few old men are to be met with. In one of the reports of the Board of Health, out of 4312 deaths among males, of the age of 15 and upwards, the mortality among the sweepers, masters and men, was 9, or one in 109 of the whole trade. As the calculation was formed, however, from data supplied by the census of 1841, and on the Post Office Directory, it supplies no reliable information, as I shall show when I come to treat of the nightmen. Many of these men still suffer, I am told, from the chimney-sweeper's cancer, which is said to arise mainly from uncleanly habits. Some sweepers assure me that they have vomited balls of soot.

As to the abodes of the master sweepers, I can supply the following account of two. The soot, I should observe, is seldom kept long, rarely a month, on the premises of a sweeper, and is in the best "concerns" kept in cellars.

The localities in which many of the sweepers reside are the "lowest" places in the district. Many of the houses in which I found the lower class of sweepers were in a ruinous and filthy condition. The "high-class" sweepers, on the other hand, live in respectable localities, often having back premises sufficiently large to stow away their soot.

I had occasion to visit the house of one of the persons from whom I obtained much information. He is a master in a small way, a sensible man, and was one of the few who are teetotallers. His habitation, though small—being a low house only one story high—was substantially furnished with massive mahogany chairs, table, chests of drawers, &c., while on each side of the fire-place, which was distinctly visible from the street over a hall door, were two buffets, with glass doors, well filled with glass and china vessels. It was a wet night, and a fire burned brightly in the stove, by the light of which might be seen the master of the establishment sitting on one side, while his

wife and daughter occupied the other; a neighbour sat before the fire with his back to the door, and altogether it struck me as a comfortable-looking evening party. They were resting and chatting quietly together after the labour of the day, and everything betokened the comfortable circumstances in which the man, by sobriety and industry, had been able to place himself. Yet this man had been a climbing-boy, and one of the unfortunates who had lost his parents when a child, and was apprenticed by the parish to this business. From him I learned that his was not a solitary instance of teetotalism (I have before spoken of another); that, in fact, there were some more, and one in particular, named Brown, who was a good speaker, and devoted himself during his leisure hours at night in advocating the principles which by experience he had found to effect such great good to himself; but he also informed me that the majority of the others were a drunken and dissipated crew, sunk to the lowest degree of misery, yet recklessly spending every farthing they could earn in the public-house.

Different in every respect was another house which I visited in the course of my inquiries, in the neighbourhood of H—street, Bethnal-green. The house was rented by a sweeper, a master on his own account, and every room in the place was let to sweepers and their wives or women, which, with these men, often signify one and the same thing. The inside of the house looked as dark as a coal-pit; there was an insufferable smell of soot, always offensive to those unaccustomed to it; and every person and every thing which met the eye, even to the caps and gowns of the women, seemed as if they had just been steeped in Indian ink. In one room was a sweep and his woman quarrelling. As I opened the door I caught the words, "I'm d——d if I has it any longer. I'd see you b——y well d——d first, and you knows it." The savage was intoxicated, for his red eyes flashed through his sooty mask with drunken excitement, and his matted hair, which looked as if it had never known a comb, stood out from his head like the whalebone ribs of his own machine. "B——y Bet," as he called her, did not seem a whit more sober than her man; and the shrill treble of her voice was distinctly audible till I turned the corner of the street, whither I was accompanied by the master of the house, to whom I had been recommended by one of the fraternity as an intelligent man, and one who knew "a thing or two." "You see," he said, as we turned the corner, "there isn't no use a talkin' to them ere fellows—they're all tosticated now, and they doesn't care nothink for nobody; but they'll be quiet enough to-morrow, 'cept they yarns somethink, and if they do then they'll be just as bad to-morrow night. They're a awful lot, and nobody ill niver do anythink with them." This man was not by any means in such easy circumstances as the master first mentioned. He was merely a man working for himself, and unable to employ any one else in the business; as is customary with some of these people, he had taken the house he had shown me to let to lodgers of his own class, making something by so doing; though, if his own account be correct, I'm at a loss to imagine how he contrived even to get his rent. From him I obtained the following statement:—

"Yes, I was a climbing-boy, and sarved a rigler printiceship for seven years. I was out on my printiceship when I was fourteen. Father was a silk-weaver, and did all he knew to keep me from being a sweep, but I would be a sweep, and nothink else." [This is not so very uncommon a predilection, strange as it may seem.] "So father, when he saw it was no use, got me bound printice. Father's alive now, and near 90 years of age. I don't know why I wished to be a sweep, 'cept it was this—there was sweeps always lived about here, and I used to see the boys with lots of money a tossin' and gamblin', and wished to have money too. You see they got money where they swept the chimneys; they used to get 2*d.* or 3*d.* for theirselves in a day, and sometimes 6*d.* from the people of the house, and that's the way they always had plenty of money. I niver thought anythink of the climbing; it wasn't so bad at all as some people would make you believe. There are two or three ways of climbing. In wide flues you climb with your elbows and your legs spread out, your feet pressing against the sides of the flue; but in narrow flues, such as nine-inch ones, you must slant it; you must have your sides in the angles, it's wider there, and go up just that way." [Here he threw himself into position—placing one arm close to his side, with the palm of the hand turned outwards, as if pressing the side of the flue, and extending the other arm high above his head, the hand apparently pressing in the same manner.] "There," he continued, "that's slantin'. You just put yourself in that way, and see how small you make yourself. I niver got to say stuck myself, but a many of them did; yes, and were taken out dead. They were smothered for want of air, and the fright, and a stayin' so long in the flue; you see the waistband of their trowsers sometimes got turned down in the climbing, and in narrow flues, when not able to get it up, then they stuck. I had a boy once—we were called to sweep a chimney down at Poplar. When we went in he looked up the flues, 'Well, what is it like?' I said. 'Very narrow,' says he, 'don't think I can get up there;' so after some time we gets on top of the house, and takes off the chimney-pot, and has a look down—it was wider a' top, and I thought as how he could go down. 'You had better buff it, Jim,' says I. I suppose you know what that means; but Jim wouldn't do it, and kept his trowsers on. So down he goes, and gets on very well till he comes to the shoulder o. the flue, and then he couldn't stir. He shouts down, 'I'm stuck.' I shouts up and tells him what to do. 'Can't move,' says he, 'I'm stuck hard and fast.' Well, the people of the house got fretted like, but I says to them, 'Now my boy's stuck, but for Heaven's sake don't make a word of noise; don't say a word, good or bad, and I'll

see what I can do.' So I locks the door, and hurls it, and forces myself up till I could reach him with my hand, and as soon as he got his foot on my hand he begins to prize himself up, and gets loosened, and comes out at the top again. I was stuck myself, but I was stronger nor he, and I manages to get out again. Now I'll be bound to say if there was another master there as would kick up a row and a-worrited, that ere boy 'ud a niver come out o' that ere flue alive. There was a many o' them lost their lives in that way. Most all the printices used to come from the 'House' (workhouse.) There was nobody to care for them, and some masters used them very bad. I was out of my time at fourteen, and began to get too stout to go up the flues; so after knockin' about for a year or so, as I could do nothink else, I goes to sea on board a man-o'-war, and was away four year. Many of the boys, when they got too big and useless, used to go to sea in them days—they couldn't do nothink else. Yes, many of them went for sodgers; and I know some who went for Gipsies, and others who went for play-actors, and a many who got on to be swell-mobsmen, and thieves, and housebreakers, and the like o' that ere. There ain't nothink o' that sort a-goin' on now since the Ack of Parliament. When I got back from sea father asked me to larn his business; so I takes to the silk-weaving and larned it, and then married a weaveress, and worked with father for a long time. Father was very well off—well off and comfortable for a poor man—but trade was good then. But it got bad afterwards, and none on us was able to live at it; so I takes to the chimney-sweeping again. *A man might manage to live somehow at the sweeping, but the weaving was o' no use.* It was the furrin silks as beat us all up, that's the whole truth. Yet they tells us as how they was a-doin' the country good; but they may tell that to the marines—the sailors won't believe it—not a word on it. I've stuck to the sweeping ever since, and sometimes done very fair at it; but since the Ack there's so many leeks come to it that I don't know how they live—they must be eatin' one another up.

"Well, since you ask then, I can tell you that our people don't care much about law; they don't understand anythink about politics much; they don't mind things o' that ere kind. They only minds to get drunk when they can. Some on them fellows as you seed in there niver cleans theirselves from one year's end to the other. They'll kick up a row soon enough, with Chartists or anybody else. I thinks them Chartists are a weak-minded set; they was too much a frightened at nothink,—a hundred o' them would run away from one blue-coat, and that wasn't like men. I was often at Chartist meetings, and if they'd only do all they said there was a plenty to stick to them, for there's a somethink wants to be done very bad, for everythink is a-gettin' worser and worser every day. I used to do a good trade, but now I don't yarn a shilling a day all through the year (?). I may walk a this time three or four miles and not get a chimney to sweep, and then get only a sixpence or threepence, and sometimes nothink. It's a starvin', that's what it is; there's so much 'querying' a-goin' on. Querying? that's what we calls under-working*. If they'd all fix a riglar price we might do very well still. I'm 50 years of age, or thereabouts. I don't know much about the story of Mrs. Montague; it was afore my time. I heard of it though. I heard my mother talk about it; she used to read it out of books; she was a great reader—none on 'em could stand afore her for that. I was often at the dinner—the masters' dinner—that was for the boys; but that's all done away long ago, since the Ack of Parliament. I can't tell how many there was at it, but there's such a lot it's impossible to tell. How could any one tell all the sweeps as is in London? I'm sure I can't, and I'm sure nobody else can."

Some years back the sweepers' houses were often indicated by an elaborate sign, highly coloured. A sweeper, accompanied by a "chummy" (once a common name for the climbing-boy, being a corruption of chimney), was depicted on his way to a red brick house, from the chimneys of which bright yellow flames were streaming. Below was the detail of the things undertaken by the sweep, such as the extinction of fires in chimneys, the cleaning of smoke-jacks, &c., &c. A few of these signs, greatly faded, may be seen still. A sweeper, who is settled in what is accounted a "genteel neighbourhood," has now another way of making his calling known. He leaves a card whenever he hears of a new comer, a tape being attached, so that it can be hung up in the kitchen, and thus the servants are always in possession of his address. The following is a customary style:—

"Chimneys swept by the improved machine, much patronized by the Humane Society.

"W. H., Chimney Sweeper and Nightman, 1, —— Mews, in returning thanks to the inhabitants of the surrounding neighbourhood for the patronage he has hitherto received, begs to inform them that he sweeps all kinds of chimneys and flues in the best manner.

"W. H., attending to the business himself, cleans smoke-jacks, cures smoky coppers, and extinguishes chimneys when on fire, with the greatest care and safety; and, by giving the strictest personal attendance to business, performs what he undertakes with cleanliness and punctuality, whereby he hopes to ensure a continuance of their favours and recommendations.

"Clean cloths for upper apartments. Soot-doors to any size fixed. Observe the address, 1, —— Mews, near ——."

At the top of this card is an engraving of the machine; at the foot a rude sketch of a nightman's cart, with men at work. All the cards I saw reiterated the address, so that no mistake might lead the customer to a rival tradesman.

As to their politics, the sweepers are somewha

* Querying means literally inquiring or asking for work at the different houses. The "queriers" among the sweeps are a kind of pedlar operatives.

similar to the dustmen and costermongers. A fixed hatred to all constituted authority, which they appear to regard as the police and the "beaks," seems to be the sum total of their principles. Indeed, it almost assumes the character of a fixed law, that persons and classes of persons who are themselves disorderly, and to a certain extent lawless, always manifest the most supreme contempt for the conservators of law and order in every degree. The police are therefore hated heartily, magistrates are feared and abominated, and Queen, Lords, and Commons, and every one in authority, if known anything about, are considered as natural enemies. A costermonger who happened to be present while I was making inquiries on this subject, broke in with this remark, "The costers is the chaps—the government can't do nothink with them—they allus licks the government." The sweepers have a sovereign contempt for all Acts of Parliament, because the only Act that had any reference to themselves "threw open," as they call it, their business to all who were needy enough and who had the capability of availing themselves of it. Like the "dusties" they are, I am informed, in their proper element in times of riot and confusion; but, unlike them, they are, to a man, Chartists, understanding it too, and approving of it, not because it would be calculated to establish a new order of things, but in the hope that, in the transition from one system to the other, there might be plenty of noise and riot, and in the vague idea that in some indefinable manner good must necessarily accrue to themselves from any change that might take place. This I believe to be in perfect keeping with the sentiments of similar classes of people in every country in the world.

The journeymen lay by no money when in work, as a fund to keep them when incapacitated by sickness, accident, or old age. There are, however, a few exceptions to the general improvidence of the class; some few belong to sick and benefit societies, others are members of burial clubs. Where, however, this is not the case, and a sweeper becomes unable, through illness, to continue his work, the mode usually adopted is to make a raffle for the benefit of the sufferer; the same means are resorted to at the death of a member of the trade. When a chimney-sweeper becomes infirm through age, he has mostly, if not invariably, no refuge but the workhouse.

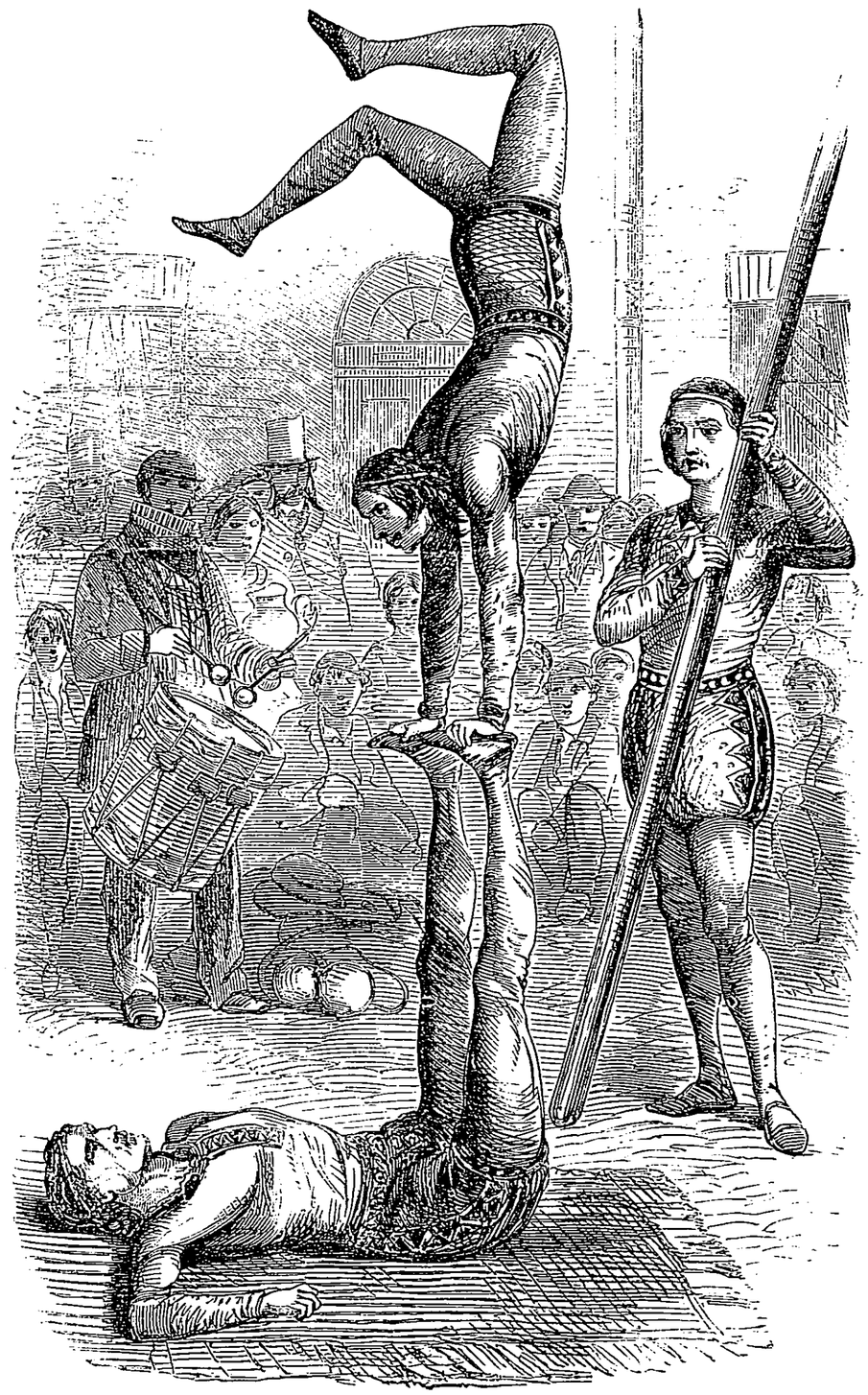
The chimney-sweepers generally are regardless of the marriage ceremony, and when they do live with a woman it is in a state of concubinage. These women are always among the lowest of the street-girls—such as lucifer-match and orange girls, some of the very poorest of the coster girls, and girls brought up among the sweepers. They are treated badly by them, and often enough left without any remorse. The women are equally as careless in these matters as the men, and exchange one paramour for another with the same levity, so that there is a promiscuous intercourse continually going on among them. I am informed that, among the worst class of sweepers living with women, not one in 50 is married. To these couples very few children are born; but I am not able to state the proportion as compared with other classes.

There are some curious customs among the London sweepers which deserve notice. Their May-day festival is among the best known. The most intelligent of the masters tell me that they have taken this "from the milkmen's garland" (of which an engraving has been given). Formerly, say they, on the first of May the milkmen of London went through the streets, performing a sort of dance, for which they received gratuities from their customers. The music to which they danced was simply brass plates mounted on poles, from the circumference of which plates depended numerous bells of different tones, according to size; these poles were adorned with leaves and flowers, indicative of the season, and may have been a relic of one of the ancient pageants or mummeries.

The sweepers, however, by adapting themselves more to the rude taste of the people, appear to have completely supplanted the milkmen, who are now never seen in pageantry. In Strutt's "Sports and Pastimes of the People of England," I find the following with reference to the milk-people:—

"It is at this time," that is in May, says the author of one of the papers in the *Spectator*, "we see brisk young wenches in the country parishes dancing round the Maypole. It is likewise on the first day of this month that we see the ruddy milkmaid exerting herself in a most sprightly manner under a pyramid of silver tankards, and, like the Virgin Tarpeia, oppressed by the costly ornaments which her benefactors lay upon her. These decorations of silver cups, tankards, and salvers, were borrowed for the purpose, and hung round the milk-pails, with the addition of flowers and ribands, which the maidens carried upon their heads when they went to the houses of their customers, and danced in order to obtain a small gratuity from each of them. In a set of prints, called 'Tempest's Cries of London,' there is one called the 'Merry Milkmaid,' whose proper name was Kate Smith. She is dancing with the milk-pail, decorated as above mentioned, upon her head. Of late years the plate, with the other decorations, were placed in a pyramidical form, and carried by two chairmen upon a wooden horse. The maidens walked before it, and performed the dance without any incumbrance. I really cannot discover what analogy the silver tankards and salvers can have to the business of the milkmaids. I have seen them act with much more propriety upon this occasion, when, in place of these superfluous ornaments, they substituted a cow. The animal had her horns gilt, and was nearly covered with ribands of various colours formed into bows and roses, and interspersed with green oaken leaves and bunches of flowers."

With reference to the May-day festival of the sweepers the same author says:—"The chimney-sweepers of London have also singled out the first of May for their festival, at which time they parade the streets in companies, disguised in various manners. Their dresses are usually deco-



STREET ACROBATS PERFORMING.

rated with gilt paper and other mock fineries; they have their shovels and brushes in their hands, which they rattle one upon the other; and to this rough music they jump about in imitation of dancing. Some of the larger companies have a fiddler with them, and a Jack in the Green, as well as a Lord and Lady of the May, who follow the minstrel with great stateliness, and dance as occasion requires. The Jack in the Green is a piece of pageantry consisting of a hollow frame of wood or wicker-work, made in the form of a sugar-loaf, but open at the bottom, and sufficiently large and high to receive a man. The frame is covered with green leaves and bunches of flowers, interwoven with each other, so that the man within may be completely concealed, who dances with his companions; and the populace are mightily pleased with the oddity of the moving pyramid."

Since the date of the above, the sweepers have greatly improved on their pageant, substituting for the fiddle the more noisy and appropriate music of the street-showman's drum and pipes, and adding to their party several diminutive imps, no doubt as representatives of the climbing-boys, clothed in caps, jackets, and trowsers, thickly covered with party-coloured shreds. These still make a show of rattling their shovels and brushes, but the clatter is unheard alongside the thunders of the drum. In this manner they go through the various streets for three days, obtaining money at various places, and on the third night hold a feast at one of their favourite public-houses, where all the sooty tribes resort, and, in company with their wives or girls, keep up their festivity till the next morning. I find that this festival is beginning to disappear in many parts of London, but it still holds its ground, and is as highly enjoyed as ever, in all the eastern localities of the metropolis.

It is but seldom that any of the large masters go out on May-day; this custom is generally confined to the little masters and their men. The time usually spent on these occasions is four days, during which as much as from 2*l.* to 4*l.* a day is collected: the sums obtained on the three first days are divided according to the several kinds of work performed. But the proceeds of the fourth day are devoted to a supper. The average gains of the several performers on these occasions are as follows:—

My lady, who acts as Columbine, and receives	2*s.* per day.
My lord, who is often the master himself, but usually one of the journeymen	3*s.* „
Clown	3*s.* „
Drummer	4*s.* „
Jack in the green, who is often an individual acquaintance, and does not belong to the trade .	3*s.* „
And the boys, who have no term applied to them, receive from	1*s.* to 1*s.* 6*d.* „

The share accruing to the boys is often spent in purchasing some article of clothing for them, but the money got by the other individuals is mostly spent in drink.

The sweepers, however, not only go out on May-day, but likewise on the 5th of November. On the last Guy-Fawkes day, I am informed, some of them received not only pence from the public, but silver and gold. "It was quite a harvest," they say. One of this class, who got up a gigantic Guy Fawkes and figure of the Pope on the 5th of November, 1850, cleared, I am informed, 10*l.* over and above all expenses.

For many years, also, the sweepers were in the habit of partaking of a public dinner on the 1st of May, provided for every climbing-boy who thought proper to attend, at the expense of the Hon. Mrs. Montagu. The romantic origin of this custom, from all I could learn on the subject, is this:—The lady referred to, at the time a widow, lost her son, then a boy of tender years. Inquiries were set on foot, and all London heard of the mysterious disappearance of the child, but no clue could be found to trace him out. It was supposed that he was kidnapped, and the search at length was given up in despair. A long time afterwards a sweeper was employed to cleanse the chimneys of Mrs. Montagu's house, by Portman-square, and for this purpose, as was usual at the time, sent a climbing-boy up the chimney, who from that moment was lost to him. The child did not return the way he went up, but it is supposed that in his descent he got into a wrong flue, and found himself, on getting out of the chimney, in one of the bedrooms. Wearied with his labour, it is said that he mechanically crept between the sheets, all black and sooty as he was. In this state he was found fast asleep by the housekeeper. The delicacy of his features and the soft tones of his voice interested the woman. She acquainted the family with the strange circumstance, and, when introduced to them with a clean face, his voice and appearance reminded them of their lost child. It may have been that the hardships he endured at so early an age had impaired his memory, for he could give no account of himself; but it was evident, from his manners and from the ease which he exhibited, that he was no stranger to such places, and at length, it is said, the Hon. Mrs. Montagu recognised in him her long-lost son. The identity, it was understood, was proved beyond doubt. He was restored to his rank in society, and in order the better to commemorate this singular restoration, and the fact of his having been a climbing-boy, his mother annually provided an entertainment on the 1st of May, at White Conduit House, for all the climbing-boys of London who thought proper to partake of it. This annual feast was kept up during the lifetime of the lady, and, as might be expected, was numerously attended, for since there were no question asked and no document required to prove any of the guests to be climbing-boys, very many of the precocious urchins of the metropolis used to blacken their faces for this special occasion. This annual feast continued, as I have said, as long as the lady lived. Her son continued it

only for three or four years afterwards, and then, I am told, left the country, and paid no further attention to the matter.

Of the story of the young Montagu, Charles Lamb has given the following account:—

"In one of the state-beds at Arundel Castle, a few years since—under a ducal canopy (that seat of the Howards is an object of curiosity to visitors, chiefly for its beds, in which the late duke was especially a connoisseur)—encircled with curtains of delicatest crimson, with starry coronets interwoven—folded between a pair of sheets whiter and softer than the lap where Venus lulled Ascanius—was discovered by chance, after all methods of search had failed, at noon-day, fast asleep, a lost chimney-sweeper. The little creature having somehow confounded his passage among the intricacies of those lordly chimneys, by some unknown aperture had alighted upon this magnificent chamber, and, tired with his tedious explorations, was unable to resist the delicious invitement to repose, which he there saw exhibited; so, creeping between the sheets very quietly, he laid his black head on the pillow and slept like a young Howard." . . . . "A high instinct," adds Lamb, "was at work in the case, or I am greatly mistaken. Is it probable that a poor child of that description, with whatever weariness he might be visited, would have ventured under such a penalty as he would be taught to expect, to uncover the sheets of a duke's bed, and deliberately to lay himself down between them, when the rug or the carpet presented an obvious couch still far above his pretensions?—is this probable, I would ask, if the great power of nature, which I contend for, had not been manifested within him, prompting to the adventure? Doubtless, this young nobleman (for such my mind misgives me he must be) was allured by some memory not amounting to full consciousness of his condition in infancy, when he was used to be lapt by his mother or his nurse in just such sheets as he there found, into which he was now but creeping back as into his proper incubation (*incunabula*) and resting place. By no other theory than by his sentiment of a pre-existent state (as I may call it) can I explain a deed so venturous."

There is a strong strain of romance throughout the stories of the lost and found young Montagu. I conversed with some sweepers on the subject. The majority had not so much as heard of the occurrence, but two who had heard of it—both climbing-boys in their childhood—had heard that the little fellow was found in his mother's house. In a small work, the "Chimney-Sweepers' Friend," got up in aid of the Society for the Supersedence of Climbing Boys, by some benevolent Quaker ladies and others (the Quakers having been among the warmest supporters of the suppression of climbers), and "arranged" (the word "edited" not being used) by J. Montgomery, the case of the little Montagu is not mentioned, excepting in two or three vague poetical allusions.

The account given by Lamb (although pronounced apocryphal by some) appears to be the more probable version; and to the minds of many is shown to be conclusively authentic, as I understand that, when Arundel Castle is shown to visitors, the bed in which the child was found is pointed out; nor is it likely that in such a place the story of the ducal bed and the little climbing-boy would be *invented*.

The following account was given by the wife of a respectable man (now a middle-aged woman) and she had often heard it from her mother, who passed a long life in the neighbourhood of Mrs. Montagu's residence:—

"Lady M. had a son of tender years, who was supposed to have been stolen for the sake of his clothes. Some time after, there was an occasion when the sweeps were necessary at Montagu House. A servant noticed one of the boys, being at first attracted by his superior manner, and her curiosity being excited fancied a resemblance in him to the lost child. She questioned his master respecting him, who represented that he had found him crying and without a home, and thereupon took him in, and brought him up to his trade. The boy was questioned apart from his master, as to the treatment he received; his answers were favourable; and the consequence was, a compensation was given to the man, and the boy was retained. All doubt was removed as to his identity."

The annual feast at "White Condick," so agreeable to the black fraternity, was afterwards continued in another form, and was the origin of a well-known society among the master sweepers, which continued in existence till the abolition of the climbing-boys by Act of Parliament. The masters and the better class of men paid a certain sum yearly, for the purpose of binding the children of the contributors to other trades. In order to increase the funds of this institution, as the dinner to the boys at White Conduit House was an established thing, the masters continued it, and the boys of every master who belonged to the society went in a sort of state to the usual place of entertainment every 1st of May, where they were regaled as formerly. Many persons were in the habit of flocking on this day to White Conduit House to witness the festivities of the sweepers on this occasion, and usually contributed something towards the society. As soon, however, as the Act passed, this also was discontinued, and it is now one of the legends connected with the class.

Sweeping of the Chimneys of Steam-Vessels.

The sweeping of the flues in the boilers of steam-boats, in the Port of London, and also of land boilers in manufactories, is altogether a distinct process, as the machine cannot be used until such time as the parties who are engaged in this business travel a long way through the flues, and reach the lower part of the chimney or funnel where it communicates with the boilers and receives the smoke in its passage to the upper air. The boilers in the large sea-going steamers are of curious construction; in some large steamers there are four separate boilers with three furnaces

in each, the flues of each boiler uniting in one beneath the funnel; immediately beyond the end of the furnace, which is marked by a little wall constructed of firebrick to prevent the coals and fire from running off the firebars, there is a large open space very high and wide, and which space after a month's steaming is generally filled up with soot, somewhat resembling a snow drift collected in a hollow, were it not for its colour and the fact that it is sometimes in a state of ignition; it is, at times, so deep, that a man sinks to his middle in it the moment he steps across the firebridge. Above his head, and immediately over the end of the furnace, he may perceive an opening in what otherwise would appear to be a solid mass of iron; up to this opening, which resembles a doorway, the sweeper must clamber the best way he can, and when he succeeds in this he finds himself in a narrow passage completely dark, but with so strong a current of air rushing through it from the furnaces beneath towards the funnel overhead that it is with difficulty the wick lamp which he carries in his hand can be kept burning. This passage, between the iron walls on either side, is lofty enough for a tall man to stand upright in, but does not seem at first of any great extent; as he goes on, however, to what appears the end, he finds out his mistake, by coming to a sharp turn which conducts him back again towards the open space in the centre of the boiler, but which is now hid from him by the hollow iron walls which on every side surround him, and within which the waters boil and seethe as the living flames issuing from the furnaces rush and roar through these winding passages; another sharp turn leads back to the front of the boilers, and so on for seven or eight turns, backwards and forwards, like the windings in a maze, till at the last turn a light suddenly breaks upon him, and, looking up, he perceives the hollow tube of the funnel, black and ragged with the adhering soot.

Here, then, the labour of the sweeper commences: he is armed with a brush and shovel, and laying down his lamp in a space from which he has previously shovelled away the soot, which in many parts of the passage is knee deep, he brushes down the soot from the sides and roof of the passage, which being done he shovels it before him into the next winding; this process he repeats till he reaches, by degrees, the opening where he ascended. Whenever the accumulation of soot is so great that it is likely to block up the passage in the progress of his work, he wades through and shovels as much as he thinks necessary out of the opening into the large space behind the furnaces, then resumes his work, brushing and shovelling by turns, till the flues are cleared; when this is accomplished, he descends, and the fire bars being previously removed, he shovels the soot, now all collected together, over the firebridge and into the ashpit of the furnace; other persons stand ready in the stoke-hole armed with long iron rakes, with which they drag out the soot from the ash-pits; and others shovel it into sacks, which they make fast to tackle secured to the upper deck, by which they "bowse" it up out of the engine-room, and either discharge it overboard or put it into boats preparatory to being taken ashore. In this manner an immense quantity of soot is removed from the boilers of a large foreign-going steamer when she gets into port, after a month or six weeks' steaming, having burned in that time perhaps 700 or 800 tons of coal: this work is always performed by the stokers and coal-trimmers in the foreign ports, who seldom, if ever, get anything extra for it, although it is no uncommon thing for some of them to be ill for a week after it.

In the port of London, however, the sweeper comes into requisition, who, besides going through the process already described, brings his machine with him, and is thus enabled to cleanse the funnel, and to increase the quantity of soot. Some of the master sweepers, who have the cleansing of the steam-boats in the river, and the sweeping of boiler flues are obliged to employ a good many men, and make a great deal of money by their business. The use of anthracite coals, however, and some modern improvements, by which air at a certain temperature is admitted to certain parts of the furnace, have in many instances greatly lessened, if they have not altogether prevented, the accumulation of soot, by the prevention of smoke; and it seems quite possible, from the statements made by many eminent scientific and practical men who were examined before a select committee of the House of Commons, presided over by Mr. Mackinnon, in 1843, that by having properly-constructed stoves, and a sufficient quantity of pure air properly admitted, not only less fuel might be burned, and produce a greater amount of heat, but soot would cease to accumulate, so that the necessity for sweepers would be no longer felt, and there would be no fear of fires from the ignition of soot in the flues of chimneys; blacks and smoke, moreover, would take their departure together; and with them the celebrated London fog might also, in a great measure, disappear.

The funnels of steamers are generally swept at from 8*d.* to 1*s.* 6*d.* per funnel. The Chelsea steamers are swept by Mr. Allbrook, of Chelsea; the Continental, by Mr. Hawsey, of Rosemary-lane; and the Irish and Scotch steamers, by Mr. Tuff, who resides in the East London district

Of the "Ramoneur" Company.

The Patent Ramoneur Company demands, perhaps, a special notice. It was formed between four and five years ago, and has now four stations: one in Little Harcourt-street, Bryanstone-square; another in New-road, Sloane-street; a third in Charles-place, Euston-square; and the fourth in William-street, Portland-town.

"This Company has been formed," the prospectus stated, "for the purpose of cleansing chimneys with the Patent Ramoneur Machine, and introducing various other improvements in the business of chimney sweeping. Chimneys are daily swept with this machine where others have failed."

The Company charge the usual prices, and all

the men employed have been brought up as sweepers. The patent machine is thus described:—

"The Patent Ramoneur Machine consists of four brushes, forming a square head, which, by means of elastic springs, contracts or expands, according to the space it moves in; the rods attached to this head or brush are supplied at intervals with a universal spring-joint, capable of turning even a right angle, and the whole is surmounted with a double revolving ball, having also a universal spring-joint, which leads the brush with certainty into every corner, cleansing its route most perfectly."

The recommendation held out to the public is, that the patented chimney-machine sweeps cleaner than that in general use, and for the reasons assigned; and that, being constructed with more and better springs, it is capable of "turning even a right angle," which the common machine often leaves unswept. This was and is commonly said of the difference between the cleansing of the chimney by a climbing-boy and that effected by the present mechanical appliances in general use —the boy was "better round a corner."

The patent machines now worked in London are fifteen in number, and fifteen men are thus employed. Each man receives as a weekly wage, always in money, 14*s.*, besides a suit of clothes yearly. The suit consists of a jacket, waistcoat, and trousers, of dark-coloured corduroy; also a "frock" or blouse, to wear when at work, and a cap; the whole being worth from 35*s.* to 40*s.* This payment is about equivalent to that received weekly by the journeymen in the regular or honourable trade; for although higher in nominal amount as a weekly remuneration, the Ramoneur operatives are not allowed any perquisites whatever. The resident or manager at each station is also a working chimney-sweeper for the Company, and at the same rate as the others, his advantage being that he lives rent-free. At one station which I visited, the resident had two comfortable-looking up-stairs'-rooms (the stations being all in small streets), where he and his wife lived; while the "cellar," which was indeed but the ground floor, although somewhat lower than the doorstep, was devoted to business purposes, the soot being stored there. It was boarded off into separate compartments, one being at the time quite full of soot. All seemed as clean and orderly as possible. The rent of those two rooms, unfurnished, would not be less than 4*s.* or 5*s.* a week, so that the resident's payment may be put at about 50*l.* a year. The patent-machine operatives sweep, on an average, the same number of chimneys each, as a master chimney-sweeper's men in a good way of business in the ordinary trade.

Of the Brisk and Slack Seasons, and the Casual Trade among the Chimney-Sweepers.

As among the rubbish-carters in the unskilled, and the tailors and shoemakers of the skilled trades, the sweepers' trade also has its slackness and its briskness, and from the same cause—the difference in the *seasons*. The seasons affecting the sweepers' trade are, however, the *natural* seasons of the year, the recurring summer and winter, while the seasons influencing the employment of West-end tailors are the *arbitrary* seasons of fashion.

The chimney-sweepers' *brisk* season is in the winter, and especially at what may be in the respective households the periods of the resumption and discontinuance of sitting-room fires.

The sweepers' seasons of briskness and slackness, indeed, may be said then to be ruled by the thermometer, for the temperature causes the increase or diminution of the number of fires, and consequently of the production of soot. The thermometrical period for fires appears to be from October to the following April, both inclusive (seven months), for during that season the temperature is below 50°. I have seen it stated, and I believe it is merely a statement of a fact, that at one time, and even now in some houses, it was customary enough for what were called "great families" to have a fixed day (generally Michaelmas-day, Sept. 29) on which to commence fires in the sitting-rooms, and another stated day (often May-day, May 1) on which to discontinue them, no matter what might be the mean temperature, whether too warm for the enjoyment of a fire, or too cold comfortably to dispense with it. Some wealthy persons now, I am told—such as call themselves "economists," while their servants and dependants apply the epithet "mean"—defer fires until the temperature descends to 42°, or from November to March, both inclusive, a season of only five months.

As this question of the range of the thermometer evidently influences the seasons, and therefore, the casual labour of the sweepers, I will give the following interesting account of the changing temperature of the metropolis, month by month, the information being derived from the observations of 25 years (1805 to 1830), by Mr. Luke Howard. The average temperature appears to be:—

	Degrees.		Degrees.
January	35·1	July	63·1
February	38·9	August	57·1
March	42·0	September	50·1
April	47·5	October	42·9
May	54·9	November	41·9
June	59·6	December	38·3

London, I may further state, is 2½ degrees warmer than the country, especially in winter, owing to the shelter of buildings and the multiplicity of the fires in the houses and factories. In the summer the metropolis is about 1½ degree hotter than the country, owing to want of free air in London, and to a cause little thought about —the reverberations from narrow streets. In spring and autumn, however, the temperature of both town and country is nearly equal.

In London, moreover, the nights are 11·3 degrees colder than the days; in the country they are 15·4 degrees colder. The extreme ranges of the temperature in the day, in the capital, are from 20° to 99°. The thermometer *has* fallen below zero in the night time, but not frequently.

In London the hottest months are 28 degrees warmer than the coldest; the temperature of July, which is the hottest month, being 63·1; and that of January, the coldest month, 35·1 degrees.

The month in which there are the greatest number of extremes of heat and cold is January. In February and December there are (generally speaking) only two such extreme variations, and five in July; through the other months, however, the extremes are more diffused, and there are only two spring and two autumn months (April and June—September and November), which are not exposed to great differences of temperature.

The mean temperature assumes a rate of increase in the different months, which may be represented by a curve nearly equal and parallel with one representing the progress of the sun in declination.

Hoar-frosts occur when the thermometer is about 39°, and the dense yellow fogs, so peculiar to London, are the most frequent in the months of November, December, and January, whilst the temperature ranges below 40°.

The busy season in the chimney-sweepers' trade commences at the beginning of November, and continues up to the month of May; during the remainder of the year the trade is "slack." When the slack season has set in nearly 100 men are thrown out of employment. These, as well as many of the single-handed masters, resort to other kinds of employment. Some turn costermongers, others tinkers, knife-grinders, &c., and others migrate to the country and get a job at hay-making, or any other kind of unskilled labour. Even during the brisk season there are upwards of 50 men out of employment; some of these occasionally contrive to get a machine of their own, and go about "knulling,"—getting a job where they can.

Many of the master sweepers employ in the summer months only two journeymen, whereas they require three in the winter months; but this, I am informed, is not the general average, and that it will be more correct to compute it for the whole trade, in the proportion of two and a half to two. We may, then, calculate that one-fourth of the entire trade is displaced during the slack season.

This, then, may be taken as the extent of casual labour, with all the sufferings it entails upon improvident, and even upon careful working-men.

A youth casually employed as a sweeper gave the following account:—"I jobs for the sweeps sometimes, sir, as I'd job for anybody else, and if you have any herrands to go, and will send me, I'll be unkimmon thankful. I haven't no father and don't remember one, and mother might do well but for the ruin (gin). I calls it 'ruin' out of spite. No, I don't care for it myself. I like beer ten to a farthing to it. "She's a ironer, sir, a stunning good one, but I don't like to talk about her, for she might yarn a hatful of

browns—3*s.* 6*d.* a day; and when she has pulled up for a month or more it's stunning is the difference. I'd rather not be asked more about that. Her great fault against me is as I won't settle. I was one time put to a woman's shoemaker as worked for a ware'us. He was a relation, and I was to go prentice if it suited. But I couldn't stand his confining ways, and I'm sartain sure that he only wanted me for some tin mother said she'd spring if all was square. He was bad off, and we lived bad, but he always pretended he was going to be stunning busy. So I hooked it. I'd other places—a pot-boy's was one, but no go. None suited.

"Well, I can keep myself now by jobbing, leastways I can partly, for I have a crib in a corner of mother's room, and my rent's nothing, and when she's all right *I'm* all right, and she gets better as I grows bigger, I think. Well, I don't know what I'd like to be; something like a lamp-lighter, I think. Well, I look out for sweep jobs among others, and get them sometimes. I don't know how often. Sometimes three mornings a week for one week; then none for a month. Can any one live by jobbing that way for the sweeps? No, sir, nor get a quarter of a living; but it's a help. I know some very tidy sweeps now. I'm sure I don't know what they are in the way of trade. O, yes, now you ask that, I think they're masters. I've had 6*d.* and half-a-pint of beer for a morning's work, jobbing like. I carry soot for them, and I'm lent a sort of jacket, or a wrap about me, to keep it off my clothes—though a Jew wouldn't sometimes look at 'em—and there's worser people nor sweeps. Sometimes I'll get only 2*d.* or 3*d.* a day for helping that way, a carrying soot. I don't know nothing about weights or bushels, but I know I've found it —— heavy.

"The way, you see, sir, is this here: I meets a sweep as knows me by sight, and he says, 'Come along, Tom's not at work, and I want you. I have to go it harder, so you carry the soot to our place to save my time, and join me again at No. 39.' That's just the ticket of it. Well, no; I wouldn't mind being a sweep for myself with my own machine; but I'd rather be a lamp-lighter. How many help sweeps as I do? I can't at all say. No, I don't know whether it's 10, or 20, or 100, or 1000. I'm no scholard, sir, that's one thing. But it's very seldom such as me's wanted by them. I can't tell what I get for jobbing for sweeps in a year. I can't guess at it, but it's not so much, I think, as from other kinds of jobbing. Yes, sir, I haven't no doubt that the t'others as jobs for sweeps is in the same way as me. I think I may do as much as any of 'em that way, quite as much."

Of the "Leeks" among the Chimney-Sweepers.

The *Leeks* are men who have not been brought up to the trade of chimney sweeping, but have adopted it as a speculation, and are so called from their entering *green*, or inexperienced, into the

business. There are I find as many as 200 leeks altogether among the master chimney-sweepers of the metropolis. Of the "high masters" the greater portion are leeks—no less than 92 out of 106. I was informed that one of this class was formerly a solicitor, others had been ladies' shoemakers, and others master builders and bricklayers. Among the lower-class sweepers who have taken to this trade, there are dustmen, scavagers, bricklayers' labourers, soldiers, costermongers, tinkers, and various other unskilled labourers.

The leeks are regarded with considerable dislike by the class of masters who have been regularly brought up to the business, and served their apprenticeships as climbing-boys. These look upon the leeks as men who intrude upon, or interfere with, their natural and, as they account it, legal rights—declaring that only such as have been brought up to the business should be allowed to establish themselves in it as masters. The chimney-sweepers, as far as I can learn, have never possessed any guild, or any especial trade regulations, and this opinion of their rights being invaded by the leeks arises most probably from their knowledge that during the climbing-boy system every lad so employed, unless the son of his employer, was obliged to be apprenticed.

This jealousy towards the leeks does not at all affect the operative sweepers, as some of these leeks are good masters, and among them, perhaps, is to be found the majority of the capitalists of the chimney-sweeping trade, paying the best wages, and finding their journeymen proper food and lodging. Into whatever district I travelled I heard the operative chimney-sweepers speak highly in favour of some of the leeks.

Many of the small masters, however, said "it were a shame" for persons who had never known the horrors of climbing to come into the trade and take the bread out of the mouths of those who had undergone the drudgery of the climbing system; and there appears to be some little justice in their remarks.

Since the introduction of machines into the chimney-sweeping trade the masters have increased considerably. In 1816 there were 200 masters, and now there are 350. Before the machines were introduced, the high master sweepers or "great gentlemen," as they were called, numbered only about 20; their present number is 106. The lower-class and master-men sweepers, on the other hand. were, under the climbing system, from 150 to 180 in number; but at present there are as many as 240 odd. The majority of these fresh hands are "leeks," not having been bred to the business.

Of the Inferior Chimney Sweepers—the "Knullers" and "Queriers."

The majority of occupations in all civilized communities are divisible into two distinct classes, the employers and the employed. The employers are necessarily capitalists to a greater or less extent, providing generally the materials and implements necessary for the work, as well as the subsistence of the workmen, in the form of wages and appropriating the proceeds of the labour, while the employed are those who, for the sake of the present subsistence supplied to them, undertake to do the requisite work for the employer. In some few trades these two functions are found to be united in the same individuals. The class known as peasant proprietors among the cultivators of the soil are at once the labourers and the owners of the land and stock. The cottiers, on the other hand, though renting the land of the proprietor, are, so to speak, peasant farmers, tilling the land for themselves rather than doing so at wages for some capitalist tenant. In handicrafts and manufactures the same combination of functions is found to prevail. In the clothing districts the domestic workers are generally their own masters, and so again in many other branches of production. These trading operatives are known by different names in different trades. In the shoe trade, for instance, they are called "chamber-masters," in the "cabinet trade" they are termed "garret-masters," and in "the cooper's trade" the name for them is "small trading-masters." Some style them "master-men," and others, "single-handed masters." In all occupations, however, the master-men are found to be especially injurious to the interests of the entire body of both capitalists and operatives, for, owing to the limited extent of their resources, they are obliged to find a market for their work, no matter at what the sacrifice, and hence by their excessive competitions they serve to lower the prices of the trade to a most unprecedented extent. I have as yet met with no occupation in which the existence of a class of master-men has worked well for the interest of the trade, and I have found many which they have reduced to a state of abject wretchedness. It is a peculiar circumstance in connection with the master-men that they abound only in those callings which require a small amount of capital, and which, consequently, render it easy for the operative immediately on the least disagreement between him and his employer to pass from the condition of an operative into that of a trading workmen. When among the fancy cabinet-makers I had a statement from a gentleman, in Aldersgate-street, who supplied the materials to these men, that a fancy cabinet-maker, the manufacturer of writing-desks, tea-caddies, ladies' work-boxes, &c., could begin, and did begin, business on less than 3*s.* 6*d.* A youth had just then bought materials of him for 2*s.* 6*d.* to "begin on a small desk," stepping at once out of the trammels of apprenticeship into the character of a master-man. Now this facility to commence business on a man's own account is far greater in the chimney-sweepers' trade than even in the desk-makers,' for the one needs no previous training, while the other does.

Thus when other trades, skilled or unskilled, are depressed, when casual labour is with a mass of workpeople more general than constant labour, they naturally inquire if they "cannot do better at something else," and often resort to such trades as the chimney-sweepers'. It is open to all, skilled and unskilled alike. Distress, a desire of change, a vagabond spirit, a hope to "better themselves," all tend to swell the ranks of the single-handed master chimney-sweepers; even though these men, from the casualties of the trade in the way of "seasons," &c., are often exposed to great privations.

There are in all 147 single-handed masters, who are thus distributed throughout the metropolis:—

Southwark (17), Chelsea (11), Marylebone, Shoreditch, and Whitechapel (each 9), Hackney, Stepney, and Lambeth (each 8), St. George's-in-the-East (7), Rotherhithe (6), St. Giles' and East London (each 5), Bethnal-green, Bermondsey, Camberwell, and Clapham (each 4), St. Pancras, Islington, Walworth, and Greenwich (each 3), St. James's (Westminster), Holborn, Clerkenwell, St. Luke's, Poplar, Westminster, West London, City, Wandsworth, and Woolwich (each 1); in all, 147.

Thus we perceive, that the single-handed masters abound in the suburbs and poorer districts; and it is generally in those parts where the lower rate of wages is paid that these men are found to prevail. Their existence appears to be at once the cause and the consequence of the depreciation of the labour.

Of the single-handed masters there is a sub-class known by the name of "knullers" or "queriers."

The *knullers* were formerly, it is probable, known as knellers. The Saxon word *Cnyllan* is to knell (to knull properly), or sound a bell, and the name "knuller" accordingly implies the sounder of a bell, which has been done, there can be no doubt, by the London chimney-sweepers as well as the dustmen, to announce their presence, and as still done in some country parts. One informant has known this to be the practice at the town of Hungerford in Berkshire. The bell was in size between that of the muffin-man and the dustman.

The knuller is also styled a "*querier*," a name derived from his making *inquiries* at the doors of the houses as to whether his services are required or are likely to be soon required, calling even where they know that a regular resident chimney-sweeper is employed. The men go along calling "sweep," more especially in the suburbs, and if asked "Are you Mr. So-and-So's man?" answer in the affirmative, and may then be called in to sweep the chimneys, or instructed to come in the morning. Thus they receive the full charge of an established master, who, for the sake of his character and the continuance of his custom, must do his work properly; while if such work be done by the knuller, it will be hurriedly and therefore badly done, as all work is, in a general way, when done under false pretences.

Some of the sharpest of these men, I am told, have been reared up as sweepers; but it appears, although it is a matter difficult to ascertain with precision, the majority have been brought up to some generally unskilled calling, as scavagers, costermongers, tinkers, bricklayers' labourers, soldiers, &c. The knullers or queriers are almost all to be found among the lower class chimney-sweepers. There are, from the best information to be obtained, from 150 to 200 of them. Not only do they scheme for employment in the way I have described, but some of them call at the houses of both rich and poor, boldly stating that they had been *sent* by Mr. —— to sweep the flues. I was informed by several of the master sweepers, that many of the fires which happen in the metropolis are owing to persons employing these "knullers," "for," say the high masters, "they scamp the work, and leave a quantity of soot lodged in the chimney, which, in the event of a large fire being kept in the range or grate, ignites." This opinion as to the fires in the chimneys being caused by the scamped work of the knullers must be taken with some allowance. Tradesmen, whose established business is thus, as they account it, usurped, are naturally angry with the usurpers.

There is another evil, so say the regular masters, resulting from the employment of the knullers—the losses accruing to persons employing them, as "they take anything they can lay their hands upon."

This, also, is a charge easy to make, but not easy to refute, or even to sift. One master chimney-sweeper told me that when chimneys are swept in rich men's houses there is almost always some servant in attendance to watch the sweepers. If the rich, I am told, be watchful under these circumstances, the poor are more vigilant.

The distribution of the knullers or queriers is as follows:—Southwark (17), Chelsea and St. Giles' (11 each), Shoreditch and Whitechapel (10 each), Lambeth (9), Marylebone, Stepney and Walworth (8 each), St. George's in the East and Woolwich (7 each), Islington and Hackney (6 each), East London, Rotherhithe, and Greenwich (5 each), Paddington, St. Pancras, East London, Retherhithe and Greenwich (5 each), Paddington, St. Pancras, Bethnal Green, Bermondsey, and Clapham (4 each), Westminster, St. Martin's, Holborn, St. Luke's, West London, Poplar, and Camberwell (3 each); St. James's (Westminster), Clerkenwell, City of London, and Wandsworth (2 each), Kensington (1); in all, 183.

Like the single-handed men the knullers abound in the suburbs. I endeavoured to find a knuller who had been a skilled labourer, and was referred to one who, I was told, had been a working plumber, and a "good hand at spouts." I found him a doggedly ignorant man; he saw no good, he said, in books or newspapers, and "wouldn't say nothing to me, as I 'd told him it would be printed. He wasn't a going to make a holy-show [so I understood him] of *his*-self."

Another knuller (to whom I was referred by a master who occasionally employed him as a journeyman) gave me the following account. He was "doing just middling" when I saw him, he said, but his look was that of a man who had known privations, and the soot actually seemed to bring out his wrinkles more fully, although he told me he was only between 40 and 50 years old; he believed he was not 46.

"I was hard brought up, sir," he said; "ay, them as 'll read your book—I mean them readers as is well to do—cannot fancy how hard. Mother was a widow; father was nobody knew where; and, poor woman, she was sometimes distracted that a daughter she had before her marriage, went all wrong. She was a washerwoman, and slaved herself to death. She died in the house [workhouse] in Birmingham. I can read and write a little. I was sent to a charity school, and when I was big enough I was put 'prentice to a gunsmith at Birmingham. I 'm master of the business generally, but my perticler part is a gun lock-filer. No, sir, I can't say as ever I liked it; nothing but file file all day. I used to wish I was like the free bits o' boys that used to beg steel filings of me for their fifth of November fireworks. I never could bear confinement. It's made me look older than I ought, I know, but what can a poor man do? No, I never cared much about drinking. I worked in an iron-foundry when I was out of my time. I had a relation that was foreman there. Perhaps it might be that, among all the dust and heat and smoke and stuff, that made me a sweep at last, for I was then almost or quite as black as a sweep.

"Then I come up to London; ay, that must be more nor 20 years back. O, I came up to better myself, but I couldn't get work either at the gun-makers—and I fancy the London masters don't like Birmingham hands—nor at the iron-foundries, and the iron-foundries is nothing in London to what they is in Staffordshire and Warwickshire; nothing at all, they may say what they like. Well, sir, I soon got very bad off. My togs was hardly to call togs. One night—and it was a coldish night, too—I slept in the park, and was all stiff and shivery next morning. As I was wandering about near the park, I walked up a street near the Abbey—King-street, I think it is—and there was a picture outside a public-house, and a writing of men wanted for the East India Company's Service. I went there again in the evening, and there was soldiers smoking and drinking up and down, and I 'listed at once. I was to have my full bounty when I got to the depôt—Southampton I think they called it. Somehow I began to rue what I 'd done. Well, I hardly can tell you why. O, no; I don't say I was badly used; not at all. But I had heard of snakes and things in the parts I was going to, and I gently hooked it. I was a navvy on different rails after that, but I never was strong enough for that there work, and at last I couldn't get any more work to do. I came back to London; well, sir, I can't say, as you ask, why I came to London 'stead of Birmingham. I seemed to go natural like. I could get nothing to do, and Lord! what I suffered! I once fell down in the Cut from hunger, and I was lifted into Watchorn's, and he said to his men, 'Give the poor fellow a little drop of brandy, and after that a biscuit; the best things he can have.' He saved my life, sir. The people at the bar—they see'd it was no humbug—gathered 7½d. for me. A penny a-piece from some of Maudslay's men, and a halfpenny from a gent that hadn't no other change, and a poor woman as I was going away slipt a couple of trotters into my hand.

"I slept at a lodging-house, then, in Baldwin's-gardens when I had money, and one day in Gray's inn-lane I picked up an old gent that fell in the middle of the street, and might have been run over. After he 'd felt in all his pockets, and found he was all right, he gave me 5s. I knew a sweep, for I sometimes slept in the same house, in King-street, Drury-lane; and he was sick, and was going to the big house. And he told me all about his machines, that 's six or seven years back, and said if I 'd pay 2s. 6d. down, and 2s. 6d. a week, if I couldn't pay more, I might have his machine for 20s. I took it at 17s. 6d., and paid him every farthing. That just kept him out of the house, but he died soon after.

"Yes, I 've been a sweep ever since. I've had to shift as well as I could I don't know that I I 'm what you call a Nuller, or a Querier. Well, if I 'm asked if I 'm anybody's man, I don't like to say 'no,' and I don't like to say 'yes;' so I says nothing if I can help it. Yes, I call at houses to ask if anything 's wanted. I 've got a job that way sometimes. If they took me for anybody's man, I can't help that. I lodge with another sweep which is better off nor I am, and pay him 2s. 9d. a week for a little stair-head place with a bed in it. I think I clear 7s. a week, one week with another, but that 's the outside. I never go to church or chapel. I've never got into the way of it. Besides, I wouldn't be let in, I s'pose, in my togs. I 've only myself. I can't say I much like what I 'm doing, but what can a poor man do?"

Of the Fires of London.

Connected with the subject of chimney sweeping is one which attracts far less of the attention of the legislature and the public than its importance would seem to demand: I mean the fires in the metropolis, with their long train of calamities, such as the loss of life and of property. These calamities, too, especially as regards the loss of property, are almost all endured by the poor, the destruction of whose furniture is often the destruction of their whole property, as insurances are rarely effected by them; while the wealthier classes, in the case of fires, are not exposed to the evils of houselessness, and may be actually gainers by the conflagration, through the sum for which the property was insured.

"The daily occurrence of fires in the metropolis," say the Board of Health, "their extent, the number of persons who perish by them, the enormous loss of property they occasion, the prevalence of incendiarism, the apparent apathy with which such calamities are regarded, and the rapidity with which they are forgotten, will hereafter be referred to as evidence of a very low social condition and defective administrative organization. These fires, it was shown nearly a century ago, when the subject of insurance was debated in Parliament, were frequently caused from not having chimneys swept in proper time." I am informed that a chimney may be on fire for many days, unknown to the inmates of the house, and finally break out in the body of the building by its getting into contact with some beam or wood-work. The recent burning of Limehouse Church was occasioned by the soot collected in the flue taking fire, and becoming red hot, when it ignited the wood-work in the roof. The flue, or pipe, was of iron.

From a return made by Mr. Braidwood of the houses and properties destroyed in the metropolis in the three years ending in 1849 inclusive, it appears that the total number was 1111: of contents destroyed (which, being generally insured separately, should be kept distinct) there were 1013. The subjoined table gives the particulars as to the proportion insured and uninsured:—

	Insured.	Uninsured.	Total.
Houses . .	914	197	1111
Contents . .	609	404	1013
	1523	601	2124

"The proportion per cent. of the uninsured to the insured, would be—

		Insured.	Uninsured.	Total.
		Per Cent.	Per Cent.	
Houses .	1111	82·3	17·7	100
Contents .	1013	60·1	39·9	100
	2124	71·7	28·3	100

The following table gives the total number of fires in the metropolis during a series of years:

Abstract of Causes of Fire in the Metropolis, from 1833 to 1849, inclusive.

Compiled by W. Baddeley.

	1833	1834	1835	1836	1837	1838	1839	1840	1841	1842	1843	1844	1845	1846	1847	1848	1849	Total.	Average
Accidents of various kinds, for the most part unavoidable	83	40	14	13	17	36	25	26	26	44	19	11	17	29	20	19	13	452	27
Apparel ignited on the person	..	..	..	7	7	5	3	12	5	9	5	4	3	3	3	1	2	69	4
Candles, various accidents with	56	146	110	157	125	132	128	169	134	139	166	205	165	229	237	237	241	2876	169
Carelessness, palpable instances of	23	..	19	18	7	17	14	24	25	19	27	15	14	15	20	23	24	309	18
Children playing with fire or candles	..	..	5	6	18	5	12	21	18	16	20	23	19	25	16	19	15	228	14
Drunkenness	..	2	3	..	2	4	6	5	5	11	6	9	7	9	5	3	7	84	5
Fire-heat, application of, to various hazardous manufacturing processes	31	24	39	34	22	40	26	29	16	36	14	21	22	25	16	22	23	440	26
Fire-sparks	..	..	..	7	10	12	9	17	13	23	17	27	24	32	65	63	40	359	21
Fire-works	..	..	3	..	5	3	5	1	4	7	5	3	10	9	6	1	8	70	4
Fires kindled on hearths and other improper places	7	..	9	5	5	15	8	7	8	9	9	8	12	7	3	4	4	120	7
Flues, foul, defective, &c.	71	65	69	72	53	56	56	89	83	90	105	84	78	86	78	56	78	1273	75
Fumigation, incautious	..	3	7	5	2	1	5	3	2	2	1	1	3	4	4	4	2	49	3
Furnaces, kilns, &c, defective or over-heated	..	11	2	9	12	15	20	15	12	23	19	17	29	28	14	16	21	263	16
Gas	20	25	39	38	31	42	72	46	48	52	40	33	54	53	63	65	57	780	46
Gunpowder	3	3	..	1	3	1	2	..	..	3	1	..	1	..	2	..	2	22	1
Hearths, defective, &c.	..	..	..	..	..	..	..	..	..	3	5	2	..	4	3	4	3	24	1
Hot cinders put away	..	..	..	..	..	..	..	..	..	3	3	7	10	8	9	5	11	56	3
Lamps	..	..	..	2	3	9	4	3	5	2	2	6	11	7	2	3	17	76	5
Lime, slaking of	..	3	4	3	..	4	2	2	5	4	2	3	9	7	5	5	3	61	4
Linen, drying, airing, &c.	..	..	22	31	46	32	26	25	27	41	33	45	30	39	34	36	40	509	30
Lucifer-matches	..	..	..	..	8	9	17	18	16	17	14	19	12	14	9	23	12	188	11
Ovens	6	..	..	6	3	11	4	13	13	13	10	10	8	8	8	2	2	117	7
Reading, working, or smoking in bed	..	3	..	..	..	1	2	..	5	2	3	..	..	3	1	1	1	22	1
Shavings, loose, ignited	..	6	9	13	8	17	8	27	35	22	31	18	25	35	37	27	21	339	20
Spontaneous combustion	7	2	5	4	4	5	13	11	22	20	23	34	19	18	15	7	19	228	13
Stoves, defective, over-heated, &c.	18	20	11	23	36	31	24	48	54	32	58	44	51	43	37	48	43	626	37
Tobacco smoking	..	6	4	1	3	4	11	9	22	17	14	21	19	29	18	37	24	239	14
Suspicious	..	..	..	..	7	8	6	11	7	9	16	7	9	7	17	11	10	125	7
Wilful	3	9	6	8	5	6	7	9	13	19	21	11	14	19	17	25	19	211	12
Unknown	125	114	91	96	57	45	67	39	23	32	60	74	32	39	72	38	76	1080	63

Here, then, we perceive that there are, upon an average of 17 years, no less than 770 "fires" per annum, that is to say, 29 houses in every 10,000 are discovered to be on fire every year; and about one-fourth of these are uninsured. In the year 1833 the total number of fires was only 458, or 20 in every 10,000 inhabited houses, whilst, in 1849, the number had gradually progressed to 838, or 28 in every 10,000 houses.

We have here, however, to deal more particularly with the causes of these fires, of which the following table gives the result of many years' valuable experience:—

TABULAR EPITOME OF METROPOLITAN FIRES, FROM 1833 to 1849.

By W. Baddeley, 29, Alfred Street, Islington.

	1833	1834	1835	1836	1837	1838	1839	1840	1841	1842	1843	1844	1845	1846	1847	1848	1849	Total.	Average
Slightly damaged	292	338	315	397	357	393	402	451	438	521	489	502	431	576	536	509	592	6,574	470
Seriously damaged	135	116	125	134	122	152	165	204	234	224	231	237	244	238	273	269	228	2,955	211
Totally destroyed	31	28	31	33	22	33	17	26	24	24	29	23	32	20	27	27	28	365	26
Total No. of Fires	458	482	471	564	501	568	584	681	696	769	749	762	707	834	836	805	838	9,894	770
False Alarms	59	63	66	66	89	80	70	84	67	61	79	70	81	119	88	120	76	1,150	82
Alarms from Chimneys on Fire	75	106	106	126	127	107	101	98	92	82	83	94	87	69	66	86	89	1,307	94
Total No. of Calls	592	651	643	756	717	755	755	963	855	912	911	926	875	1022	990	1011	1003	12,351	882
Insuran. on Building and Contents	..	..	..	169	173	161	169	237	343	321	276	313	313	302	263	310	368	3,718	266
Insurances on Building only ..	..	..	..	73	47	59	58	92	149	116	124	138	107	137	125	120	163	1,508	108
Insurances on Contents only..	..	..	..	104	76	128	115	104	52	112	107	94	73	125	157	134	72	1,453	104
Uninsured	..	..	..	218	205	220	242	248	152	220	242	217	214	270	291	241	235	3,215	230

Thus we perceive that, out of an average of 665 fires per annum, the information being derived from 17 years' experience, the following were the number of fires produced by different causes:—

	Average No. of Fires per Annum.
Candles, various accidents with	169
Flues, foul, defective, &c.	75
Unknown	63
Gas	46
Stoves over-heated	37
Linen, drying, airing, &c.	30
Accidents of various kinds, for the most part unavoidable	27
Fire heat, application of, to various hazardous manufacturing processes	26
Fire sparks	21
Shavings, loose, ignited	20
Carelessness, palpable instances of	18
Furnaces, kilns, &c., defective or over-heated	16
Children playing with fire or candles	14
Tobacco smoking	14
Spontaneous combustion	13
Wilful	12
Lucifer-matches	11
Ovens	7
Fires, kindled on hearths and other improper places	7
Suspicious	7
Lamps	5
Drunkenness	5
Lime, slaking of	4
Apparel, ignited on the person	4
Fireworks	4
Hot cinders put away	3
Incautious fumigation	3
Reading, working, or smoking in bed	1·33
Hearths defective	1·25
	665

Here, then, we find that while the greatest proportion of fires are caused by accidents with candles, about one-ninth of the fires above mentioned arise from foul flues, or 75 out of 665, a circumstance which teaches us the usefulness of the class of labourers of whom we have been lately treating.

It would seem that a much larger proportion of the fires are wilfully produced than appear in the above table.

The Board of Health, in speaking of incendiarism in connection with insurance, report:—

"Inquiries connected with measures for the improvement of the population have developed the operation of insurances, in engendering crimes and calamities; negatively, by weakening natural responsibilities and motives to care and forethought; positively, by temptations held out to the commission of crime in the facility with which insurance money is usually obtainable.

"The *steady increase* in the number of fires in the metropolis, whilst our advance in the arts gives means for their diminution, is ascribable mainly to the operation of these two causes, and to the division and weakening of administrative authority. From information on which we can rely, we feel assured that the crime of incendiarism for the sake of insurance money exists to a far greater extent than the public are aware of."

Mr. Braidwood has expressed his opinion that only one-half of the property in the metropolis is insured, not as to numbers of property, but as to value; but the proportion of insured and uninsured houses could not be ascertained.

Mr. Baddeley, the inspector to the Society for the Protection of Life from Fire, who had given attention to the subject for the last 30 years, gave the Board the following account of the increase of fires:—

—	Fires per Annum of Houses and Properties.	Of which were Totally Uninsured.	Proportion per Cent. of Insured Houses and Properties Burnt.
In the first seven years there were on an average .	623	215	65·15
In the second seven years . .	790	244	69·3

During this period there has been a great increase in the number of dwellings, but this has been chiefly in suburban places, where fires rarely occur.

"The frequency of fires," it is further stated, "led Mr. Payne, the coroner of the City of London, to revive the exercise of the coroner's function of inquiring into the causes of fires; most usefully. Out of 58 inquests held by him (in the City of London and the borough of Southwark, which comprise only one-eighteenth of the houses of the metropolis) since 1845, it appears that, 8 were proved to be wilful; 27 apparently accidental; and 23 from causes unknown, including suspicious causes. The proportion of ascertained wilful fires was, therefore, 23 per cent.; which gives strong confirmation to the indications presented by the statistical returns as to the excess of insured property burnt above uninsured."

The at once mean and reckless criminality of arson, by which a man exposes his neighbours to the risk of a dreadful death, which he himself takes measures to avoid, has long, and on many occasions, gone unpunished in London. The insurance companies, when a demand is made upon them for a loss through fire, institute an inquiry, carried on quietly by their own people. The claimant is informed, if sufficient reasons for such a step appear, that from suspicious circumstances, which had come to the knowledge of the company, the demand would not be complied with, and that the company would resist any action for the recovery of the money. The criminal becomes alarmed, he is afraid of committing himself, and so the matter drops, and the insurance companies, not being required to pay the indemnification, are satisfied to save their money, and let the incendiarism remain unnoticed or unpunished. Mr. Payne, the coroner, has on some occasions strongly commented on this practice as one which showed the want of a public prosecutor.

A few words as regards the means of extinction and help at fires.

Upwards of two years ago the Commissioners of Police instructed their officers to note the time which elapsed between the earliest alarm of fire and the arrival of the first engine. Seventeen fires were noted, and the average duration of time before the fire-brigade or any parochial or local fire-engine, reached the spot, was 36 minutes. Two or three of these fires were in the suburbs: so that in this crowded city, so densely packed with houses and people, fifteen fires raged unchecked for more than half-an-hour.

There are in the metropolis, not including the more distant suburbs, 150 public fire stations, with engines provided under the management of the parochial authorities. The fire-brigade has but seventeen stations on land, and two on the river, which are, indeed, floating engines, one being usually moored near Southwark-bridge, the other having no stated place, being changed in its locality, as may be considered best. In the course of three years, the term of the official inquiry, the engines of the fire-brigade reached on the average the place where a fire was raging *thirty-five* times as the earliest means of assistance, when the parochial engines did the same only in the proportion of *two* to the thirty-five.

Mr. Braidwood, the director of the fire-brigade, stated, when questioned on the subject with a view to a report to be laid before Parliament, that "the average time of an engine turning out with horses was from three to seven minutes." The engines are driven at the rate of ten miles an hour along the streets, which, in the old coaching days, was considered the "best royal mail pace." Indeed, there have been frequent complaints of the rapidity with which the fire-engines are driven, and if the drivers were not skilful and alert, it would really amount to recklessness.

"Information of the breaking out of a fire," it is stated in the report, "will be conveyed to the station of the brigade at the rate of about five miles an hour: thus in the case of the occurrence of a fire within a mile of the station, the intelligence may be conveyed to the station in about twelve minutes; the horses will be put to, and the engine got out into the street in about five minutes on the average; it traverses the mile in about six minutes; and the water has to be got into the engine, which will occupy about five minutes, making, under the most favourable circumstances for such a distance, 28 minutes, or for a half-mile distance, an average of not less than 20 minutes."

The average distance of the occurring fires from a brigade station were, however, during a period of three years, terminating in 1850, upwards of a mile. One was five miles, several four miles, more were two miles, and a mile and a half, while the most destructive fires were at an average distance of a mile and three quarters. Thus it was impossible for a fire-brigade to give assistance as soon as assistance was needed, and, under other circumstances, might have been rendered. And all this damage may and does very often result from what seems so trifling a neglect as the non-sweeping of a chimney.

Mr. W. Baddeley, an engineer, and a high authority on this subject, has stated that he had attended fires for 30 years in London, and that, of 838 fires which took place in 1849, two-thirds might have been easily extinguished had there been an immediate application of water. In some places, he said, delay originated from the turncocks being at wide intervals, and some of the

companies objecting to let any but their own servants have the command of the main-cocks.

The Board of Health have recommended the formation of a series of street-water plugs within short distances of each other, the water to be constantly on at high pressure night and day, and the whole to be under the charge of a trained body of men such as compose the present fire-brigade, provided at appointed stations with every necessary appliance in the way of hose, pipes, ladders, &c. "The hose should be within the reach," it is urged in the report, "fixed, and applied on an average of not more than five minutes from the time of the alarm being given; that is to say, in less than one-fourth of the time within which fire-engines are brought to bear under existing arrangements, and with a still greater proportionate diminution of risks and serious accidents."

Nor is this mode of extinguishing fires a mere experiment. It is successfully practised in some of the American cities, Philadelphia among the number, and in some of our own manufacturing towns. Mr. Emmott, the engineer and manager of the Oldham Water-works, has described the practice in that town on the occurrence of fires:—

"In five cases out of six, the hose is pushed into a water-plug, and the water thrown upon a building on fire, for the average pressure of water in this town is 146 feet; by this means our fires are generally extinguished even before the heavy engine arrives at the spot. The hose is much preferred to the engine, on account of the speed with which it is applied, and the readiness with which it is used, for one man can manage a hose, and throw as much water on the building on fire as an engine worked by many men. On this account we very rarely indeed use the engines, as they possess no advantage whatever over the hose."

When the city of Hamburgh was rebuilt two or three years back, after its destruction by fire, it was rebuilt chiefly under the direction of Mr. W. Lindley, the engineer, and, as far as Mr. Lindley could accomplish, on sanitary principles, such as the abolition of cesspools. The arrangements for the surface cleansing of the streets by means of the hose and jet and the water-plugs, are made available for the extinction of fires, and with the following results, as communicated by Mr. Lindley:—

"Have there been fires in buildings in Hamburgh in the portion of the town rebuilt?—Yes, repeatedly. They have all, however, been put out at once. If they had had to wait the usual time for engines and water, say 20 minutes or half an hour, these might all have led to extensive conflagrations.

"What has been the effect on insurance?—The effect of the rapid extinction of fires has brought to light to the citizens of Hamburgh, the fact that the greater proportion of their fires are the work of incendiaries, for the sake of the insurance money. A person is absent; smoke is seen to exude; the alarm of fire is given, and the door is forced open, the jet applied, and the fire extinguished immediately. Case after case has occurred, where, upon the fire being extinguished, the arrangements for the spread of the fire are found and made manifest. Several of this class of incendiaries for the insurance money are now in prison. The saving of money alone, by the prevention of fires, would be worth the whole expense of the like arrangement in London, where it is well known that similar practices prevail extensively."

The following statement was given by Mr. Quick, an engineer, on this subject:—

"After the destruction of the terminus of the South Western Railway by fire, I recommended them to have a 9-inch main, with 3-inch outlets leading to six stand-pipes, with joining screws for hose-pipes to be attached, and that they should carry a 3-inch pipe of the same description up into each floor, so that a hose might be attached in any room where the fire commenced.

"In how many minutes may the hose be attached?—There is only the time of attaching the hose, which need be nothing like a minute. I have indeed recommended that a short length of hose with a short nozzle or branch should be kept attached to the cock, so that the cock has only to be turned, which is done in an instant.

"It appears that fire-engines require 26 men to work each engine of two 7-inch barrels, to produce a jet of about 50 feet high. The arrangement carried out, at your recommendation, with six jets, is equivalent to keeping six such engines, and the power of 156 men, in readiness to act at all times, night and day, at about a minute's notice, for the extinction of fires?—It will give a power more than equal to that number of men; for the jets given off from a 20-inch main will be much more regular and powerful, and will deliver more water than could be delivered by any engine. The jets at that place would be 70 feet high."

The system of roof-cisterns, which was at one time popular as a means of extinction, has been found, it appears, on account of their leakage and diffusion of damp, to be but sorry contrivances, and have very generally been discontinued. Mr. Holme, a builder in Liverpool, gives the following, even under the circumstances, amusing account of a fire where such a cistern was provided:—

"The owner of a cotton kiln, which had been repeatedly burnt, took it into his head to erect a large tank in the roof. His idea was, that when a fire occurred, they should have water at hand; and when the fire ascended, it would burn the wooden tank, and the whole of the contents being discharged on the fire like a cataract, it would at once extinguish it. Well, the kiln again took fire; the smoke was so suffocating, that nobody could get at the internal pipe, and the whole building was again destroyed. But what became of the tank? It could not burn, because it was filled with water; consequently, it boiled most admirably. No hole was singed in its side or bottom; it looked very picturesque, but it was utterly useless."

The necessity of almost immediate help is shown in the following statement by Mr. Braidwood, when consulted on the subject of fire-escapes, which under the present system are not considered sufficiently effective:—

"Taking London to be six miles long and three miles broad, to have anything like an efficient system of fire-escapes, it would be necessary to have one with a man to attend it within a quarter of a mile of each house, as assistance, to be *of any use, must generally be rendered within five minutes after the alarm is given*. To do this the stations must be within a quarter of a mile of each other (as the escapes must be taken round the angles of the streets): 253 stations would thus be required and as many men.

"At present scaling ladders are kept at all the engine stations, and canvas sheets also at some of them; several lives have been saved by them; but the distance of the stations from each other renders them applicable only in a limited number of instances."

The engines of the fire-brigade throw up about 90 gallons a minute. Their number is about 100. The cost of a fire-engine is from 60*l.* to 100*l.*, and the hose, buckets, and general apparatus, cost nearly the same amount.

Of the Sewermen and Nightmen of London.

We now come to the consideration of the last of the several classes of labourers engaged in the removal of the species of refuse from the metropolis. I have before said that the public refuse of a town consists of two kinds:—

I. The street-refuse.
II. The house-refuse.

Of each of these kinds there are two species:—

A. The dry.
B. The wet.

The dry street-refuse consists, as we have seen, of the refuse earth, bricks, mortar, oyster-shells, potsherds, and pansherds.

And the dry house-refuse of the soot and ashes of our fires.

The wet street-refuse consists, on the other hand, of the mud, slop, and surface water of our public thoroughfares.

And the wet house-refuse, of what is familiarly known as the "slops" of our residences, and the liquid refuse of our factories and slaughter-houses.

We have already collected the facts in connection with the three first of these subjects. We have ascertained the total amount of each of these species of refuse which have to be annually removed from the capital. We have set forth the aggregate number of labourers who are engaged in the removal of it, as well as the gross sum that is paid for so doing, showing the individual earnings of each of the workmen, and arriving, as near as possible, at the profits of their employers, as well as the condition of the employed. This has been done, it is believed, for the first time in this country; and if the subject has led us into longer discussions than usual, the importance of the matter, considered in a sanitary point of view, is such that a moment's reflection will convince us of the value of the inquiry—especially in connection with a work which aspires to embrace the whole of the offices performed by the labourers of the capital of the British Empire.

It now but remains for us to complete this novel and vast inquiry by settling the condition and earnings of the men engaged in the removal of the last species of public refuse. I shall consider, first, the aggregate quantity of wet house-refuse that has to be annually removed; secondly, the means adopted for the removal of it; thirdly, the cost of so doing; and lastly, the number of men engaged in this kind of work, as well as the wages paid to them, and the physical, intellectual, and moral condition in which they exist, or, more properly speaking, are allowed to remain.

Of the Wet House-Refuse of London.

All house-refuse of a liquid or semi-liquid character is *wet* refuse. It may be called semi-liquid when it has become mingled with any solid substance, though not so fully as to have lost its property of fluidity, its natural power to flow along a suitable inclination.

Wet house-refuse consists of the "slops" of a household. It consists, indeed, of *all* waste water, whether from the supply of the water companies, or from the rain-fall collected on the roofs or yards of the houses; of the "suds" of the washerwomen, and the water used in every department of scouring, cleansing, or cooking. It consists, moreover, of the refuse proceeds from the several factories, dye-houses, &c.; of the blood and other refuse (not devoted to Prussian blue manufacture or sugar refining) from the butchers' slaughter-houses and the knackers' (horse slaughterers') yards; as well as the refuse fluid from all chemical processes, quantities of chemically impregnated water, for example, being pumped, as soon as exhausted, from the tan-pits of Bermondsey into the drains and sewers. From the great hat-manufactories (chiefly also in Bermondsey and other parts of the Borough) there is a constant flow of water mixed with dyes and other substances, to add to the wet refuse of London.

It is evident, then, that *all* the water consumed or wasted in the metropolis must form a portion of the total sum of the wet refuse.

There is, however, the exception of what is used for the watering of gardens, which is absorbed at once by the soil and its vegetable products; we must also exclude such portion of water as is applied to the laying of the road and street dust on dry summer days, and which forms a part of the street mud or "mac" of the scavager's cart, rather than of the sewerage and we must further deduct the water derived from the street plugs for the supply of the fire-engines, which is consumed or absorbed in the extinction of the flames; as well as the water required for the victualling of ships on the eve of a voyage,

when such supply is not derived immediately from the Thames.

The quantity of water required for the diet, or beverage, or general use of the population; the quantity consumed by the maltsters, distillers, brewers, ginger-beer and soda-water makers, and manufacturing chemists; for the making of tea, coffee, or cocoa; and for drinking at meals (which is often derived from pumps, and not from the supplies of the water companies);—the water which is thus consumed, in a prepared or in a simple state, passes into the wet refuse of the metropolis in another form.

Now, according to reports submitted to Parliament when an improved system of water-supply was under consideration, the daily supply of water to the metropolis is as follows:—

	Gallons.
From the Water Companies .	44,383,329
„ „ Artesian Wells . .	8,000,000
„ „ land spring pumps .	3,000,000
	55,383,329

The yearly rain-fall throughout the area of the metropolis is 172,053,477 tons, or 33,589,972,120 gallons, 2 feet deep of rain falling on every square inch of London in the course of the year. The yearly total of the water pumped or falling into the metropolis is as follows:—

	Gallons.
Yearly mechanical supply .	19,215,000,000
„ natural ditto . .	38,539,972,122
	57,754,972,122

The reader will find the details of this subject at p. 203 of the present volume. I recapitulate the results here to save the trouble of reference, and briefly to present the question under one head.

Of course the rain which ultimately forms a portion of the gross wet refuse of London, can be only such as falls on that part of the metropolitan area which is occupied by buildings or streets. What falls upon fields, gardens, and all open ground, is absorbed by the soil. But a large proportion of the rain falling upon the streets, is either absorbed by the dry dust, or retained in the form of mud; hence that only which falls on the house-tops and yards can be said to contribute largely to the gross quantity of wet refuse poured into the sewers. The streets of London appear to occupy one-tenth of the entire metropolitan area, and the houses (estimating 300,000 as occupying upon an average 100 square yards each*) another tithe of the surface. The remaining 92 square miles out of the 115 now included in the Registrar-General's limits (which extend, it should be remembered, to Wandsworth, Lewisham, Bow, and Hampstead), may be said to be made up of suburban gardens, fields, parks, &c., where the rain-water would soak into the earth. We have, then, only two-tenths of the gross rain-fall, or 7,700,000,000 gallons, that could possibly appear in the sewers, and calculating one-third of this to be absorbed by the mud and dust of the streets, we come to the conclusion that the total quantity of rain-water entering the sewers is, in round numbers, 5,000,000,000 gallons per annum.

Reckoning, therefore, 5,000,000,000 gallons to be derived from the annual rain-fall, it appears that the yearly supply of water, from all sources, to be accounted for among the wet house-refuse is, in round numbers, 24,000,000,000 gallons.

The refuse water from the factories need not be calculated separately, as its supply is included in the water mechanically supplied, and the loss from evaporation in boiling, &c., would be perfectly insignificant if deducted from the vast annual supply, but 350,000,000 gallons have been allowed for this and other losses.

There is still another source of the supply of wet house-refuse unconnected either with the rain-fall or the mechanical supply of water—I mean such proportion of the blood or other refuse from the butchers' and knackers' premises as is washed into the sewers.

Official returns show that the yearly quantity of animals sold in Smithfield is—

Horned cattle	224,000
Sheep	1,550,000
Calves	27,300
Pigs	40,000
	1,841,300

The blood flowing from a slaughtered bullock, whether killed according to the Christian or the Jewish fashion, amounts, on an average, to 20 quarts; from a sheep, to 6 or 7 quarts; from a pig, 5 quarts; and the same quantity from a calf. The blood from a horse slaughtered in a knackers' yard is about the same as that from a bullock. This blood used to bring far higher prices to the butcher than can be now realized.

In the evidence taken by a Select Committee of the House of Commons in 1849, concerning Smithfield-market, Mr. Wyld, of the Fox and Knot-yard, Smithfield, stated that he slaughtered about 180 cattle weekly. "We have a sort of well made in the slaughterhouse," he said, "which receives the blood. I receive about 1*l.* a week for it; it goes twice a day to Mr. Ton's, at Bow Common. We used to receive a good deal more for it." Even the market for blood at Mr. Ton's, is, I am informed, now done away with. He was a manufacturer of artificial manure, a preparation of night-soil, blood, &c., baked in what may be called "cakes," and exported chiefly to our sugar-growing colonies, for manure. His manure yard has been suppressed.

I am assured, on the authority of experienced butchers, that at the present time fully three-fourths of the blood from the animals slaughtered in London becomes a component part of the wet refuse I treat of, being washed into the sewers.

* In East and West London there are rather more than 32 houses to the acre, which gives an average of 151 square yards to each dwelling, so that, allowing the streets here to occupy one-third of the area, we have 100 square yards for the space covered by each house. In Lewisham, Hampstead, and Wandsworth, there is not one house to the acre. The average number of houses per acre throughout London is 4.

STREET CONJURER PERFORMING.

The more wholesale slaughterers, now that blood is of little value (9 gallons in Whitechapel-market, the blood of two beasts—less by a gallon—can be bought for 3*d.*), send this animal refuse down the drains of their premises in far greater quantities than was formerly their custom.

Now, reckoning only three-fourths of the blood from the cattle slaughtered in the metropolis, to find its way into the sewers, we have, according to the numbers above given, the following yearly supply:—

	Gallons.
From horned cattle	840,000
„ sheep	1,743,000
„ pigs	37,500
„ calves	25,590
	2,646,090

This is merely the blood from the animals sold in Smithfield-market, the lambs not being included in the return; while a great many pigs and calves are slaughtered by the London tradesmen, without their having been shown in Smithfield.

The ordure from a slaughtered bullock is, on an average, from ½ to ¾ cwt. Many beasts yield one cwt.; and cows "killed full of grass," as much as two cwt. Of this excrementitious matter, I am informed, about a fourth part is washed into the sewers. In sheep, calves, and pigs, however, there is very little ordure when slaughtered, only 3 or 4 lbs. in each as an average.

Of the number of horses killed there is no official or published account. One man familiar with the subject calculated it at 100 weekly. *All* the blood from the knackers' yards is, I am told, washed into the sewers; consequently its yearly amount will be 26,000 gallons.

But even this is not the whole of the wet house-refuse of London.

There are, in addition, the excreta of the inhabitants of the houses. These are said to average ¼ lb. daily per head, including men, women, and children.

It is estimated by Bousingault, and confirmed by Liebig, that each individual produces ¼ lb. of solid excrement and 1¼ lb. of liquid excrement per day, making 1½ lb. each, or 150 lbs. per 100 individuals, of semi-liquid refuse from the water-closet. "But," says the Surveyor of the Metropolitan Commission of Sewers, "there is other refuse resulting from culinary operations, to be conveyed through the drains, and the whole may be about 250 lbs. for 100 persons."

The more fluid part of this refuse, however, is included in the quantity of water before given, so that there remains only the more solid excrementitious matter to add to the previous total. This, then, is ¼ lb. daily and individually; or from the metropolitan population of nearly 2,500,000 a daily supply of 600,000 lbs., rather more than 267 tons; and a yearly aggregate for the whole metropolis of 219,000,000 lbs., or very nearly about 100,000 tons.

From the foregoing account, then, the following is shown to be

The Gross Quantity of the Wet House-Refuse of the Metropolis.

	Gallons.	Lbs.
"Slops" and unabsorbed rain-water....	24,000,000,000 =	240,000,000,000
Blood of beasts....	2,646,000 =	26,460,000
„ horses....	26,000 =	260,000
Excreta		219,000,000
Dung of slaughtered cattle		17,400,000
Total	24,002,657,000 =	240,263,120,000

Hence we may conclude that the more fluid portion of the wet house-refuse of London amounts to 24,000,000,000 gallons per annum; and that altogether it weighs, in round numbers, about 240,000,000,000 lbs., or 100,000,000 tons.

As these refuse products are not so much matters of trade or sale as other commodities, of course less attention has been given to them, in the commercial attributes of weight and admeasurement. I will endeavour, however, to present an uniform table of the whole great mass of metropolitan wet house-refuse in cubic inches.

The imperial standard gallon is of the capacity of 277·274 cubic inches; and estimating the solid excrement spoken of as the ordinary weight of earth, or of the soil of the land, at 18 cubic feet the ton, we have the following result, calculating in round numbers:—

Wet House-Refuse of the Metropolis.

Liquid ..	24,000,000,000 gal. =	6,600,000,000,000 cub. in.
Solid....	100,000 tons =	3,110,400,000 „

Thus, by this process of admeasurement, we find the

Wet House-Refuse of London.....	= 6,603,110,400,000 cubic in., or 3,820,000,000 cubic feet.

Figures best show the extent of this refuse, "inexpressible" to common appreciation "by numbers that have name."

Of the Means of Removing the Wet House-refuse.

Whether this mass of filth be, zymotically, the cause of cholera, or whether it be (as cannot be be questioned) a means of agricultural fertility, and therefore of national wealth, it *must* be removed. I need not dilate, in explaining a necessity which is obvious to every man with uncorrupted physical senses, and with the common moral sense of decency.

"Dr. Paley," it is said, in a recent Report to the Metropolitan Commission of Sewers, "gave to Burckhardt and other travellers a set of instructions as to points of observation of the manners and conditions of the populations amongst whom they travelled. One of the leading instructions was to observe how they disposed of their excreta, for what they did with that showed him what men were; he also inquired what structure they had to answer the purpose of a privy, and what were their habits in respect to it. This information Dr Paley desired, not for popular use, but for himself, for he was accustomed to say, that the facts connected with that topic gave him more

information as to the real condition and civilisation of a population than most persons would be aware of. It would inform him of their real habits of cleanliness, of real decency, self-respect, and connected moral habits of high social importance. It would inform him of the real state of police, and of local administration, and much of the general government.

"The human ordure which defiles the churches, the bases of public edifices and works of art in Rome and Naples, and the Italian cities, gives more sure indications of the real moral and social position of the Italian population than any impressions derived from the edifices and works of art themselves.

"The subject, in relation to which the Jewish lawgiver gave most particular directions, is one on which the serious attention and labour of public administrators may be claimed."

The next question, is—*How* is the wet house-refuse to be removed?

There are two ways:—

1. One is, to transport it to a river, or some powerfully current stream by a series of ducts.
2. The other is, to dig a hole in the neighbourhood of the house, there collect the wet refuse of the household, and when the hole or pit becomes full, remove the contents to some other part.

In London the most obvious means of getting rid of a nuisance is to convey it into the Thames. Nor has this been done in London only. In Paris the Seine is the receptacle of the sewage, but, comparatively, to a much smaller extent than in London. The fæcal deposits accumulated in the houses of the French capital are drained into "fixed" and "moveable" cesspools. The contents of both these descriptions of cesspools (of which I shall give an account when I treat of the cesspool system) are removed periodically, under the direction of the government, to large receptacles, called *voiries*, at Montfaucon, and the Forest of Bondy, where such refuse is made into portable manure. The evils of this system are not a few; but the river is spared the greater pollution of the Thames. Neither is the Seine swayed by the tide as is the Thames, for in London the very sewers are affected by the tidal influence, and are not to be entered until some time before or after high-water. I need not do more, for my present inquiry, than allude to the Liffy, the Clyde, the Humber, and others of the rivers of the United Kingdom, being used for purposes of sewerage, as channels to carry off that of which the law prohibits the retention.

Of the folly, not to say wickedness, of this principle, there can be no doubt. The vegetation which gives, demands food. The grass will wither without its fitting nutriment of manure, as the sheep would perish without the pasturage of the grass. Nature, in temperate and moist climates, is, so to speak, her own manurer, her own restorer. The sheep, which are as wild and active as goats, manure the Cumberland fells in which they feed. In the more cultivated sheep-walks (or, indeed, in the general pasturage) of the northern and some of the midland counties, women, with a wooden implement, may be continually seen in the later autumn, or earlier and milder winter, distributing the "stercoraceous treasure," as Cowper calls it, which the animals, to use the North Yorkshire word, have "dropped," as well as any extraneous manure which may have been spread for the purpose. As population and the demand for bread increase, the need of extraneous manures also increases; and Nature in her beneficence has provided that the greater the consumption of food, the greater shall be the promoters of its reproduction by what is loathsome to man, but demanded by vegetation. Liebig, as I shall afterwards show more fully, contends that many an arid and desolate region in the East, brown and burnt with barrenness, became a desolation because men understood not the restoration which all nature demands for the land. He declares that the now desolate regions of the East had been made desolate, because "the inhabitants did not understand the art of restoring exhausted soil." It would be hopeless now to form, or attempt to form, the "hanging gardens," or to display the rich florescence "round about Babylon," to be seen when Alexander the Great died in that city. The Tigris and Euphrates, before and after their junction, Liebig maintains, have carried, and, to a circumscribed degree, still carry, into the sea "a sufficient amount of manure for the reproduction of food for millions of human beings." It is said that, "could that matter only be arrested in its progress, and converted into bread and wine, fruit and beef, mutton and wool, linen and cotton, then cities might flourish once more in the desert, where men are now digging for the relics of primitive civilization, and discovering the symbols of luxury and ease beneath the barren sand and the sunburnt clay."

This is one great evil; but in our metropolis there is a greater, a far greater, beyond all in degree, even if the same abuse exist elsewhere. What society with one consent pronounces filth—the evacuations of the human body—is not only washed into the Thames, and the land so deprived of a vast amount of nutriment, but the tide washes these evacuations back again, with other abominations. The water we use is derived almost entirely from the Thames, and therefore the water in which we boil our vegetables and our meat, the water for our coffee and tea, the water brewed for our consumption, comes to us, and is imbibed by us, impregnated over and over again with our own animal offal. We import guano, and drink a solution of our own fæces: a manure which might be made far more valuable than the foreign guano.

Such are a few of the evils of making a common sewer of the neighbouring river.

The other mode of removal is, to convey the wet house-refuse, by drains, to a hole near the house where it is produced, and empty it periodically when full.

The house-drainage throughout London has two characteristics. By one system all excrementitious and slop refuse generally is carried usually along

brick drains from the water-closets, privies, sinks, lavatories, &c., of the houses into the cesspools, where it accumulates until its removal (by manual labour) becomes necessary, which is not, as an average, more than once in two years. By the other, and the newer system, all the house-refuse is drained into the public sewer, the cesspool system being thereby abolished. All the houses built or rebuilt since 1848 are constructed on the last-mentioned principle of drainage.

The first of these modes is cesspoolage.

The second is sewerage.

I shall first deal with the sewerage of the metropolis.

Of the Quantity of Metropolitan Sewage.

Having estimated the gross quantity of wet house-refuse produced throughout London in the course of the year, and explained the two modes of removing it from the immediate vicinity of the house, I will now proceed to set forth the *quantity* of wet house-refuse matter which it has been *ascertained* is removed with the contents of London sewers.

An experiment was made on the average discharge of sewage from the outlets of Church-lane and Smith-street, Chelsea, Ranelagh, King's Scholar's-pond, Grosvenor-wharf, Horseferry-road, Wood-street, King-street, Northumberland-street, Durham-yard, Norfolk-street, and Essex-street (the four last-mentioned places running from the Strand). The experiments were made "under ordinary and extraordinary circumstances," in the months of May, June, and July, 1844, but the system is still the same, so that the result in the investigation as to the sewage of the year 1844 may be taken as a near criterion of the present, as regards the localities specified and the general quantity.

The surface drained into the outlets before enumerated covers, in its total area, about 7000 acres, of which nearly 3500 may be classed as urban. The observations, moreover, were made generally during fine weather.

I cannot do better by way of showing the reader the minuteness with which these observations were made, than by quoting the two following results, being those of the fullest and smallest discharges of twelve issues into the river. I must premise that these experiments were made on seven occasions, from May 4 to July 12 inclusive, and made at different times, but generally about eight hours after high water. In the Northumberland-street sewer, from which was the largest issue, the width of the sewer at the outlet was five feet. In the King-street sewer (the smallest discharge, as given in the second table) the width of the sewer was four feet. The width, however, does not affect the question, as there was a greater issue from the Norfolk-street sewer of two feet, than from the King-street sewer of four feet in width.

Northumberland Street.

Date.	Velocity per second.	Quantity discharged per second.
	Feet.	Cubic Feet.
May 4 .	4·600	10·511000
„ 9 .	4·000	6·800000
June 5 .	4·000	6·800000
„ 10 .	4·600	10·350000
„ 11 .	4·920	12·300000
„ 16 .	3·600	5·940000
July 12 .	2·760	3·394800
		56·095800
Being Mean Discharge per second		8·013685
Ditto per 24 hours . .		692382·

King Street.

May 4 .	·147	·021756
„ 9 .	·333	·079920
June 5 .	·170	·020400
„ 10 .	·311	·064688
„ 11 .	·300	·048000
„ 16 .	·101	·004040
July 12 .	·103	·008240
		·247044
Mean Discharge per second .		·035292
Ditto per 24 hours		3049·

Here we find that the mean discharge per second was, from the Northumberland-street sewer, 692,382· cubic feet per 24 hours, and from the King-street sewer, 3049 cubic feet per 24 hours.

The discharge from the principal outlets in the Westminster district "being the mean of seven observations taken during the summer," was 1,798,094 cubic feet in 24 hours; the number of acres drained was 7006. *The mean discharge per acre, in the course of 24 hours, was found to be about 256 cubic feet, comprising the urban and suburban parts.*

The sewage, from the discharge of which this calculation was derived—and the dryness of the weather must not be lost sight of—may be fairly assumed as derived (in a dry season) almost entirely from artificial sources or house drainage, as there was no rain-fall, or but little. "*Supposing, therefore,*" the Report states, "*the entire surface to be urban, we have 540 cubic feet as the mean daily discharge per acre.* If, however, the average be taken of the first eight outlets, viz., from Essex-street to Grosvenor-wharf inclusive, which drain a surface wholly urban, the result is 1260 cubic feet per acre in the 24 hours. This excess may be attributed to the number of manufactories, and the densely-populated nature of the locality drained; but, as indicative of the general amount of sewage due to ordinary urban districts, the former ought perhaps to be considered the fairer average."

It is then assumed—I may say officially—that the average discharge of the urban and suburban sewage from the several districts included within an area of 58 square miles, is equal to 256 cubic feet per acre.

	Sq. Miles.
The extent of the jurisdiction included within this area is, on the north side of the Thames	43
And on the Surrey and Kent side	15

	Cubic Feet.
The ordinary *daily* amount of sewage discharged into the river on the north side is, therefore . .	7,045,120
And on the south side. . .	2,457,600
Making a total of . . .	9,502,720

Or a quantity equivalent to a surface of more than 36 acres in extent, and 6 feet in depth.

This mass of sewage, it must be borne in mind, is but the *daily* product of the sewage of the more populous part of the districts included within the jurisdiction of the two commissions of sewers.

The foregoing observations, calculations, and deductions have supplied the basis of many scientific and commercial speculations, but it must be remembered that they were taken between seven and eight years ago. The observations were made, moreover, during fine summer weather, generally, while the greatest discharge is during rainy weather. There has been, also, an increase of sewers in the metropolis, because an increase of streets and inhabited houses. The approximate proportion of the increase of sewers (and there is no precise account of it) is pretty nearly that of the streets, lineally. Another mattter has too, of late years, added to the amount of sewage—the abolition of cesspoolage in a considerable degreee, owing to the late Building and Sanitary Acts, so that fœcal and culinary matters, which were drained into the cesspool (to be removed by the nightmen), are now drained into the sewer. Altogether, I am assured, on good authority, the daily discharge of the sewers extending over 58 square miles of the metropolis may be now put at 10,000,000 cubic feet, instead of rather more than nine and a half millions. And this gives, as

	Cubic Feet.
The annual amount of discharge from the sewers	3,650,000,000
The total amount of wet house-refuse, according to the calculation before given, is	3,820,000,000
Hence there remains .	170,000,000

	Sq. Miles.
Now it will be seen that the total area from which this amount of sewage is said to be drained is	58
But the area of London, according to the Registrar-General's limits, is . .	115

So that the 3,650,000,000 cubic feet of sewage annually removed from 58 square miles of the metropolis refer to only one-half of the entire area of the *true* metropolis; but it refers, at the same time, to that part of London which is the most crowded with houses, and since, in the suburbs, the buildings average about 2 to the acre, and, in the densest parts of London, about 30, it is but fair to assume that the refuse would be, at least, in the same proportion, and this is very nearly the fact; for if we suppose the 58 miles of the suburban districts to yield twenty times less sewage than the 58 miles of the urban districts, we shall have 182,500,000 cubic feet to add to the 3,650,000,000 cubic feet before given, or 3,832,500,000 for the sewage of the entire metropolis.

It does not appear that the sewage has ever been weighed so as to give any definite result, but calculating from the weight of water (a gallon, or 10 lbs. of water, comprising 277·274 cubic inches, and 1 ton of liquid comprising 36 cubic feet) the total, from the returns of the investigation in 1844, would be

	Tons.
Quantity of sewage *daily* emptied into the Thames	278,000
Ditto Annually . . .	101,390,000

In September, 1849, Mr. Banfield, at one time a Commissioner of Sewers, put the yearly quantity of sewage discharged into the Thames at 45,000,000 tons; but this is widely at variance with the returns as to quantity.

Of Ancient Sewers.

The traverser of the London streets rarely thinks, perhaps, of the far extended subterranean architecture below his feet; yet such is indeed the case, for the sewers of London, with all their imperfections, irregularities, and even absurdities, are still a great work; certainly not equal, in all respects, to what once must have existed in Rome, but second, perhaps, only to the giant works of sewerage in the eternal city.

The origin of these Roman sewers seems to be wrapped in as great a mystery as the foundation of the city itself. The statement of the Roman historians is that these sewers were the works of the elder Tarquin, the fifth (apocryphal) king of Rome. Tarquin's dominions, from the same accounts, did not in any direction extend above sixteen miles, and his subjects could be but banditti, foragers, and shepherds. One conjecture is, that Rome stands on the site of a more ancient city, and that to its earlier possessors may be attributed the work of the sewers. To attribute them to the rudeness and small population of Tarquin's day, it is contended, is as feasible as it would be to attribute the ruins of ancient Jerusalem, or any others in Asia Minor, to the Turks, or the ruins of Palmyra to the Arabs, because these people enjoy the privilege of possession.

The main sewer of Rome, the Cloaca Maxima, is said to have been lofty and wide enough for a waggon load of hay to pass clear along it. Another, and more probable account, however, states that it was proposed to *enlarge* the great sewer to these dimensions, but is does not appear to have been so enlarged. Indeed, when Augustus "made

Rome marble," it was one of his great works also, under the direction of Agrippa, to reconstruct, improve, and enlarge the sewers. It was a project in the days of Rome's greatness to turn seven navigable rivers into vast subterraneous passages, larger sewers, along which barges might pass, carrying on the traffic of Imperial Rome. In one year the cost of cleansing, renewing, and repairing the sewers is stated to have been 1000 talents of gold, or upwards of 192,000*l*. Of the *average* yearly cost we have no information. Some accounts represent these sewers as having been rebuilt after the irruption of the Gauls. In Livy's time they were pronounced not to be accommodated to the plan of Rome. Some portions of these ancient structures are still extant, but they seem to have attracted small notice even from professed antiquarians; their subterranean character, however, renders such notice little possible. In two places they are still kept in repair, and for their original purpose, to carry off the filth of the city, but only to a small extent.

Our legislative enactments on the subject of sewers are ancient and numerous. The oldest is that of 9 Henry III., and the principal is that of 23 Henry VIII., commonly called the "Statute of Sewers." These and many subsequent statutes, however, relate only to watercourses, and are silent as regards my present topic—the Refuse of London.

It is remarkable how little is said in the London historians of the *sewers*. In the two folio volumes of the most searching and indefatigable of all the antiquarians who have described the old metropolis, John Stow, the tailor, there is no account of what we now consider sewers, inclosed and subterranean channels for the conveyance of the refuse filth of the metropolis to its destination—the Thames. Had covered sewers been known, or at any rate been at all common, in Stow's day, and he died full of years in 1604, and had one of them presented but a crumbling stone with some heraldic, or apparently heraldic, device at its outlet, Stow's industry would certainly have ferreted out some details. Such, however, is not the case.

This absence of information I hold to be owing to the fact that no such sewers then existed. Our present system of sewerage, like our present system of street-lighting, is a modern work; but it is not, like our gas-lamps, an *original* English work. We have but followed, as regards our arched and subterraneous sewerage, in the wake of Rome.

As I have said, the early *laws* of sewers relate to watercourses, navigable communications, dams, ditches, and such like; there is no doubt, however, that in the heart of the great towns the filth of the houses was, by rude contrivances in the way of drainage, or natural fall, emptied into such places. Even in the accounts of the sewers of ancient Rome, historians have stated that it is not easy, and sometimes not possible, to distinguish between the *sewers* and the *aqueducts*, and Dr. Lemon, in his English Etymology, speaks of sewers as a species of aqueducts. So, in some of our earlier Acts of Parliament, it is hardly possible to distinguish whether the provisions to be applied to the management of a sewer relate to a ditch to which house-filth was carried—to a channel of water for general purposes—or to an open channel being a receptacle of filth and a navigable stream at the same time.

That the ditches were not sewers for the conveyance of the filth from the houses to any very great, or rather any very general extent, may very well be concluded, because (as I have shown in my account of the early scavagers) the excrementitious matter was deposited during the night in the street, and removed by the proper functionaries in the morning, or as soon as suited their convenience. Though this was the case generally it is evident that the filth, or a portion of it, from the houses which were built on the banks of the Fleet River (as it was then called, as well as the Fleet Ditch), and on the banks of the other "brooks," drained into the current stream. The Corporation accounts contain very frequent mention of the cleansing, purifying, and "thorough" cleansing of the Fleet Ditch, the Old Bourne (Holborn Brook), the Wall Brook, &c.

Of all these streams the most remarkable was Fleet Ditch, which was perhaps the first main sewer of London. I give from Stow the following curious account of its origin. It is now open, but only for a short distance, offending the air of Clerkenwell. At one period it was to afford a defence to the City! as the Tower-moat was a defence to the Tower, and fortress.

"The Ditch, which partly now remaineth and compassed the Wall of the City, was begun to be made by the *Londoners*, in the year 1211, and finished 1213, the 15th of K. *John*. This Ditch being then made of 200 foot broad, caused no small hindrance to the Canons of the Holy *Trinity*, whose Church stood near *Ealdgate*, for that the said Ditch passed through their Ground from the *Tower* unto *Bishopsgate*.

"The first Occasion of making a Ditch about the City seems to have been this: *William*, Bishop of *Ely*, Chancellor of *England*, in the Reign of King *Richard* I., made a great Ditch round about the *Tower*, for the better Defence of it against *John* the King's Brother, the King being then out of the Realm. Then did the City also begin a Ditch to encompass and strengthen their Walls [which happened between the Years 1190 and 1193.] So the Book *Dunthorn*. Yet the Register of *Bermondsey* writes that the Ditch was begun, Oct. 15, 1213, which was in the Reign of King *John* that succeeded to *Richard*.

"This Ditch being originally made for the Defence of the City, was also a long time together carefully cleansed and maintained, as Need required; but now of late neglected, and forced either to a very narrow, and the same a filthy Channel.

"In the Year of *Christ*, 1354, 28 *Ed.* 3, the Ditch of this City flowing over the Bank into the *Tower-ditch*, the King commanded the said Ditch of the City to be cleansed, and so ordered, that the overflowing thereof should not force any Filth into the *Tower-ditch*.

"*Anno*, 1379, John Philpot, Maior of *London*,

caused this Ditch to be cleansed, and every Houshold to pay 5*d.*, which was a Day's Work toward the Charges thereof.

"*Ralph Joseline*, Maior, 1477, caused the whole Ditch to be cast and cleansed. . . . . In 1519, the 10th of Henry 8, for cleansing and scouring the common Ditch, between *Aldgate*, and the Postern next the *Tower-ditch;* the chief Ditcher had by the day 7*d.*, the Second Ditcher, 6*d*, the other Ditchers, 5*d*. And every Vagabond (for as they were then termed) 1*d*. the Day, Meat and Drink, at the Charges of the City. Sum 95*l*. 3*s*. 4*d*.

"Fleet Ditch was again cleansed in the Year 1549," Stow continues, "*Henry Ancoates* being Maior, at the Charges of the Companies. And again 1569, the 11th of Queen *Elizabeth;* for cleansing the same Ditch between *Ealdgate* and the *Postern*, and making a new Sewer and Wharf of Timber, from the Head of the *Postern* into the *Tower-ditch*, 814*l*. 15*s*. 8*d*. (was disbursed). Before the which Time the said Ditch lay open, without either Wall or Pall, having therein great Store of very good Fish, of divers Sorts, as many men yet living, who have taken and tasted them, can well witness. But now no such matter, the Charge of Cleansing is spared, and great Profit made by letting out the Banks, with the Spoil of the whole Ditch."

The above information appeared, but I am unable to specify the year (for Stow's works went through several editions, though it is to be feared he died very poor) between 1582 and 1590. So did the following:—

"At this Day there be no Ditches or Boggs in the City except the said *Fleet-ditch*, but instead thereof large common *Dreins* and *Sewers*, made to carry away the water from the *Postern-Gate*, between the two *Tower-hills* to *Fleet-bridge* without *Ludgate*."

Great, indeed, is the change in the character of the capital of England, from the times when the Fleet Ditch was a defence to the city (which was then the entire capital); and from the later era, when "great store of very good fish of divers sorts," rewarded the skill or the patience of the anglers or netters; but this, it is evident, was in the parts near the river (the Tower postern, &c.), and at that time, or about that time, there was salmon-fishing in the Thames, at least as far up as Hungerford Wharf.

The Fleet Ditch seems always to have had a *sewery* character. It was described, in 1728, as

> "The king of dykes! than whom no sluice of mud
> With deeper sable blots the silver flood—"

the *silver* flood being, in Queen Anne's and the First George's days, the London Thames. This silver has been much alloyed since that time.

Until within these 40 or 50 years, open sewer-ditches, into which drains were emptied, and ordure and refuse thrown, were frequent, especially in the remoter parts of Lambeth and Newington, and some exist to this day; one especially, open for a considerable distance, flowing along the back of the houses in the Westminster-road, on the right-hand side towards the bridge, into which the neighbouring houses are drained. The "Black Ditch," a filthy sewer, until lately was open near the Broadwall, and other vicinities of the Blackfriars-road. The open ditch-sewers of Norwood and Wandsworth have often been spoken of in Sanitary Reports. Indeed, some of our present sewers, in addition to Fleet River and Wall Brook, are merely ditches rudely arched over.

The first covered and continuous street sewer was erected in London—I think, without doubt—when Wren rebuilt the capital, after the great fire of 1666. Perhaps there is no direct evidence of the fact, for, although the statutes and Privy Council and municipal enactments, consequent on the rebuilding of the capital, required, more or less peremptorily, "fair sewers, and drains, and water-courses," it is not defined in these enactments what was meant by a "sewer;" nor were they carried out.

I may mention, as a further proof that open ditches, often enough stagnant ditches also, were the first London sewers, that, after 1666, a plan, originally projected, it appears, by Sir Leonard Halliday, Maior, 60 years previously, and strenuously supported at that time by Nic Leate, "a worthy and grave citizen," was revived and reconsidered. This project, for which Sir Leonard and Nic Leate "laboured much," was "for a river to be brought on the north of the city into it, for the cleansing the sewers and ditches, and for the better keeping London wholesome, sweet, and clean." An admirable *intention;* and it is not impossible nor improbable that in less than two centuries hence, we, of the present sanitary era, may be accounted, for our sanitary measures, as senseless as we now account good Sir Leonard Halliday and the worthy and grave Nic Leate. These gentlemen cared not to brook filth in their houses, nor to be annoyed by it in the nightly pollution of the streets, but they advocated its injection into running water, and into water often running slowly and difficultly, and continually under the eyes and noses of the citizens. *We*, I apprehend, go a little further. We drink, and use for the preparation of our meals, the befouled water, which they did not; for, more than seven-eighths of our water-supply from the companies is drawn from the Thames, the main sewer of the greatest city in the world, ancient or modern, into which millions of tons of every description of refuse are swept yearly.

Of the Kinds and Characteristics of Sewers.

The sewers of London may be arranged into two distinct groups—according to the side of the Thames on which they are situate.

Now the essential difference between these two classes of sewers lies in the elevation of the several localities whence the sewers carry the refuse to the Thames.

The chief differences in the circumstances of the people north and south of the river are shown in the annexed table from the Registrar-General's returns:—

	London.	North side of the River.	South side of the River.
Elevation of the ground, in feet, above Trinity high-water mark .	39	51	5
Density, or number of persons to an acre, 1849 . . .	30	52	14
Deaths from Cholera to 10,000 persons living, in 60 weeks, ending Nov. 24, 1849 . .	66	44	127
Deaths from all causes annually to 10,000 persons (5000 males, 5000 females) living, during the 7 years, 1838-44 . . .	252	251	257

Here, it will be seen, that while the houses on the north side of the river stand, on an average, 51 feet above the high-water mark of the Thames, those on the south side are only 5 feet above it. The effect of this is shown most particularly in the deaths from cholera in 1849, which were nearly three times as many on the south as on the north side of the Thames. It is said, officially, that "of the 15 square miles of the Urban district on the south side of the river Thames, *three* miles are from six to seven feet below high-water mark, so that the locality may be said to be drained only for four hours out of the twelve, and during these four hours very imperfectly . . . . . When the tide rises above the orifices of the sewers, the whole drainage of the district is stopped until the tide recedes again, rendering the whole system of sewers in Kent and Surrey only an *articulation of cesspools*."

That this is but the fact, the following table of the elevation in feet above the Trinity high-water mark, as regards the several districts on the Surrey side of the Thames, may be cited as evidence.

	Elevation.		Elevation.
Lewisham .	28	St. Olave .	2
Wandsworth	22	Bermondsey	0
Greenwich .	8	Rotherhithe	0
Camberwell	4	St. George's (Southwark) .	0
Lambeth .	3	Newington (below high water)	2
St. Saviour (Southwark) . .	2		

From these returns, made by Capt. Dawson, R.E., the difficulty, to use no stronger word, attending the sewerage of the Surrey district is shown at once. There is no flow to be had, or—the word more generally used, no *run* for the sewage. In parts of the north of England it used to be a general, and still is a partial, saying among country-people who are figuratively describing what they account impossible. "Ay, when? *When* water runs up bank." This is a homely expression of the difficulties attending the Surrey sewerage.

There is, as regards these Surrey, more than the Kent, sewers, another evil which promotes the "articulation of cesspools." Some of these sewers have "dead-ends," like places which in the streets (a parallel case enough) are known as "no thoroughfare," and in these sewers it is seldom, in any state of the tide, that flushing can be resorted to; consequently these cesspool-like sewers remain uncleansed, or have to be cleansed by manual labour, the matter being drawn up into the street or road.

The refuse conduits of the metropolis are of two kinds:—

1. Sewers.
2. Drains.

These two classes of refuse-charts are often confounded, even in some official papers, the sewer being there designated the "main drain." All sewerage is undoubtedly drainage, but there is a manifest distinction between a sewer and a drain.

The First-Class Sewers, which are generally termed "main sewers," and run along the centres of the first-class streets (first-class alike from the extent or populousness of such streets), may be looked upon as underground rivers of refuse, to which the drains are tributary rivulets. No sewer exists unconnected with the drains from the streets and houses; but many house-drains are constructed apart from the sewers, communicating only with the cesspools. Even where houses are built in close contiguity to a public sewer, and built after the new mode without cesspools, there is always a drain to the sewer; no house so situated can get rid of its refuse except by means of a drain; unless, indeed, the house be not drained at all, and its filth be flung down a gully-hole, or got rid of in some other way.

These drains, all with a like determination, differ only in their forms. They are barrel-shaped, made of rounded bricks, or earthenware pipeage, and of an interior between a round and an oval, with a diameter of from 2 to 6 inches, although only a few private houses, comparatively, are so drained. The barrel drain of larger dimensions, is used in the newer public buildings and larger public mansions, when it represents a sort of house or interior sewer as well as a house main drain, for smaller drains find their issue into the barrel-drain. There is the barrel-drain in the new Houses of Parliament, and in large places which cover the site of, and are required for the purposes of several houses or offices. The tubular drain is simply piping, of which I have spoken fully in my account of the present compulsory mode of house drainage. The third drain, one more used to carry refuse to the cesspool than the sewer, but still carrying such refuse to the sewers, is the old-fashioned brick drain, generally 9 inches square.

I shall first deal with the sewerage, and then with the house and street drainage.

The sewer is a twofold receptacle of refuse; into it are conveyed the wet refuse not only of many of the houses, but of all the streets.

The slop or surface water of the streets is conveyed to the sewer by means of smaller sewers or street-drains running from the "kennel" or channel to the larger sewers.

In the streets, at such uncertain distances as the traffic and circumstances of the locality may require, are gully-holes. These are openings into the sewer, and were formerly called, as they were, simply gratings, a sort of iron trap-doors of grated bars, clumsily made, and placed almost at random. On each side of the street was, even into the present century, a very formidable channel, or kennel, as it was formerly written, into which, in heavy rains, the badly-scavaged street dirt was swept, often demanding a good leap from one who wished to cross in a hurry. These "kennels" emptied themselves into the gratings, which were not unfrequently choked up, and the kennel was then an utter nuisance. At the present time the channel is simply a series of stone work at the edge of the footpaths, blocks of granite being sloped to meet more or less at right angles, and the flow from the inclination from the centre of the street to the channel is carried along without impedimen or nuisance into the gully-hole.

The gully-hole opens into a drain, running, with a rapid slope, into the sewer, and so the wet refuse of the streets find its vent.

In many courts, alleys, lanes, &c., inhabited by the poor, where there is imperfect or no drainage to the houses, all the slops from the houses are thrown down the gully-holes, and frequently enough blood and offal are poured from butchers' premises, which might choke the house drain. There have, indeed, been instances of worthless street dirt (slop) collected into a scavager's vehicle being shot down a gully-hole.

The sewers, as distinct from the drains, are to be divided principally into three classes, all devoted to the same purpose—the conveyance of the underground filth of the capital to the Thames—and all connected by a series of drains, afterwards to be described, with the dwelling-houses.

The *first-class sewers* are found in the main streets, and flow at their outlets into the river.

The *second-class sewers* run along the second-class streets, discharging their contents into a first-class sewer; and

The *third-class sewers* are for the reception of the sewage from the smaller streets, and always communicate, for the voidance of their contents, with a sewer of the second or first description.

As regards the destination of the sewers, there is no difference between the Middlesex and Surrey portions of the metropolis. The sewage is *all* floated into the river.

The first-class sewers of the modern build rarely exceed 50 inches by 30 in internal dimensions; the second class, 40 inches by 24; the third, 30 inches by 18.

Smaller class or branch sewers, from No. 4 to No. 8 inclusive, also form part of the great subterranean filth-channels of the metropolis. It is only, however, the three first-mentioned classes which can be described as in any way principal *sewers;* the others are in the capacity of branch sewers, the ramifications being in many places very extensive, while pipes are often used. The dimensions of these smaller sewers, when pipes are not used, are—No. 4, 20 inches by 12; No. 5, 17½ inches by 10½; No. 6, 15 inches by 9; No. 7, 12 inches by 7½; and No. 8, 9 inches by 6.

These branch sewers may, from their circumscribed dimensions, be looked upon as mere channels of connection with the larger descriptions; but they present, as I have intimated, an important part of the general system. This may be shown by the fact, that in the estimates for building sewers for the improvement of the drainage of the city of Westminster (a plan, however, not carried out), the estimated, or indeed surveyed, run of the first class was to be 8115 feet; of the second class, 4524 feet; of the third, but 2086 feet; while of the No. 5 and No. 6 description, it was, respectively, 18,709 and 53,284 feet. The branch sewers may, perhaps, be represented in many instances as public drains connecting the sewer of the street with the issue from the houses, but I give the appellation I find in the reports.

The dimensions I have cited are not to be taken as an average size of the existing sewers of the metropolis on either side of the Thames, for no average size and no uniformity of shape can be adduced, as there has been no uniformity observed. The sewers are of all sizes and shapes, and of all depths from the surface of the streets. I was informed by an engineering authority that he had often seen it asserted that the naval authorities of the kingdom could not build a war-steamer, and it might very well be said that the sanitary authorities of the metropolis could not build a sewer, as none of the present sewers could be cited as in all respects properly fulfilling all the functions required. But it must be remembered that the present engineers have to contend with great difficulties, the whole matter being so complicated by the blunderings and mismanagement of the past.

The dimensions I have cited (because they appear officially) exceed the medium size of the *newer* sewerage, the average height of the first class being in such sewers about 3 feet 9 inches.

Of the width of the sewers, as of the height, no precise average can be drawn. Perhaps that of the New Palace main, or first-class sewer, 3 feet 6 inches, may be nearest the average, while the smaller classes diminish in their width in the proportions I have shown. The sewers of the older constructions nearly all widen and deepen as they near the outlet, and this at no definite distance from the river, but from a quarter of a mile or somewhat less to a mile and more. Some such sewers are then 14 feet in width; some 20 feet, and no doubt of proportionate height, but I do not find that the height has been ascertained. For flushing purposes there are recesses of greater or less width, according to the capacity of the sewer, where sluice-gates, &c., can be fixed, and water accumulated.

Under the head of "Subterranean Survey of the Sewers," will be found some account of the different dimensions of the sewers.

The form of the interior of the sewers (as shown in the illustrations I have given) is irregularly elliptical. They are arched at the summits, and more or less hollowed or curved, internally, at the bottom. The bottom of the sewer is called the "invert," from a general resemblance in the construction to an "inverted" arch. The *best* form of invert is a matter which has attracted great engineering attention. It is, indeed, the important part of the sewer, as the part along which there is the flow of sewage; and the superior or inferior formation of the invert, of course, facilitates or retards the transmission of the contents.

A few years back, the building of egg-shaped, or "oviform" sewers, was strongly advocated. It was urged that the flow of the sewage and the sewer-water was accelerated by the invert (especially) being oviform, as the matter was more condensed when such was the shape adopted, while the more the matter was diffused, as in some of the inverts of the more usual form of sewers, the less rapid was its flow, and consequently the greater its deposit.

What extent of egg-shaped sewers are now, so to speak, at work, I could not ascertain. One informant thought it might be somewhere about 50 miles.

The following interesting account of the velocities of streams, with a relativeness to sewers, is extracted from the evidence of Mr. Phillips:—

"The area of surface that a sewer will drain, and the quantity of water that it will discharge in a given time, will be greater or less in proportion as the channel is inclined from a horizontal to a vertical position. The ordinary or common run of water in each sewer, due from house drainage alone, and irrespective of rain, should have sufficient velocity to prevent the usual matter discharged into the sewer from depositing. For this purpose, it is necessary that there should be in each sewer a contant velocity of current equal to 2½ feet per second, or 1¾ mile per hour." Mr. Phillips then states that the inclinations of all rivulets, &c., diminish as they progress to their outfalls. "If the force of the waters of the river Rhone," he has said, "were not absorbed by the operation of some constant retardation in its course, the stream would have shot into the Bay of Marseilles with the tremendous velocity of 16½ miles every hour. Even if the Thames met with no system of impediments in its course, the stream would have rushed into the sea with a velocity of 80 feet per second, or 54½ miles in an hour. . . . . The inclinations of the sewers of a natural district should be made to diminish from their heads to their outfalls in a corresponding ratio of progression, so that as the body of water is increased at each confluence, one and the same velocity and force of current may be kept up throughout the whole of them."

Mr. Phillips advocates a tubular system of sewerage and drainage.

The main sewer, which has lately called forth the most public attention and professional controversy, is that connected with the new Houses of Parliament, or as they are called in divers reports and correspondence, the "New Palace at Westminster."

The workmanship in the building of the sewers is of every quality. The material of which some of the older sewers are constructed is a porous sort of brick, which is often found crumbling and broken, and saturated with damp and rottenness, from the exhalations and contact of their contents. The sewers erected, however, within the last twenty, and more especially within the last ten years, are sometimes of granite, but generally of the best brick, with an interior coating of enduring cement, and generally with concrete on their exterior, to protect them from the dampness and decaying qualities of the superincumbent or lateral soil.

The depth of the sewers—I mean from the top of the sewer to the surface of the street—seems to vary as everything else varies about them. Some are found forty feet below the street, some *two* feet, some almost level! These, however, are exceptions; and the average depth of the sewers on the Middlesex side is from twelve to fourteen feet; on the Surrey side, from six to eight feet. The reason is that the north shores of the metropolis are above the tide level, the south shores are below it.

An authority on the subject has said, "The Surrey sewers are bad, owing principally to the land being below tide level. They were the most expensively constructed, because, *perhaps,* in that Commission the surveyors were paid by percentage on the cost of works. When it was proposed, in the Westminster Commission, to effect a reduction of four-fifths in the cost, it was like a proposition to return the officers' salaries to that extent, if they had been paid in that way."

The reader may have observed that the official intelligence I have given all, or nearly all, refers to the "Westminster and part of Middlesex" Commission, and to that of the "Surrey and Kent." This is easily accounted for. In the metropolitan districts, up to 1847, the only Commission which published its papers was the Westminster, of which Mr. L. C. Hertslet had the charge as clerk; when the Commissions were consolidated in 1847, he printed the Westminster and Surrey only, the others being of minor importance.

I may observe that one of the engineers, in showing the difficulty or impossibility of giving any description of a *system* of sewerage, as to points of agreement or difference, represents the whole mass as but a "detached parcel of sewers."

The course of the sewers is in no direct or uniform line, with the exception of one characteristic—all their bearings are towards the river as regards the main sewers (first-class), and all the bearings of the second-class sewers are towards the main sewers in the main streets. The smaller classes of sewers fill up the great area of London sewerage with a perfect network of intersection and connection, and even this network is increased

manyfold by its connection with the house-drains.

There is no map of the general sewerage of the metropolis, merely "sections" and "plans" of improvements making or suggested, in the reports of the surveyors, &c., to the Commissioners; but did a map of subterranean London exist, with its lines of every class of sewerage and of the drainage which feeds the sewers; with its course, moreover, of gas-pipes and water-pipes, with their connection with the houses, the streets, the courts, &c., it would be the most curious and skeleton-like map in the world.

Of the Subterranean Character of the Sewers.

In my inquiries among that curious body of men, the "Sewer Hunters," I found them make light of any danger, their principal fear being from the attacks of rats in case they became isolated from the gang with whom they searched in common, while they represented the odour as a mere nothing in the way of unpleasantness. But these men pursued only known and (by them) beaten tracks at low water, avoiding any deviation, and so becoming but partially acquainted with the character and direction of the sewers. And had it been otherwise, they are not a class competent to describe what they saw, however keen-eyed after silver spoons.

The following account is derived chiefly from official sources. I may premise that where the deposit is found the greatest, the sewer is in the worst state. This deposit, I find it repeatedly stated, is of a most miscellaneous character. Some of the sewers, indeed, are represented as the dust-bins and dung-hills of the immediate neighbourhood. The deposit has been found to comprise all the ingredients from the breweries, the gas-works, and the several chemical and mineral manufactories; dead dogs, cats, kittens, and rats; offal from slaughter-houses, sometimes even including the entrails of the animals; street-pavement dirt of every variety; vegetable refuse; stable-dung; the refuse of pig-styes; night-soil; ashes; tin kettles and pans (pansherds); broken stoneware, as jars, pitchers, flower-pots, &c.; bricks; pieces of wood; rotten mortar and rubbish of different kinds; and even rags. Our criminal annals of the previous century show that often enough the bodies of murdered men were thrown into the Fleet and other ditches, then the open sewers of the metropolis, and if found washed into the Thames, they were so stained and disfigured by the foulness of the contents of these ditches, that recognition was often impossible, so that there could be but one verdict returned—"Found drowned." Clothes stripped from a murdered person have been, it was authenticated on several occasions in Old Bailey evidence, thrown into the open sewer ditches, when torn and defaced, so that they might not supply evidence of identity. So close is the connection between physical filthiness in public matters and moral wickedness.

The following particulars show the characteristics of the underground London of the sewers. The subterranean surveys were made after the commissions were consolidated.

"An old sewer, running between Great Smith-street and St. Ann-street (Westminster), is a curiosity among sewers, although it is probably only one instance out of many similar constructions that will be discovered in the course of the subterranean survey. The bottom is formed of planks laid upon transverse timbers, 6 inches by 6 inches, about 3 feet apart. The size of the sewer varies in width from 2 to 6 feet, and from 4 to 5 feet in height. The inclination of the bottom is very irregular: there are jumps up at two or three places, and it contains a deposit of filth averaging 9 inches in depth, the sickening smell from which escapes into the houses and yards that drain into it. In many places the side walls have given way for lengths of 10 and 15 feet. Across this sewer timbers have been laid, upon which the external wall of a workshop has been built; the timbers are in a decaying state, and should they give way, the wall will fall into the sewer."

From the further accounts of this survey, I find that a sewer from the Westminster Workhouse, which was of all shapes and sizes, was in so wretched a condition that the leveller could scarcely work for the thick scum that covered the glasses of the spirit-level in a few minutes after being wiped. "At the outfall into the Dean-street sewer, it is 3 feet 6 inches by 2 feet 8 inches for a short length. From the end of this, a wide sewer branches in each direction at right angles, 5 feet 8 inches by 5 feet 5 inches. Proceeding to the eastward about 30 feet, a chamber is reached about 30 feet in length, from the roof of which hangings of putrid matter *like stalactites* descend *three feet in length*. At the end of this chamber, the sewer passes under the public privies, the ceilings of which can be seen from it. Beyond this it is not possible to go."

"In the Lucas-street sewer, where a portion of new work begins and the old terminates, a space of about 10 feet has been covered with boards, which, having broken, a dangerous chasm has been caused immediately under the road."

"The West-street sewer had one foot of deposit. It was flushed while the levelling party was at work there, and the stream was so rapid that it nearly washed them away, instrument and all."

There are further accounts of "deposit," or of "stagnant filth," in other sewers, varying from 6 to 14 inches, but that is insignificant compared to what follows.

The foregoing, then, is the pith of the first authentic account which has appeared in print of the actually surveyed condition of the subterranean ways, over which the super-terranean tides of traffic are daily flowing.

The account I have just given relates to the (former) Westminster and part of Middlesex district on the north bank of the Thames, as ascertained under the Metropolitan Commission. I now give some extracts concerning a similar survey on the south bank, in different and distant directions in the district, once the "Surrey and Kent." The Westminster, &c., survey took place in 1848; the Kent and Surrey in 1849. In the one case, 72 miles of sewers were surveyed; in the other, 69⅛ miles.

"The surveyors (in the Surrey and Kent sewers) find great difficulty in levelling the sewers of this district (I give the words of the Report); for, in the first place, the deposit is *usually* about two feet in depth, and in some cases it amounts to nearly *five feet* of putrid matter. The smell is usually of the most horrible description, the air being so foul that explosion and choke damp are very frequent. On the 12th January we were very nearly losing a whole party by choke damp, the last man being dragged out on his back (through two feet of black fœtid deposits) in a state of insensibility. . . . . Two men of one party had also a narrow escape from drowning in the Alscot-road sewer, Rotherhithe.

"The sewers on the Surrey side are very irregular; even where they are inverted they frequently have a number of steps and inclinations the reverse way, causing the deposit to accumulate in *elongated cesspools*.

"It must be considered very fortunate that the subterranean parties did not first commence on the Surrey side, for if such had been the case, we should most undoubtedly have broken down. When compared with Westminster, the sewers are smaller and more full of deposit; and, bad as the smell is in the sewers in Westminster, it is infinitely worse on the Surrey side."

Several details are then given, but they are only particulars of the general facts I have stated.

The following, however, are distinct facts concerning this branch of the subject.

In my inquiries among the working scavagers I often heard of their emptying street slop into sewers, and the following extract shows that I was not misinformed:—

"The detritus from the macadamized roads frequently forms a kind of grouting in the sewers so hard that it cannot be removed without hand labour.

"One of the sewers in Whitehall and another in Spring-gardens have from three to four feet of this sort of deposit; and another in Eaton-square was found filled up within a few inches of the 'soffit,' but it is supposed that the scavengers (scavagers) emptied the road-sweepings down the gully-grate in this instance;" and in other instances, too, there is no doubt—especially at Charing Cross, and the Regent Circus, Piccadilly.

Concerning the sewerage of the most aristocratic parts of the city of Westminster, and of the fashionable squares, &c., to the north of Oxford-street, I glean the following particulars (reported in 1849). They show, at any rate, that the patrician quarters have not been unduly favoured; that there has been no partiality in the construction of the sewerage. In the Belgrave and Eaton-square districts there are many faulty places in the sewers which abound with noxious matter, in many instances stopping up the house drains and "smelling horribly." It is much the same in the Grosvenor, Hanover, and Berkeley-square localities (the houses in the squares themselves included). Also in the neighbourhood of Covent-garden, Clare-market, Soho and Fitzroy-squares; while north of Oxford-street, in and about Cavendish, Bryanstone, Manchester, and Portman-squares, there is so much rottenness and decay that there is no security for the sewers standing from day to day, and to flush them for the removal of their "most loathsome deposit" might be "to bring some of them down altogether."

One of the accounts of a subterranean survey concludes with the following rather curious statement:—"Throughout the new Paddington district the neighbourhood of Hyde Park Gardens, and the costly squares and streets adjacent, the sewers abound with the foulest deposit, from which the most disgusting effluvium arises; indeed, amidst the whole of the Westminster District of Sewers the *only* little spot which can be mentioned as being in at all a satisfactory state is the Seven Dials."

I may point out also that these very curious and authenticated accounts by no means bear out the zymotic doctrine of the Board of Health as to the cause of cholera; for where the zymotic influences from the sewers were the worst, in the patrician squares of what has been called Belgravia and Tyburnia, the cholera was the least destructive. This, however, is no reason whatever why the stench should not be stifled.

Of the House-Drainage of the Metropolis as connected with the Sewers.

Every house built or rebuilt since the passing of the Metropolitan Sewers Act in 1848, must be drained, with an exception, which I shall specify, into a sewer. The law, indeed, divested of its technicalities is this: the owner of a newly-erected house must drain it to a sewer, without the intervention of a cesspool, if there be a sewer within 100 feet of the site of the house; and, if necessary, in places but partially built over, such owner must continue the sewer along the premises, and make the necessary drain into it; all being done under the approval of the proper officer under the Commissioners. If there be, however, an established sewer, along the side, front, or back of any house, a covered drain must be made into that at the cost of the owner of the premises to be drained. "Where a sewer," says the 46th section of the Act, "shall already be made, and a drain only shall be required, the party is to pay a contribution towards the original expense of the sewer, if it shall have been made within thirty-five years before the 4th of September, 1848, the contribution to be paid to the builder of the sewer." . . . . . "In cases where there shall be no sewer into which a drain could be made, the party must make a covered drain to lead into a cesspool or other place (not under a house) as the Commissioners may direct. If the parties infringe this rule, the Commissioners may

do the work and throw the cost on them in the nature of an improvement rate, or as charges for default, and levy the amount by distress."

I mention these circumstances more particularly to show the extent, and the far-continued ramification, of the subterranean metropolis. I am assured by one of the largest builders in the western district of the capital that the new regulations (as to the dispensing with cesspools) are readily complied with, as it is a recommendation which a house agent, or any one letting new premises, is never slow to advance ("and when it 's the truth," he said, "they do it with a better grace"), that there will be in the course of occupancy no annoyance and no expense incurred in the clearing away of cesspoolage.

I shall at present describe only the house-drainage, which is connected with the public sewerage. The old mode of draining a house separately into the cesspool of the premises will, of course, be described under the head of cesspoolage, and that old system is still very prevalent.

At the times of passing both general and local Acts concerning buildings, town improvements and extensions, the erection of new streets and the removal of old, much has been said and written concerning better systems of ventilating, warming, and draining dwelling-houses; but until after the first outbreak of cholera in England, in 1832, little public attention was given to the great drainage of all the sewers. However, on the passing of the Building and Sanitary Acts generally, the authorities made many experiments, not so much to improve the system of sewerage as of house-drainage, so as to make the dwelling-houses more wholesome and sweet.

To effect this, the great object was the abolition of the cesspool system, under which filth must accumulate, and where, from scamped buildings or other causes, evaporation took place, the effects of the system were found to be vile and offensive, and have been pronounced miasmatic. Having just alluded to these matters, I proceed to describe the modernly-adopted connection of house-drainage and street-sewerage.

Experiments, as I have said, were set on foot under the auspices of public bodies, and the opinions of eminent engineers, architects, and surveyors were also taken. Their opinions seem really to be concentrated in the advocacy of *one* remedy—improved house-drainage; and they appear to have agreed that the system which is at present adopted is. under the circumstances, the best that can be adopted.

I was told also by an eminent practical builder, perfectly unconnected with any official or public body, and, indeed, often at issue with surveyors, &c., that the new system was unquestionably a great improvement in every respect, and that some years before its adoption as at present he had abetted such a system, and had carried it into effect when he could properly do so.

I will first show the mode and then the cost of the new system.

I find it designated "back," "front," "tubular," and "pipe" house-drainage, and all with the object of carrying off all fæces, soil water, cesspool matter, &c., before it has had time to accumulate. It is not by brick or other drains of masonry that the system is carried out or is recommended to be carried out, but by means of tubular earthenware pipes; and for any efficient carrying out of the projected improvement a system of *constant*, and not as at present *intermittent*, supply of water from the several companies would be best. These pipes communicate with the nearest sewer. The pipes in the tubular drainage are of red earthenware or stoneware (pot).

The use of earthenware, clay, or pot pipes for the conveyance of liquids is very ancient. Mr. Stirrat, a bleacher in Paisley, in a statement to the Board of Health, mentioned that clay pipes were used in ancient times. King Hezekiah (2nd Book of Kings, chap. 20, and 2nd Book of Chronicles, chap. 32) brought in water from Jerusalem. "His pool and conduit," said Mr. Stirrat, "are still to be seen. The conduit is three feet square inside, built of freestone, strongly cemented; the stone, fifteen inches thick, evidently intended to sustain a considerable pressure; and I have seen pipes of clay, taken by a friend from a house in the ruins of the ancient city, of one inch bore, and about seven inches in diameter, proving evidently, to my mind, that ancient Jerusalem was supplied with water on the principle of gravitation. The pools or reservoirs are also at this day in tolerably good order, one of them still filled with water; the other broken down in the centre, no doubt by some besieging enemy, to cut off the supply to the city."

The new system to supply the place of the cesspools is a *combined*, while the old is principally a *separate*, system of house-drainage; but the new system is equally available for such separate drainage.

As regards the success of this system the reports say experiments have been tried in so large a number of houses, under such varied and, in many cases, disadvantageous circumstances, that no doubts whatsoever can remain in the minds of competent and disinterested persons as to the efficient self-cleansing action of well-adjusted tubular drains and sewers, even without any additional supplies of water.

Mr. Lovick said:—

"A great number of small 4-inch tubular drains have been laid down in the several districts, some for considerable periods. They have been found to keep themselves clear by the ordinary soil and drainage waters of the houses. I have no doubt that pipes of this kind will keep themselves clear by the ordinary discharge of house-drainage; assuming, of course, a supply of water, pipes of good form, and materials properly laid, and with fair usage."

"One of the earliest illustrations of the tubular system," it is stated in a Report of the Board of Health, "was given in the improved drainage of a block of houses in the cloisters of Westminster, which had been the seat of a severe epidemic fever. The cesspools and the old drains were filled up, and an entire system of tubular drainage and sewerage substituted for the service of that block of houses.

"The Dean of Westminster, in a letter on the state of this drainage, says, 'I beg to report to the Commissioners that the success of the entire new pipe-drainage laid down in St. Peter's College during the last twelve months has been complete. I consider this experiment on drainage and sewage of about fifteen houses to afford a triumphant proof of the efficacy of draining by pipes, and of the facility of *dispensing entirely with cesspools and brick sewers*.' Up to this time they have acted, and continue to act, perfectly.

"Mr. Morris, a surveyor attached to the Metropolitan Sewers Commission, gives the following account of the action of trial works of improved house-drainage:—

"'I have introduced the new 4-inch tubular house-drains into some houses for the trustees of the parish of Poplar, with water-closets, and have received no just cause of complaint. In every instance where I have applied it, I found the system answer extremely well, if a sufficient quantity of water has been used.

"'The answer of the householders as to the effect of the new drainage has invariably been that they and their families have been better in health; that they were formerly annoyed with smells and effluvia, from which they are now quite free.

"'Since the new drainage has been laid down there has been only occasion to go on the ground to examine it once for the whole year, and that was from the inefficiency of the water service. It was found that rags had been thrown down and had got into the pipe; and further, that very little water had been used, so that the stoppage was the fault of the tenant, not of the system.'"

Mr. Gotto, the engineer, having stated that in a plan for the improvement of Goulston-street, Whitechapel, not only was the removal of all cesspools contemplated, but also the substitution of water-closet apparatus, gave the following estimate of *the cost*, provided the pipes were made and the work done by contract under the Commissioners of Sewers:—

Water-closet Apparatus, &c.

	£	s.	d.
Emptying, &c., cesspool	0	12	0
Digging, &c., for 8-feet pipe drain, at 4*d.*	0	2	8
Making good to walls and floor of water-closet over drain, at 3*d.*	0	2	0
8 feet run of 4-inch pipe, at 3*d.*	0	2	0
Laying ditto, at 2*d.*	0	1	4
Extra for junction	0	0	4
Fixing ditto	0	0	2
Water-closet apparatus, with stool cock	0	10	0
Fixing ditto	0	2	0
Contingencies (10 per cent.)	0	3	6
	1	16	0

	£	s.	d.
Brought forward	1	16	0
The yard sink and drain would cost	0	11	2
Kitchen sink and drain	0	15	7½
So that the cost of *back* draining one house, including water-closet, would be	3	2	9½

The *front* tubular drainage of a similar house (with fifteen yards of carriage-way to be paved) would cost 6*l.* 2*s.* 7½*d.*; or the drainage would cost, according to the old system, 11*l.* 13*s.* 11*d.*

"The engineering witnesses who have given their special attention to the subject," state the Board of Health, in commenting on the information I have just cited, "affirm that upon the improved system of combined works the expense of the apparatus in substitution of cesspools would *not greatly exceed one-half the expense* of cleaning the cesspools."

The engineers have calculated — stating the difficulty of coming to a nice calculation — that the present system of cesspools entailed an average expenditure, for cleansing and repairs, of 4*d.* a week on each householder; and that by the new system it would be but 1¾*d.* The Board of Health's calculations. however, are, I regret to say, always dubious.

The subjoined scale of the difference in cost was prepared at the instance of the Board.

Mr. Grant took four blocks of houses for examination, and the results are given as a guide to what would be the general expenditure if the change took place:—

"In one block of 44 houses—
The length of drains by back drainage was 1544 feet.
Cost (exclusive of pans, traps, and water in both cases) of back drainage, 83*l.* 12*s.*, or 1*l.* 18*s.* per house.
Cost of separate tubular drainage, 467*l.* 9*s.* 6*d.*, or 10*l.* 12*s.* 6*d.* per house.
Cost of separate brick drains, 910*l.* 19*s.*, or 20*l.* 14*s.* 1*d.* per house.

"In another block of 23 houses—
The length of back drains was 783 feet.
Of separate drains, 1437 feet.
The cost of back tubular drains, 45*l.* 12*s.* 6*d.*, or 1*l.* 19*s.* 8*d.* per house.
Of separate tubular drains, 131*l.* 13*s.* 6*d.*, or 5*l.* 14*s.* 6*d.* per house.
Of separate brick drains, 305*l.*7*s.*, or 13*l.* 5*s.* 6*d.* per house.

"In another block of 46 houses—
The length of back drainage, 1143 feet.
Ditto by separate ditto, 1892 feet.
The cost of back tubular drainage, 66*l.* 5*s.* 2*d.*, or 1*l.* 8*s.* 9¾*d.* per house.
Ditto of separate ditto ditto, 178*l.* 19*s.* 8*d* or 3*l.* 17*s.* 10*d.* per house.
Ditto of separate brick ditto, 390*l.* 4*s.*, or 8*l.* 9*s.* 8*d.* per house.

"In a fourth block of 46 houses—
The length of back drains, 985 feet.
Ditto of separate ditto, 2913 feet.
Cost of back tubular drainage, 66*l.* 8*s.* 2*d.*, or 1*l.* 8*s.* 10½*d.* per house.
Ditto of separate ditto ditto, 262*l.* 11*s.* 7*d.*, or 5*l.* 14*s.* 2*d.* per house.
Ditto of separate brick ditto, 614*l.* 16*s.* 3*d.*, or 13*l.* 7*s.* 3¾*d.* per house."

I have mentioned the diversity of opinion as to the best form, and even material, for a sewer; and there is the same diversity as to the material, &c., for house and gully or street-drainage, more especially in the *pipes* of the larger volume. The pipe-drainage of any description is far less in favour than it was. One reason is that it does not promote *subsoil drainage;* another is the difficulty of repairs if the joints or fittings of pipes require mending; and then the combination of the noxious gases is most offensive in its exhalations, and difficult to overcome.

I was informed by a nightman, used to the cleansing of drains and to night-work generally, that when there was any escape from one of the tubular pipes the stench was more intense than any he had ever before experienced from any drains on the old system.

Of the London Street-Drains.

We have as yet dealt only with the means of removing the liquid refuse from the houses of the metropolis. This, as was pointed out at the commencement of the present subject, consists principally of the 19,000,000,000 gallons of water that are annually supplied to the London residences by mechanical means. But there still remain the 5,000,000,000 gallons of surface or rain-water to be carried off from the 1760 miles of streets, and the roofs and yards of the 300,000 houses which now form the British metropolis. If this immense volume of liquid were not immediately removed from our thoroughfares as fast as it fell, many of our streets would not only be transformed into canals at certain periods of the year, but perhaps at all times (except during drought) they would be, if not impassable, at least unpleasant and unhealthy, from the puddles or small pools of stagnant water that would be continually rotting them. Were such the case, the roads and streets that we now pride ourselves so highly upon would have their foundations soddened. "If the surface of a road be not kept clean so as to admit of its becoming dry between showers of rain," said Lord Congleton, the great road authority, "it will be rapidly worn away." Indeed the immediate removal of rain-water, so as to prevent its percolating through the surface of the road, and thereby impairing the foundation, appears to be one of the main essentials of road-making.

The means of removing this surface water, especially from the streets of a city where the rain falls at least every other day throughout the year, and reaches an aggregate depth of 24 feet in the course of the twelvemonth, is a matter of considerable moment. In Paris, and indeed almost all of the French towns, a channel is formed in the middle of each thoroughfare, and down this the water from the streets and houses is continually coursing, to the imminent peril of all pedestrians, for the wheels of every vehicle distribute, as it goes, a muddy shower on either side of the way.

We, however, have not only removed the channels from the middle to the sides of our streets, but instituted a distinct system of drainage for the conveyance of the wet refuse of our houses to the sewers—so that there are no longer (excepting in a very small portion of the suburbs) open sewers, meandering through our highways; the consequence is, the surface-water being carried off from our thoroughfares almost as fast as it falls, our streets are generally dry and clean. That there are exceptions to this rule, which are a glaring disgrace to us, it must be candidly admitted; but we must at the same time allow, when we think of the vast extent of the roadways of the metropolis (1760 miles!—nearly one-half the radius of the earth itself), the deluge of water that anually descends upon every inch of the ground which we call London (38,000,000,000 gallons!—a quantity which is almost sufficient for the formation of an American lake), and the vast amount of traffic, over the greater part of the capital—the 13,000 vehicles that daily cross London Bridge, the 11,000 conveyances that traverse Cheapside in the course of twelve hours, the 7700 that go through Temple Bar, and the 6900 that ascend and descend Holborn Hill between nine in the morning and nine at night, the 1500 omnibuses and the 3000 cabriolets that are continually hurrying from one part of the town to another, and the 10,000 private carriage, job, and cart horses that incessantly *perviate* the metropolis—when we reflect, I say, on this vast amount of traffic—this deluge of rain—and the wilderness of streets, it cannot but be allowed that the cleansing and draining of the London thoroughfares is most admirably conducted.

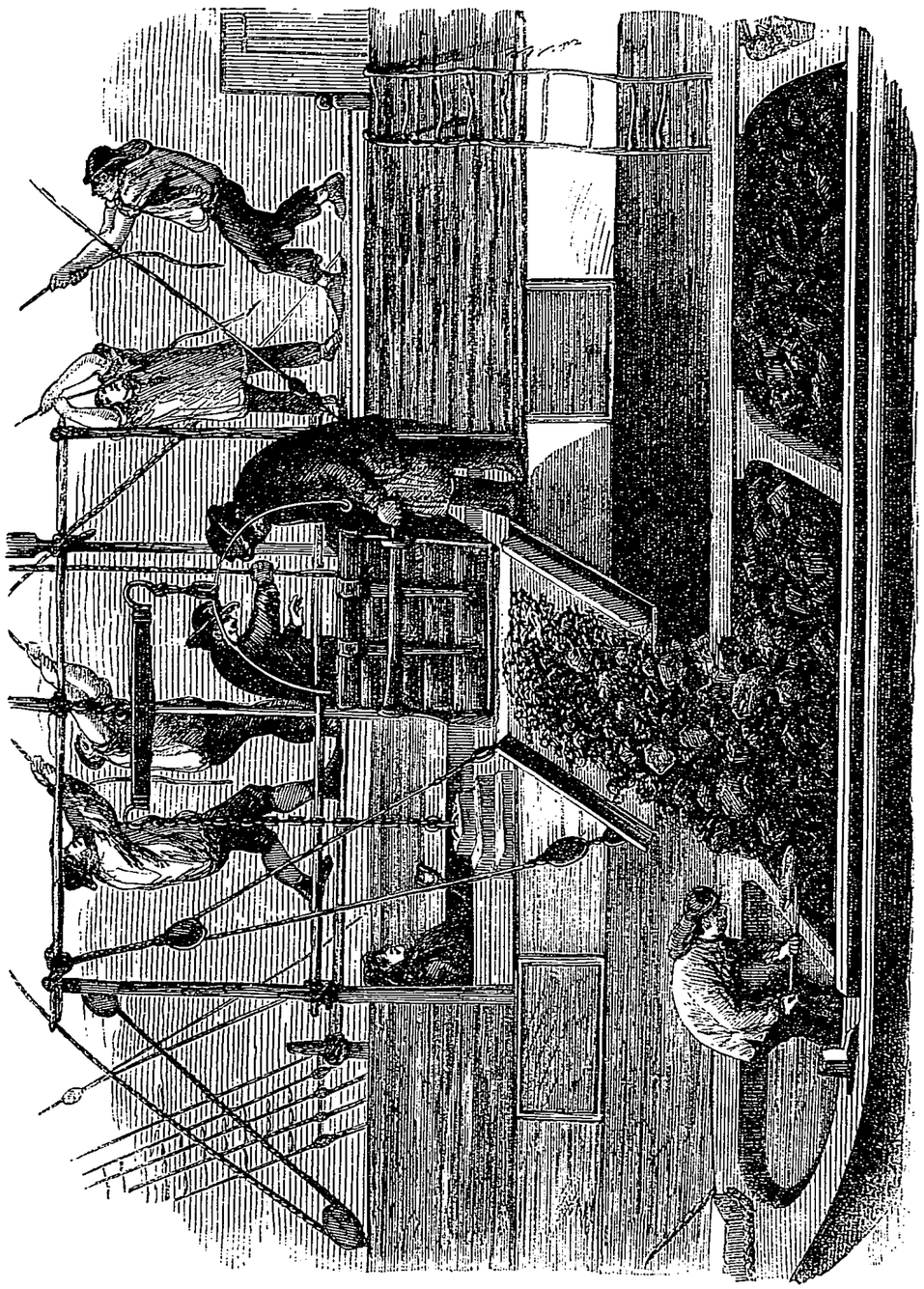
The mode of street drainage is by means of what is called a gully-hole and a gully-drain.

*The Gully-hole** is the opening from the surface of the street (and is seen generally on each side of the way), into which all the fluid refuse of the public thoroughfares runs on its course to the sewer.

The Gully-drain is a drain generally of earthenware piping, curving from the side of the street to an opening in the top or side of the sewer, and is the means of communication between the sewer and the gully-hole.

The gully-hole is indicated by an iron grate being fitted into the surface of the side of a foot-path, where the road slopes gradually from its centre to the edge of the footpath, and down this grate the water runs into the channel contrived

* *Gully* here is a corruption of the word *Gullet*, or throat; the Norman is *guelle* (Lat. *gula*), and the French, *goulet;* from this the word *gully* appears to be directly derived. A *gully*-drain is literally a *gullet*-drain, that is, a drain serving the purposes of a gullet or channel for liquids, and a gully-hole the mouth, orifice, or opening to the *gullet* or gully-drain.



GANG OF COAL-WHIPPERS AT WORK BELOW BRIDGE.
[*From a Sketch.*]

for it in the construction of the streets. These gully-grates, the observant pedestrian—if there be a man in this hive of London who, without professional attraction to the matter, regards for a few minutes the peculiarities of the street (apart from the houses) which he is traversing—an observant pedestrian, I say, would be struck at the constantly-recurring grates in a given space in some streets, and their paucity in others. In Drury-lane there is no gully-grate, as you walk down from Holborn to where Drury-lane becomes Wych-street; whilst in some streets, not a tenth of the length of Drury-lane, there may be three, four, five, or six grates. The reason is this:—There is no sewer running down Drury-lane; a contiguous sewer, however, runs down Great Wyld-street, draining, where there are drains, the hundred courts and nooks of the poor, between Drury-lane and Lincoln's-inn-fields, as well as the more open places leading down towards the proximity of Temple Bar. This Great Wyld-street sewer, moreover, in its course to Fleet Bridge, is made available for the drainage (very grievously deficient, according to some of the reports of the Board of Health) of Clare-market. Grates would of course be required in such a place as Drury-lane, only the street is thought to be sufficiently on the descent to convey the surface-water to the grate in Wych-street.

The parts in which the gully-grates will be found the most numerous are where the main streets are most intersected by other main streets, or by smaller off-streets, and indeed wherever the streets, of whatever size, continually intersect each other, as they do off nearly all the great street-thoroughfares in the City. Although the sewers may not be according to the plan of the streets, the gully-grates must nevertheless be found at the street intersections, whether the nearest point to the sewer or not, or else the water would not be quickly carried off, and would form a nuisance.

I am informed, on good authority, both as regards the City and Metropolitan Commissions, that the average distance of the gully-grates is thirty yards one from another, including both sides of the way. Their number does not depend upon population, but simply on the local characteristics of the highways; for of course the rain falls into all the streets in proportion to their size, whether populous or half-empty localities. As, however, the more distant roads have not such an approximation of grates, and the law which requires their formation is by no means—and perhaps, without unnecessary interference, cannot be—very definite, I am informed that it may fairly be represented, that, of the 1760 miles of London public ways, more than two-thirds, "or" remarked one informant, "say 1200 miles, are grated on *each* side of the street or road, at distances of sixty yards." This would give 59 gully-holes in every one of the 1200 miles of street said to be so supplied. Hence the total number throughout the metropolis will be 70,800.

The gully-drain, which is the street-drain, always presents now a sloping curve, describing, more or less, part of a circle. This drain starts, so to speak, from the side of the street, while its course to the sewer, in order to economize space, is made by any most appropriate curve, to include the reception of as great a quantity of wet street-refuse as possible; for if the gully-drains were formed in a direct, or even a not-very-indirect line, from the street sides to the sewers, they would not only be more costly, more numerous, but would, in fact, as I was told, "choke the under-ground" of London, for now the subterranean capital is so complicated with gas, water, and drain-pipes, that such a system as will allow room for each is indispensable. The new system is, moreover, more economical. In the City the gully-drains are nearly all of nine-inch diameter in tubular pipeage. In the metropolitan jurisdiction they are the same, but not to the same extent, some being only six inches.

Fifty, or even thirty years ago, the old street channels for gully drainage were costly constructions, for they were made so as to suit sewers which were cleansed by the street being taken "up," and the offensive deposit, thick and even indurated as it often was in those days, drawn to the surface. Some few were three and even four feet square; some two feet six inches wide, and three or four feet high; all of brick. I am assured that of the extent or cost of these old contrivances no accounts have been preserved, but that they were more than twice as costly as the present method.

In all the reports I have seen, metropolitan or city—the statements of the flushermen being to the same purport—there are complaints as to the uses to which the gully-holes are put in many parts, every kind of refuse admissible through the bars of the grate being stealthily emptied down them. The paviours, if they have an opportunity, sweep their surplus grout into the gullies, and so do the scavagers with their refuse occasionally, though this is generally done in the less frequented parts, to get rid of the "slop," which is valueless.

In a report, published in 1851, Mr. Haywood points out the prevalence of the practice of using the gully-gratings as dustbins! A sewer under Billingsgate accumulated in a few months many cart-loads, composed almost wholly of fish-shells; and 114 cart-loads of fish-shells, cinders, and rubbish were removed from the sewers in the vicinity of Middlesex-street (Petticoat-lane); these had accumulated in about twelve months. "Reconstructing the gullies," he says, "so as to intercept improper substances (which has been recently done at Billingsgate), might prevent this material reaching the sewers, but it would still have to be removed from the gullies, and would thus still cause perpetual expense. Indeed, I feel convinced that nothing but making public example by convicting and punishing some offenders, under clause 69 of 'The City of London Sewers' Act,' will stop the practice, so universal in the poorer localities, of using the gullies as dustbins."

The Gully-holes are now trapped—with very few exceptions, one report states, while another report intimates that gully-trapping has no exception at all. The trap is resorted to so that the effluvium from

a gully-drain may not infect the air of the public ways; but among engineers and medical sanitary inquirers, there is much difference of opinion as to whether the system of trapping is desirable or not. The general opinion seems to be, however, that all gullies should be trapped.

Of the City gully-traps, Mr. Haywood, in a report for the year 1851, says, as regards the period of their introduction:—

"About seventeen years ago your then surveyor (Mr. Kelsey) applied the first traps to sewer gullies, and from that date to the present the trapping of gullies has been adopted as a principle, and the city of London is still, I believe, the only metropolitan area in which the gullies are all trapped. The traps first constructed have since been (as all first inventions or adaptations ever have or will be) improved upon, and are rapidly being displaced by those of more improved construction.

"Now, of the incompatible conditions required of gully-traps, of the difficulty of obtaining such mechanical appliances so effective and perfect as can *theoretically* be devised, but yet of the extreme desirability of obtaining them as perfect as modern science could produce, your honourable court has, at least, for as long as I have had the honour of holding office under you, been fully alive to; no prejudice has opposed impediment to the introduction of novelties; your court has been always open to inventors, and, at the present time, there are sixteen different traps or modes of trapping gullies under trial within your jurisdiction.

"Nor has the provision of the means of excluding effluvium from the atmosphere been your only care; but the cleanliness of the sewers, and the prevention of accumulation of decomposing refuse, both by regulated cleansings, and by constructing the sewage upon the most improved principles, have also been your aim and that of your officers; and I do not hesitate to assert, that the offensiveness of the escape from the gullies has been of late years much diminished by the care bestowed upon the condition of the sewers.

"374 gullies have been retrapped in the City upon improved principles during the last year."

The gully-traps are on the principle of self-acting valves, but it is stated in several reports, that these valves often remain permanently open, partly from the street refuse (especially if mixed with the débris from new or removed buildings) not being sufficiently liquified to pass through them, and partly from the hinges getting rusted, and so becoming fixed.

Of the Length of the London Sewers and Drains.

There is no official account precisely defining the length of the London sewerage; but the information acquired on the subject leaves no doubt as to the accuracy of the following facts.

About 900 miles of sewers of the metropolis may be said to have been surveyed; and it is known that from 100 to 150 miles more constitute a portion of the metropolitan sewerage; this, too, independently of that of the City, which is 50 miles. Altogether I am assured that the sewers of the urban part of London, included within the 58 square miles before mentioned, measure 1100 miles.

The classes of sewers comprised in this long extent are pretty equally apportioned, each a third, or 366 miles, of the first, second, and third classes respectively. Of this extent about 200 miles are still, in the year 1852, *open* sewers!—to say nothing of the great open sewer, the Thames. The open sewers are found principally in the Surrey districts, in Brixton, Lewisham, Tooting, and places at the like distance from the more central parts of the Commissioners' jurisdiction. These open sewers, however, are disappearing, and it is intended that in time no such places shall exist; as it is, some miles of them are inclosed yearly. The open sewers in what may be considered more of the heart of the metropolis are a portion of the Fleet-ditch in Clerkenwell, and places in Lambeth and Bermondsey, or about 20 miles in the interior to 180 miles in the exterior portion of the capital. These are national disgraces.

The 1100 miles above-mentioned, however, include only the sewers, comprising neither the house nor gully-drains. According to the present laws, all newly-built houses must be drained into the sewers; and in 1850 there were 5000 applications from the western districts alone to the Commissioners, for the promotion of the drainage of that number of old and new houses into the sewers, the old houses having been previously drained into cesspools.

I am assured, on good authority, that fully one-half of the houses in the metropolis are at the present time drained into the sewers. In one street, about a century old, containing in the portion surveyed for an official purpose, on the two sides of the way, 76 houses, the number was found to be equally divided—half the drainage being into sewers and half into cesspools. The number of houses in the metropolis proper, of 115 square miles area, is 307,722. The majority, as far as is officially known, are now drained into the public sewers, or into private or branch sewers communicating with the larger public receptacles, so that—allowing 200,000 houses to be included in the 58 square miles of the urban sewerage, and admitting that some wretched dwelling-places are not drained at all—it is reasonable to assume that at least 100,000 houses within this area are drained into the sewers.

The average length of the house-drains is, I learn from the best sources, 50 feet per house. The builder of a new house is now required by law to drain it, at the proprietor's cost, 100 feet, if necessary, to a sewer. In some instances, in detached houses, where the owners object to the cesspool system, a house drain has been carried 230 feet to a sewer, and sometimes even farther; but in narrow or moderately wide streets, from 18 to 26 feet across, and in alleys and narrow places (in case there is sewerage) the house drains may be but from 12 to 20 feet. Both these lengths of drainage are exceptions, and there is no question that the average length may be put at 50 feet. In some squares, for example, the sewer runs along the centre, so that the house-drains here are in excess of the 50 feet average.

The length of the house-drainage of the more central part of London, assuming 100,000 houses to be drained into the sewers, and each of such drains to be on the average 50 feet long, is, then, 5,000,000 feet, or about 2840 miles.

But there are still the street or gully-drains for the surface-water to be estimated. In the Holborn and Finsbury division alone, the length of the "main covered sewers" is said to be 83 miles; the length of "smaller sewers" to carry off the surface-water from the streets 16 miles; the length of drains leading from houses to the main sewers, 264.

Now, if there be 16 miles of gully-drains to 83 miles of main covered sewers, and the same proportion hold good throughout the 58 square miles over which the sewers extend, it follows that there would be about 200 miles of gully-drains to the gross 1100 miles of sewers.

But this is only an approximate result. The length and character of the gully-drains I find to vary very considerably. If the streets where the gully-grates are found have no sewer in a line with the thoroughfare, still the water must be drained off and conveyed to the nearest sewer, of any class, large or small, and consequently at much greater length than if there were a sewer running down the street. Neither is the number of the gully-holes any sure criterion of the measurement of the gully-drains, for where the intersections are, and consequently the gully-holes frequent, a number, sometimes amounting to ten, are made to empty their contents into the same gully-drain. Neither do the returns of yearly expenditure, presented to Parliament by the Metropolitan Court of Sewers, supply information. But even if the exact length, and the exact price paid for the formation of that length, were given, it would supply but *the year's* outlay as regards the additions or repairs that had been made to the gully-drains, and certainly not furnish us with the original cost of the whole.

One experienced informant told me—but let me premise that I heard from all the gentlemen whom I consulted, a statement that they could only compute by analogy with other facts bearing upon the subject—was confident, that taking only 1200 miles of public way as gully-drained, that extent might be considered as the length of the gully-drains themselves. Even calculating such drains to run from each side of the public way, which is generally the case, I am told that, considering the economy of underground space which is now necessary, the length of 1200 miles is as fair an estimate for gully-drainage (apart from other drainage) as for the length of the streets so gullied.

Hence we have, for the gross extent of the whole sewers and drains of the metropolis, the following result,—

	Miles.
Main covered sewers	1100
House-drains	2840
Gully-drains for surface-water of streets	1200
Total length of the sewers and drains of the metropolis	5140

The island of Great Britain, I may observe, is, at its extreme points, 550 miles from north to south, and 290 from east to west. It would, therefore, appear that the main sewers of the capital are just double the length of the whole island, from the English Channel to John-o'-Groats, and nearly three times longer than the greatest width of the country. But this is the extent of the sewerage alone. The drainage of London is about equal in length to the diameter of the earth itself!

Of the Cost of Constructing the Sewers and Drains of the Metropolis.

The money actually expended in constructing the 1100 miles of sewers and 4000 miles of drains, even if we were only to date from Jan. 1, 1800, is not and never can be known. They have been built at intervals, as the metropolis, so to speak, *grew*. They were built also in many sizes and forms, and at many variations of price, according to the depth from the surface, the good or bad management, or the greater or lesser extent of jobbery or "patronage" in the several independent commissions. Accounts were either not presented in "the good old times," or not preserved.

Had the 1100 miles of sewers to be constructed anew, they would be, according to the present prices paid by the Commissioners—not including digging or such extraneous labour, but the cost of the sewer only—as follows:—

366 miles of sewers of the first class, or 1,932,480 feet, at 15*s.* per foot	£1,449,360
366 miles, or 1,932,480 feet of the second class, at 11*s.* per foot	1,062,864
Same length of third class, at 9*s.* per foot	869,616
Total cost of the sewers of the metropolis	£3,381,840

As this is a lower charge than was paid for the construction of more than three-fourths of the sewers, we may fairly assume that their cost amounted to from three millions and a half to four millions of pounds sterling.

The majority of the house-drains running into the sewers are brick, and seldom less than 9 inches square; sometimes, in the old brick drains, they are some inches larger, and in the very old drains, and in some 100 years old, wooden planks were often used instead of a brick or stone construction, for the sake of reducing cost, and replaced when rotted. The wood, in many cases, soon decayed, and since 1847 no wooden sewers have been allowed to be formed, nor any old ones to be repaired with new wood; the work must be of stone or brick, if not pipeage. About two-thirds

of the drains running from the houses to the sewers are brick; the remaining third tubular, or earthenware pipes. The cost, if now to be formed, would be somewhat as follows:—

1893⅓ miles of brick drains, 5*s.* per foot, as average of sizes . .	£2,499,200
945⅔ feet of tubular drains, average of sizes 2*s.* 6*d.*	624,800
Total cost of the house-drains of London	£3,124,000

The cost of the street or gully drains have still to be estimated.

The present cost of the 9-inch gully-pipe drains is about 3*s.* 6*d.* a foot; of the 6-inch, 2*s.* 6*d.* Of the proportionate lengths of these two classes of street-drains I have not been able to gain any account, for, I believe, it has never been ascertained in any way approaching to a total return. Taking 1200 miles, however, as quite within the full length of the gully-drains, and calculating at the low average of 3*s.* the foot for the whole, the total cost of the street-drains of the metropolis would be 950,400*l.*, or, I am assured, one might say a million sterling, and this, even if all were done at the present low prices; the original cost would, of course, have been much greater.

Hence, according to the above calculations, we have the following

Gross Estimate of the Cost of the Sewers and Drains of the Metropolis.

	£
1100 miles of main covered sewers	3,500,000
2840 miles of house-drains . .	3,000,000
1200 miles of gully or street drains	1,000,000
5140 miles of sewers and drainage =	7,500,000

Of the Uses of Sewers as a Means of Subsoil Drainage.

There is one other purpose toward which a sewer is available—a purpose, too, which I do not remember to have seen specified in the Metropolitan Reports.

"The first, and perhaps most important purpose of sewers, as respects health," says the Report of Messrs. Walker, Cubitt, and Brunel (1848), "is, *as under-drains to the surrounding earth.* They answer this purpose so effectually and quietly, and have done it so long, that their importance in this respect is overlooked. In the Sanitary Commissioners' Reports we do not find it once noticed, and the recommendation of the substitution of stone or earthenware pipes for the larger brick sewers, seems to show, that any provision for the *under-drainage* was thought unnecessary, although such a provision is in our opinion most important.

"Under the artificial ground, the collection of ages, which in the City of London, as in most ancient towns, forms the upper surface, is a considerable thickness of clean gravel, and under the gravel is the London clay. The present houses are founded chiefly on the artificial or 'made ground,' while the sewers are made through the gravel; and it is known practically, that however charged with water the gravel of a district may be, the springs for a considerable distance round are drawn down by making a sewer, and the wells that had water within a few feet of the surface have again to be sunk below the bottom of the sewer to reach the water. Every interstice between the stones of the gravel acts as an underdrain to conduct the water to the sewer, through the sides of which it finds its way, even if mortar be used in the construction.

"Hence the salubrity of a gravel foundation, if the water be drawn out of it by sewers or other means, as is the case with the City and with Westminster. A proof of this principle was afforded by the result of a reference to physicians and engineers in 1838, to inquire into the state of drainage and smells in and near Buckingham Palace, as to which there had been complaints, though none so heavy as Mr. Phillips now makes, when he says, 'that the drainage of Buckingham Palace is extremely defective, and that its precincts are reeking with filth and pestilential odours from the absence of proper sewerage!'"

The Report then shows the pains that were taken to ensure dryness in the Palace. Pits were dug in the garden 14 feet below the surface, and 3½ feet below high-water mark in the river, and they were found dry to the bottom. The kitchens and yard of the palace are, however, only 18 inches above Trinity high-water mark in the Thames, and therefore 18 inches below a very high tide. The physician, Sir James Clarke, and the engineers, Messrs. Simpson and Walker, in a separate Report, spoke in terms of commendation of the drainage of the Palace in 1838, as promotive of dryness. Since that time a connecting chain has been made from the Palace drains into the canal in St. James's-park, to prevent the wet from rising as formerly during heavy rains. "The Palace," it is stated in the Report of the three engineers, "should not be classed with the low part of Pimlico, where the drainage is, we believe, very defective, and to which, for anything we know to the contrary, the character given by Mr. Phillips may be applicable."

Unfortunately, however, for this array of opinions of high authority, and despite the advantages of a gravel bed for the substratum of the palatial sewerage, the drainage and sewerage about Buckingham Palace is more frequently than that of any other public place under repair, and is always requiring attention. It was only a few days ago, before the court left Windsor Castle for London, that men were employed night and day, on the drains and cesspoolage channels, to make, as one of them described it to me—and such working-men's descriptions are often forcible—"the place *decent.* I was hardly ever," he added, "in such a set of stinks as I've been in the sewers and underground parts of the palace."

Of the City Sewerage.

As yet I have spoken only of the sewers of London* "without the City;" but the sewers within the City, though connected, for the general public drainage and sewerage of the capital, with the works under the control of the Metropolitan Commissioners, are in a distinct and strictly defined jurisdiction, superintended by City Commissioners, and managed by City officers, and consequently demand a special notice.

The account of the City sewers, however, may be given with a comparative brevity, for the modes of their construction, as well as their general management, do not differ from what I have described as pertaining to the extra-civic metropolis. There are, nevertheless, a few distinctions which it is proper to point out.

The City sewers are the oldest in the capital, for the very plain reason that the City itself, in its site, if not now in its public and private buildings, is the oldest part of London, as regards the abode of a congregated body of people.

The ages (so to speak) of these sewers, vary, for the most part, according to the dates of the City's rebuilding after the Great Fire, and according to the dates of the many alterations, improvements, removal or rebuilding of new streets, markets, &c., which have been effected since that period. Before the Great Fire of 1666, all drainage seems, with a few exceptions, to have been fortuitous, unconnected, and superficial.

The *first* public sewer built after this important epoch in the history of London was in Ludgate-street and hill. This was the laudable work of the Dean and Chapter of St. Paul's, and was constructed at the instance, it is said, and after the plans, of Sir Christopher Wren. There is, perhaps, no official or documentary proof of this, for the proclamations from the King in council, the Acts of Parliament, and the resolutions of the Corporation of the City of London at that important period, are so vague and so contradictory, and were so frequently altered or abrogated, and so frequently disregarded, that it is more impossible than difficult to get at the truth. Of the fact which I have just mentioned, however, there need be no doubt; nor that the *second* public City sewer was in Fleet-street, commenced in 1668, the second year after the fire.

There are, nevertheless, older sewers than this, but the dates of their construction are not known; we have proof merely that they existed in old London, or as it was described by an anonymous writer (quoted, if I remember rightly, in Maitland's "History of London"), London "*ante ignem*"—London before the fire. These sewers, or rather portions of sewers, are severally near Newgate, St. Bartholomew's Hospital sewer, and that of the Irongate by the Tower.

The sewer, however, which may be pointed out as the most remarkable is that of Little Moorgate, London-wall. It is formed of red tiles; and from such being its materials, and from the circumstance of some Roman coins having been found near it, it is supposed by some to be of Roman construction, and of course coeval with that people's possession of the country. This sewer has a flat bottom, upright sides, and a circular arch at its top; it is about 5 feet by 3 feet. The other older sewers present much about the same form; and an Act in the reign of Charles II. directs that sewers shall be so built, but that the bottom shall have a circular curve.

I am informed by a City gentleman—one taking an interest in such matters—that this sewer has troubled the repose of a few civic antiquaries,

* Of the derivation of the word *Sewer* there have been many conjectures, but no approximation to the truth. One of the earliest instances I have met with of any detailed mention of sewers, is in an address delivered by a "Coroner," whose name does not appear, to "a jury of sewers." This address was delivered somewhere between the years 1660 and 1670. The coroner having first spoken of the importance of "Navigation and Drayning" (draining), then came to the question of sewers.

"Sewars," he said, "are to be accounted your grand Issuers of Water, from whence I conceive they carry their name (*Sewars quasi Issuers*). I shall take his opinion who delivers them to be Currents of Water, kept in on both sides with banks, and, in some sense, they may be called a certain kind of a little or small river. But as for the derivation of the word Sewar, from two of our English words, *Sea* and *Were*, or, as others will have it, *Sea* and *Ward*, give me leave, now I have mentioned it, to—leave it to your judgments.

"However, this word *Sewar* is very famous amongst us, both for giving the title of the Commission of Sewars itself, and for being the ordinary name of most of your common water-courses, for Drayning, and therefore, I presume, there are none of you of these juries but both know—

"1. What Sewars signify, and also, in particular,

"2. What they are; and of a thing so generally known, and of such general use."

The Rev. Dr. Lemon, who gave the world a work on "English Etymology," from the Greek and Latin, and from the Saxon and Norman, was regarded as a high authority during the latter part of the last century, when his quarto first appeared. The following is his account, under the head "Sewers"—

"Skinn. rejects Minsh's. deriv. of 'olim scriptum fuisse *seward* à sea-ward, quod versus mare factæ sunt: longè verisimilius à Fr. Gall. *eauier*; sentina; *incile*, supple. aquarum:'—then why did not the Dr. trace this Fr. Gall. *eauier*? if he had, he would have found it distorted ab 'Υδωρ, *aqua*; *sewers* being a species of *aqueduct*:—Lye, in his Add., gives another deriv., viz. 'ab Iceland. *sua*, *culare*; ut existimo; ad quod referre vellem *sewer*; *cloaca*; per *sordes* urbis ejiciuntur:'—the very word *sordes* gives me a hint that *sewer* may be derived à 'Σαιρω, *vel* Σαρσω, *verro*: nempe quia *sordes*, quæ *everruntur* è domo, in unum locum *accumulantur*; R. Σωρος, *cumulus*: Voss.'—*a collection of sweepings, dop, dirt, &c.*"

But these are the follies of learning. Had our lexicographers known that the vulgar were, as Dr. Latham says, "the conservators of the Saxon language" with us, they would have sought information from the word "shore," which the uneducated, and, consequently, unperverted, invariably use in the place of the more polite "sewer"—the common *sewer* is always termed by them "the common *shore*." Now the word *shore*, in Saxon, is written *score* and *scor* (for *c* = *h*), and means not only a bank, the land immediately next to the sea, but a *score*, a tally—for they are both substantives, made from the verb *sceran* (p. *scear*, *scær*, pp. *scoren*, *gescoren*), to *shear*, cut off, *share*, divide; and hence they meant, in the one case, the division of the land from the sea; and in the other, a division cut in a piece of wood, with a view to counting. The substantive *scar* has the same origin; as well as the verb to *score*, to cut, to gash. The Scandinavian cognates for the Saxon *scor* may be cited as proofs of what is here asserted. They are, Icel., *skor*, a notch; Swed., *skåra*, a notch; and Dan., *skaar* and *skure*, a notch, an incision. It would seem, therefore, that the word *shore*, in the sense of *sewer* (Dan., *skure*; Anglice, *shure*, for *k* = *h*), originally meant merely a *score* or incision made in the ground, a *ditch* sunk with the view of carrying off the refuse-water, a watercourse, and consequently a drain. A sewer is now a covered ditch, or channel for refuse water.

some thinking that it was a Roman sewer, while others scouted such a notion, arguing that the Romans were not in the habit of doing their work by halves; and that if they had sewered London, great and enduring remains would have been discovered, for their main sewer would have been a solid construction, and directed to the Thames, as was and is the Cloaca Maxima, in the Eternal City, to the Tiber. Others have said that the sewer in question was merely built of Roman materials, perhaps first discovered about the time, having originally formed a reservoir, tank, or even a bath, and were keenly appropriated by some economical or scheming builder or City official.

"That the Britons," says Tacitus in his "Life of Agricola," "who led a roaming life, and were easily incited to war, might contract a love for peace, by being accustomed to a pleasanter mode of life, Agricola assisted them to build houses, temples, and market-places. By praising the diligent and upbraiding the idle, he excited such emulation among the Britons, that, after they had erected all those necessary buildings in their towns, they built others for pleasure and ornament, as porticoes, galleries, *baths*, and banqueting-houses."

The sewers of the city of London are, then, a comparatively modern work. Indeed, three-fourths of them may be called modern. The earlier sewers were—as I have described under the general head—ditches, which in time were arched over, but only gradually and partially, as suited the convenience or the profit of the owners of property alongside those open channels, some of which thus presented the appearance of a series of small uncouth-looking bridges. When these bridges had to be connected so as to form the summit of a continuous sewer, they presented every variety of arch, both at their outer and under sides; those too near the surface had to be lowered. Some of these sewers, however, were in the first instances connected, despite difference of size and irregularity of form. The result may be judged from the account I have given of the strange construction of some of the Westminster sewers, under the head of "subterranean survey."

How modern the City sewers are may best be estimated from the following table of what may be called the dates of their construction. The periods are given decennially as to the progress of the formation of *new* sewers:—

	Feet.		Feet.
1707 to 1717	2,805	1777 to 1787	8,693
1717 „ 1727	2,110	1787 „ 1797	3,118
1727 „ 1737	2,763	1797 „ 1807	5,116
1737 „ 1747	1,238	1807 „ 1817	5,097
1747 „ 1757	3,736	1817 „ 1827	7,847
1757 „ 1767	3,736		
1767 „ 1777	7,597		52,810

1827 to 1837	39,072 feet.
1837 to 1847	88,363 „
	127,435

Thus the length made in the 20 years previous to 1847 was more than double all that was made during the preceding 120 years; while in the ten years from 1837 to 1847, the addition to the lineal extent of sewerage was very nearly equal to all that had been made in 130 years previously.

This addition of 127,435 feet, or rather more than 24 miles, seems but a small matter when "London" is thought of; but the reader must be reminded that only a small portion (comparatively) of the metropolis is here spoken of, and the entire length of the City sewerage, at the close of 1847, was but 44 miles; so that the additions I have specified as having been made since 1837, were more than one-half of the whole. The *re*-constructions are not included in the métage I have given, for, as the new sewers generally occupied the same site as the old, they did not add to the length of the whole.

The total length of the City sewerage was, on the 31st December, 1851, no less than 49 miles; while the entire public way was at the same recent period, 51 miles (containing about 1000 separate and distinct streets, lanes, courts, alleys, &c., &c.); and I am assured that in another year or so, not a furlong of the whole City will be unsewered.

"The more ancient sewers usually have upright walls, a flat or slightly-curved invert, and a semicircular or gothic arch. The form of such as have been built apparently more than 20 years ago, is that of two semicircles, of which the upper has a greater radius, connected by sloping side walls; those of recent construction are egg-shaped. The main lines are not unfrequently elliptic; in the case of the Fleet, and other ancient affluents of the Thames, the forms and dimensions vary considerably. Instances occur of sewers built entirely of stone; but the material is almost invariably brick, most commonly 9 inches in substance; the larger sewers 14, and sometimes 18 inches.

The falls or inclinations in the course of the City sewerage vary greatly, as much as from 1 in 240 to 1 in 24, or, in the first case, from a fall of 22 feet, in the latter, of course, to ten times such fall, or 220 feet per mile. There are, moreover, a few cases in which the inclination is as small as 1 in 960; others where it is as high as 1 in 14. This irregularity is to be accounted for, partly by the want of system in the old times, and partly from the natural levels of the ground. The want of system and the indifference shown to providing a proper fall, even where it was not difficult, was more excusable a few years back than it would be at the present time, for when some of these sewers were built, the drainage of the house-refuse into them was not contemplated.

The number of houses drained into the City sewers is, as precisely as such a matter can be ascertained, 11,209; the number drained into the cesspools is 5030. This shows a preponderance of drainage into the sewers of 6179. The length of the house-drains in the City, at an average of 50 feet to each house, may be estimated at upwards of 106 miles. These City drains are included in the general computation of the metropolis.

The gully-drains in the City are more frequent than in other parts of the metropolis, owing to the continual intersection of streets, &c., and perhaps from a closer care of the sewerage and all matters connected with it. The general average of the gully-drains I have shown to be 59 for every mile of street. I am assured that in the City the street-drains may be safely estimated at 65 to the mile. Estimating the streets gullied within the City, then, at an average of 50 miles, or about a mile more than the sewers, the number of gully-drains is 3250, and the length of them about 50 miles; but these, like the house-drains, have been already included in the metropolitan enumeration.

The actual sum expended yearly upon the construction, and repairs, and improvements of the City sewers cannot be cited as a distinct item, because the Court makes the return of the aggregate annual expenditure, as regards pavement, cleansing, and the matters specified as the general expenditure under the Court of Commissioners of the City Sewers. The cost, however, of the construction of sewers comprised within the civic boundaries is included in the general metropolitan estimate before given.

Of the Outlets, Ramifications, etc., of the Sewers.

In this enumeration I speak only of the *public* outlets into the river, controlled and regulated by public officers.

The orifices or mouths of the sewers where they discharge themselves into the Thames, beginning from their eastern, and following them seriatim to their western extremity, are as follows:—

Limehouse Hole.
Irongate Wharf.
Ratcliffe Cross.
Fox-lane, Shadwell.
London Dock.
St. Katharine's Dock.
The eleven City outlets, which I shall specify hereafter.
Essex-street, Strand.
Norfolk-street, Strand.
Durham Hill (or Adelphi).
Northumberland-street.
Scotland-yard.
Bridge-street, Westminster.
Pimlico.
Cubitt's (also in Pimlico).
Chelsea Bridge.
Fulham Bridge.
Hammersmith Bridge.
Sandford Bridge (into a sort of creek of the Thames), or near the four bridges.
Twickenham.
Hampton.
In all, 32.

It might only weary the reader to enumerate the outlets on the Surrey side of the Thames, which are 28 in number, so that the public sewer outlets of the whole metropolis are 60 in all.

The public sewer outlets from the City of London into the Thames are, as I have said, eleven in number, or rather they are usually represented as eleven, though in reality there are twelve such orifices—the "Upper" and "Eastern" Custom-House Sewers (which are distinct) being comprised as one. These outlets, generally speaking the most ancient in the whole metropolis, are—

London Bridge.
Ancient Walbrook.
Paul's Wharf.
The Fleet-street Sewer at Blackfriars Bridge.
(I mention these four first, because they are the largest outlets).
Tower Dock.
Pool Quay.
Custom House.
New Walbrook.
Dowgate Dock.
Hamburg Wharf
Puddle Dock.

Until recently, there was also Whitefriars Docks, but this is now attached to the Fleet Sewer outlet.

The Fleet Sewer is the oldest in London. No portion of the ditch or river composing it is now uncovered within the jurisdiction of the City; but until a little more than eleven years ago a portion of it, north of Holborn, was uncovered, and had been uncovered for years. Indeed, as I have before intimated, barges and small craft were employed on the Fleet River, and the City determined to "encourage its navigation." Even the "polite" Earl of Chesterfield, a century ago (for his lordship was born in 1694, and died in 1773), when asked by a Frenchman in Paris, if there was in London a river to compare to the Seine? replied that there certainly was, and it was called Fleet Ditch! This is now the sewer; but it was not a covered sewer until 1765, when the Corporation ordered it to be built over.

The next oldest sewer outlet is that at London Bridge, and London antiquaries are not agreed as to whether it or the Fleet is the oldest.

The Fleet Sewer at Blackfriars Bridge is 18 feet high; between Tudor-street and Fleet Bridge (about the foot of Ludgate-hill), 14 feet 3 inches high; at Holborn Bridge, 13 feet; and in its continuation in the long-unfinished Victoria-street, 12 feet 3 inches. In all these localities it is 12 feet wide.

The New London Bridge Sewer, built or rebuilt, wholly or partly, in 1830, is 10 feet by 8 at its outlet; decreasing to the south end of King William-street, where it is 9 feet by 7; while it is 8 feet by 7 in Moorgate-street.

Paul's Wharf sewer is 7 feet 6 inches by 5 feet 6 inches near the outlet.

With the one exception of the Fleet River, none of the City sewer outlets are covered, the Fleet outlet being covered even at low water. The issue from the others runs in open channels upon the shore.

Mr. Haywood (February 12, 1850), in a report of the City Sewer Transactions and Works, observes,—"During the year (1849) the outlet sewers at Billingsgate and Whitefriars, two of the outlets of main sewers which discharged at the line of the River Wall, have been diverted (times of storm excepted); there remain, therefore, but eleven main outlets within the jurisdiction of this commission, which discharge their waters at the line of the River Wall.

"As a temporary measure, it is expedient to convey the sewage of the whole of the outlets within the City by covered culverts, below low-water mark; this subject has been under the consideration both of this Commission and the Navigation Committee."

Whether the covered culvert is better than the open run, is a matter disputed among engineers (as are very many other matters connected with sewerage), and one into which I need not enter.

Mr. Haywood says further:—"The Fleet sewer already discharges its average flow, by a culvert, below low-water mark; with one exception only, I believe, none of the numerous outlets, which, for a length of many miles, discharge at intervals into the Thames at the line of the River Wall, both within and without your jurisdiction, discharge by culverts in a similar manner."

These eleven outlets are far from being the whole number which give their contents into "the silver bosom of the Thames," along the bank-line of the City jurisdiction. There are (including the 11) 182 outlets; but these are not under the control (unless in cases of alteration, nuisance, &c.) of the Court of Sewers. They are the outlets from the drainage of the wharfs, public buildings, or manufactories (such as gas-works, &c.) on the banks of the river; and the right to form such outlets having been obtained from the Navigation Committee, who, under the Lord Mayor, are conservators of the Thames, the care of them is regarded as a private matter, and therefore does not require further notice in this work. The officers of the City Court of Sewers observe these outlets in their rounds of inspection, but interfere only on application from any party concerned, unless a nuisance be in existence.

To convey a more definite notion of the extent and ramified sweep of the sewers, I will now describe (for the first time in print) some of the chief *Sewer Ramifications*, and then show the proportionate or average number of public ways, of inhabited houses, and of the population to each great main sewer, distinguishing, in this instance, those as *great main sewers* which have an outlet into the Thames.

The reader should peruse the following accounts with the assistance of a map of the environs, for, thus aided, he will be better able to form a definite notion of the curiously-mixed and blended extent of the sewerage already spoken of.

First, then, as to the ramifications of the great and ancient Fleet outlet. From its mouth, so to speak, near Blackfriars Bridge, its course is not parallel with any public way, but, running somewhat obliquely, it crosses below Tudor-street into Bridge-street, Blackfriars, then occupies the centre of Farringdon-street, and that street's prolongation or intended prolongation into the New Victoria-street (the houses in this locality having been pulled down long ago, and the spot being now popularly known as "the ruins"), and continues until the City portion of the Fleet Sewer meets the Metropolitan jurisdiction between Saffron and Mutton hills, the junction, so to call it, being "under the houses"* (a common phrase among flushermen). A little farther on it connects itself with an open part of the Fleet Ditch, running at the back of Turnmill-street, Clerkenwell. In its City course, the sewer receives the issue from 15 public ways (including streets, alleys, courts, lanes, &c.), which are emptied into it from the second, third, or smaller class sewers, from Ludgate-hill and its proximate streets, the St. Paul's locality, Fleet-street and its adjacent communications in public ways, with a series of sewers running down from parts of Smithfield, &c. The *greatest* accession of sewage, however, which the Fleet receives from *one* issue, is a few yards beyond where the City has merged into the Metropolitan jurisdiction; this accession is from a first-class sewer, known as "the Whitecross-street sewer," because running from that street, and carrying into the Fleet the contributions of 60 crowded streets.

After the junction of the covered City sewer with the uncovered ditch in Clerkenwell, the Fleet-river sewer (again covered) skirts round Cold Bath Fields Prison (the Middlesex House of Correction), runs through Clerkenwell-green into the Bagnigge Wells-road, so on to Battle-bridge and King's-cross; then along the Old Saint Pancras-road, and thence to the King's-road (a name now almost extinct), where the St. Pancras Workhouse stands close by the turnpike-gate. Along Upper College-street (Camden-town) is then the direction of this great sewer, and running *under* the canal at the higher part of Camden-town, near the bridge by the terminus of the Great North Western Railway, it branches into the highways and thoroughfares of Kentish-town, of Highgate, and of Hampstead, respectively, and then, at what one informant described as "the outside" of those places, receives the open ditches, which form the further sewerage, under the control of the Commissioners, who cause them to be cleansed regularly.

In order to show more consecutively the direction, from place to place, in straight, devious, or angular course, of this the most remarkable sewer of the world, considering the extent of the drainage into it, I have refrained from giving beyond the Whitecross-street connection with the Fleet, an account of the number of streets sewered into this old civic stream. I now proceed to supply the deficiency.

From a large outlet at Clerkenwell-green (a very thickly-built neighbourhood) flows the connected sewage of 100 streets. At Maiden-lane, beyond King's-cross, a district which is now being built upon for the purposes of the Great Northern Railway, the sewage of 10 streets is poured into it. In the course of this sewer along Camden-town, it receives the issue of some 20 branches, or 40 streets, &c. About 15 other issues are received before the open ditches of Kentish-town, Highgate, and Hampstead are encountered.

It is not, however, merely the sewage collected in the precincts of the City proper, which is "outletted" (as I heard a flusherman call it) into the Thames. Other districts are drained into the large City outlets nearing the river. "Many of your works," says Mr. Haywood, the City surveyer, in a report addressed to the City Commissioners, Oct. 23, 1849," have been beneficially felt by districts some miles distant from the City. Twenty-nine outlets have been provided by you for the sewage of the County of Middlesex; the high land of and about Hampstead, drains through the Fleet sewer; Holloway and a portion of Islington can now be drained by the London Bridge sewer; Norton Folgate and the densely-populated districts adjacent are also relieved by it."

On the other hand, the Irongate sewer (one of the most important), which has its outlet in the Tower Hamlets, drains a portion of the City.

The reader must bear in mind, also, that were he to traverse the Fleet sewer in the direction described—for all the men I conversed with on the subject, if asked to show the course of sewerage with which they were familiar, began *from* the outlet into the Thames—the reader, I say, must remember that he would be advancing all the way *against* the stream, in a direction in which he would find the sewage flowing onward to its mouth, while his course would be towards its sources.

On the left-hand side (for the account before given refers only to the right-hand side) proceeding in the same direction, after passing the underground precincts of the City proper, there is another addition near Saffron-hill, of the sewage of 30 streets; then at Gray's-inn-road is added the sewage of 100 streets; New-road (at King's-cross), 20 more streets; from the whole of Somers-town, a populous locality, the sewerage concentrating all the busy and crowded places round about "the Brill," &c., the sewage of 120 streets is received; and at Pratt-street, Camden-town, 12 other streets.

Thus into this sewage-current, directed to one final outlet, are drained the refuse of 517 streets, including, of course, a variety of minor thoroughfares, courts, alleys, &c., &c., as in the neighbourhoods of Gray's-inn-road, in Clerkenwell, Somers-town, &c. Some of these tributaries to the efflux of the sewage are "barrel-drains," but perform the function of sewers along small courts, where there is "no thoroughfare" either *upon* or *below* the surface.

The London Bridge sewer runs up King William-street to Moorgate-street, along Finsbury-square into the City-road, diverging near the Wharf-road, which it crosses *under* the canal near the Wenlock basin, and thence along the Lower-road, Islington, by Cock-lane, through Highbury-vale; after this, at the extremity of Holloway, the open ditches, as in the former instance, carry on the conveyance of sewage from the outer suburbs.

The King's Scholars' Pond Sewer—which seems to have given the Commissioners more trouble than any other, in its connection with Buckingham Palace, St. James's Park, and the new Houses of Parliament—runs from Chelsea-bridge past Cubitt's workshops, and along the King's-road to Eaton-square, the whole of which is drained into it; then "turning round," as one man described it, it approaches Buckingham Palace, which, with its grounds, as well as a portion of St. James's and the Green parks, is drained into this sewer; then branching away for the reception of the sewage from the houses and gardens of Chelsea, it drains Sloane-street, and, crossing the Knightsbridge-road, runs through or across Hyde-park to the Swan at Bayswater, whence its course is by the Westbourne District and under the canal, along Paddington, until it attains the open country, or rather the grounds, in that quarter, which have been very extensively and are now still being built over, and where new sewers are constructed simultaneously with new streets.

Thus in the "reach," as I heard it happily enough designated, of each of these great sewers, the reader will see from a map the extent of the subterranean metropolis traversed, alike along crowded streets ringing with the sounds of traffic, among palatial and aristocratic domains, and along the parks which adorn London, as well as winding their ramifying course among the courts, alleys, and teeming streets, the resorts of misery, poverty, and vice.

Estimating, then, the number of sewers from the number of their river outlets, and regarding all the rest as the branches, or tributaries, to each of these superior streams, we have, adopting the area before specified as being drained by the metropolitan sewers, viz., 58 square miles, the following results:—

Each of the 60 sewers having an outlet into the Thames drains 618 statute acres.

And assuming the number of houses included within these 58 square miles to be 200,000, and the population to amount to 1,500,000, or two-thirds of the houses and people included in the Registrar-General's Metropolis, we may say that each of the 60 sewers would carry into the Thames the refuse from 25,000 individuals and 3333 inhabited houses. This, however, is partly prevented by the cesspoolage system, which supplies receptacles for a proportion of the refuse that, were London to be rebuilt according to the provisions of the present Building and Sanitary Acts, would *all* be carried, without any interception, into the river Thames by the media of the sewers.

In my account of cesspoolage I shall endeavour to show the extent of fæcal refuse, &c., contained in places not communicating with the sewers, and to be removed by the labour of men and horses, as well as the amount of fæcal refuse carried into the sewerage.

Of the Qualities, etc., of the Sewage.

The question of the value, the uses, and the best means of collecting for use, the great mass of the sewage of the metropolis, seems to have become complicated by the statements which have been of late years put forth by rival projectors and rival companies. In our smaller country towns, the neighbourhood of many being remarkable for fertility and for a green beauty of meadow-land and pasturage, the refuse of the towns, whether sewage or cesspoolage (if not washed into a

* This outlet is known to the flushermen, &c., as "below the backs of houses," from its devious course *under the houses* without pursuing any direct line parallel with the open part of the streets.

current, stream, or river), is purchased by the farmers, and carted by them to spread upon the land.

By *sewage*, I mean the contents of the *sewerage*, or of the series of sewers; which neither at present nor, I believe, at any former period, has been applied to any useful or profitable purpose by the metropolitan authorities. The readiest mode to get rid of it, without any care about ultimate consequences, has always been resorted to, and that mode has been to convey it into the Thames, and leave the rest to the current of the stream. But the Thames has its ebbs as well as its flow, and the consequence is the sewage is *never* got rid of.

The most eminent of our engineers have agreed that it is a very important consideration how this sewage should be not only innocuously but profitably disposed of; and if not profitably, in an immediate money return, to those who may be considered its owners (the municipal authorities of the kingdom), at least profitably in a national point of view, by its use in the restoration or enrichment of the fertility of the soil, and the consequent increase of the food of man and beast.

Sir George Staunton has pronounced some of the tea-growing parts of China to be as blooming as an English nobleman's flower-garden. Every jot of manure, human ordure, and all else, is minutely collected, even by the poorest.

I have already given a popular account of the composition of the metropolitan sewage, &c. (under the head of Wet Refuse), and I now give its scientific analysis.

In some districts the sewage is more or less liquid —in what proportion has not been ascertained— and I give, in the first place, an analysis of the sewage of the King's Scholars' Pond Sewer, Westminster, the result having been laid before a Committee of the House of Commons. As the contents of the great majority of sewers *must* be the same, because resulting from the same natural or universally domestic causes (as in the refuse of cookery, washing, surface-water, &c.), the analysis of the sewage of the King's Scholars' Pond Sewer may be accepted as one of sewer-matter generally.

Evidence was given before the committee as to the proportion of "land-drainage *water*" to what was really *manure*, in the matter derived from the sewer in question. A produce of 140 grains of manure was derived from a gallon of sewer-water. Messrs. Brande and Cooper, the analyzers, also state that one gallon (10 lbs. ?) of the liquid portion of the sewage, evaporated to dryness, gave 85·3 grains of solid matter, 74·8 grains of which was again soluble, and contained—

Ammonia	3·29
Sulphuric acid	0·62
Phosphate of lime	0·29
Lime	6·25
Chlorine	10·00

"and potass and soda, with a large quantity of soluble and vegetable matter, and 10·54 insoluble."

This insoluble portion consisted of

Phosphate of lime	2·32
Carbonate of lime	1·94
Silica	6·23
	10·54

The deposit from another gallon weighed 55 grains, of which 21·22 were combustible, being composed of animal matter "rich in nitrogen," some vegetable matter, and a quantity of fat. Of this matter 33·75 grains consisted of

Phosphate of lime	6·81
Oxide of iron	2·01
Carbonate of lime	1·75
Sulphate of lime	1·53
Earthy matter and sand	21·65
	33·75

Other Reports and other evidence show that what is described as "earthy matter and sand" is the mac, mud, and the mortar or concrete used in pavement, washed from the surface of the streets into the sewers by heavy rains; otherwise for the most part the proper load of the scavager's cart.

Further analyses might be adduced, but with merely such variation in the result as is inevitable from the state of the weather when the sewage is drawn forth for examination; whether the day on which this is done happens to be dry or wet *.

It has been ascertained, but the exact proportion is not, and perhaps cannot be, given, that the extent of covered to uncovered surface in the district drained by the King's Scholars' Pond Sewer was as 3 to 1, while that of the Ranelagh Sewer, not far distant, was as 1 to 3, at the time of the inquiry (1848).

"It could not be expected, therefore," says the Report, "that the Ranelagh Sewer (which, moreover, is open to the admission of the tide at its mouth), in the quantity or quality of the manure produced, could bear any proportion to the King's Scholars' Pond Sewer."

Mr. Smith, of Deanston, stated in evidence, that the average quantity of rain falling into King's Scholars' Pond Sewer was 139,934,586 cubic feet in a year, and he assumes 6,000,000 tons as the amount of average minimum quantity of drainage (yearly), yielding 4 cwt. of solid matter in each 100 tons = 1 in 500.

* The following is the analysis of a gallon of sewage also dried to evaporation, by Professor Miller:—

Ammonia	3·26
Phosphoric acid	0·44
Potash	1·02
Silica	0·54
Lime	7·54
Magnesia	1·87
Common salt	13·66
Sulphuric acid	7·04
Carbonic acid	4·41
Combustible matter, containing 0·34 nitrogen	5·80
Traces of oxide of iron.	
Making in solution	45·58
Matters in suspension, consisting of combustible matters, sand, lime, and oxide of iron	44·50

Dr. Granville said, on the same inquiry, that he should be sorry to receive on his land 500 tons of diluted sewer water (such as that from the uncovered Ranelagh Sewer) for 1 ton of really fertilizing sewage, such as that to be derived from the King's Scholars' Pond Sewer.

I could easily multiply these analyses, and give further parliamentary or official statements, but, as the results are the same, I will merely give some extracts from the evidence of Dr. Arthur Hassall, as to the microscopic constituents of sewage-water:—

"I have examined," he said, "the sewer-water of several of the principal sewers of London. I found in it, amongst many other things, much decomposing vegetable matter, portions of the husks and the hairs of the down of wheat, the cells of the potato, cabbage, and other vegetables, while I detected but few forms of animal life, those encountered for the most part being a kind of worm or anælid, and a certain species of animalcule of the genus monas."

"How do you account," the Doctor was asked, "for the comparative absence of animal life in the water of most sewers?" "It is, doubtless, to be attributed," he replied, "in a great measure, to the large quantity of sulphuretted hydrogen contained in sewer-water, and which is continually being evolved by the decomposing substances included in it."

"Have you any evidence to show that sewer-water does contain sulphuretted hydrogen in such large quantity as to be prejudicial and even fatal to animal life?" "With a view of determining this question, I made the following experiments:—A given quantity of Thames water, known to contain living infusoria, was added to an equal quantity of sewer-water; examined a few minutes afterwards, the animalculæ were found to be either dead or deprived of locomotive power and in a dying state. A small fish, placed in a wine glass of sewer-water, immediately gave signs of distress, and, after struggling violently, floated on its side, and would have perished in a few seconds, had it not been removed and placed in fresh water. A bird placed in a glass bell-jar, into which the gas evolved by the sewer-water was allowed to pass, after struggling a good deal, and showing other symptoms of the action of the gas, suddenly fell on its side, and, although immediately removed into fresh air, was found to be dead. These experiments were made, in the first instance, with the sewer water of the Friar-street sewer (near the Blackfriars-road); they were afterwards repeated with the water of six other sewers on the Middlesex side, and with the same result, as respects the animalculæ and fish, but not the bird; this, although evidently much affected by the noxious emanations of the sewer-water, yet survived the experiment."

"Would you infer from these experiments that sewer-water, as contained in the Thames near to London, is prejudicial to health?" "I would, most decidedly; and regard the Thames in the neighbourhood of the metropolis as nothing less than diluted sewer-water."

"You have just stated that you found sewer-water to contain much vegetable matter, and but few forms of animal life; the vegetable matter you recognised, I presume, by the character of the cells composing the several vegetable tissues?" "Yes, as also by the action of iodine on the starch of the vegetable matter."

"In what way do you suppose these various vegetable cells, the husks of wheat, &c., reach the sewers?" "They doubtless proceed from the fæcal matter contained in sewage, and not in general from the ordinary refuse of the kitchen, which usually finds its way into the dust-bin."

"Sewer-water, then, although containing but few forms of animal life, yet contains, in large quantities, the food upon which most animalculæ feed?" "Yes; and it is this circumstance which explains the vast abundance of infusorial life in the water of the Thames within a few miles of London."

The same gentleman (a fellow of the Linnæan Society, and the author of "A History of the British Fresh-water Algæ," or water-weeds considered popularly), in answer to the following inquiries in connection with this subject, also said:—

"What species of infusoria represent the *highest* degree of impurity in water?" "The several species of the genera *Oxytricha* and *Paramecium*."

"What species is most abundant in the Thames from Kew Bridge to Woolwich?" "The *Paramecium Chrysalis* of Ehrenberg; this occurs in all seasons of the year, and in all conditions of the river, in vast and incalculable numbers; so much so, that a quart bottle of Thames water, obtained in any condition of the tide, is sure to be found, on examination with the microscope, to contain these creatures in great quantity."

"Do you find that the infusorium of which you have spoken varies in number in the different parts of the river between Kew Bridge and Woolwich?" "I find that it is most abundant in the neighbourhood of the bridges." [Where the outlet of the sewers is common.]

"Then the order of impurity of Thames water, in your view, would be the order in which it approaches the centre of London?" "Yes."

"You find then, in Thames water, about the bridges, things decidedly connected with the *sewer water*, as vegetable and animal matter in a state of decomposition?" "I do; about the bridges, and in the neighbourhood of London, there is very little living vegetable matter on which animalculæ could live; the only source of supply which they have is *the organic matter contained in sewer-water*, and which is to be regarded as the food of these creatures. Where infusoria abound, under circumstances *not* connected with sewage, vegetable matter in a living condition is certain to be met with."

Respecting the *uses of the sewage*, I may add the following brief observations. Without wishing in any way to prejudice the question (indeed the reader will bear in mind that I have all along spoken reprovingly of the waste of sewage), I am

bound to say that the opinions I heard during my inquiry from gentlemen scientifically and, in some instances, practically familiar with the subject, concurred in the conclusion that the *sewage* of the metropolis cannot, with all the applications of scientific skill and apparatus, be made either sufficiently portable or efficacious for the purposes of manure to assure a proper pecuniary return. In this matter, perhaps, speculators have not traced a sufficient distinction between the liquid manure of the sewers and the "*poudrette*," or dry manure, manufactured from the more solid excrementitious matter of the cesspools, not only in Paris, but, until lately, even in London, where the business was chiefly in the hands of Frenchmen. The staple of the French "*poudrette*" is *not* "*sewage*," that is, the outpourings of the sewers—for this is carried into the Seine, and washed away with little inconvenience, as the tide hardly affects that river in Paris; but it is altogether "*cesspoolage*," that is, the deposit of the cesspools, collected in fixed and moveable utensils, regulated by the "universal" police of Paris, and conveyed by Government labourers to the Voirées, which are huge reservoirs of night-soil at Montfaucon, about five miles, and in the Forest of Bondy, about ten miles, from the centre of Paris. The London-made manure also was all of cesspoolage; the contents of the nightman's cart being "shot" in the manufacturer's yard; and when so manufactured was, I believe, without exception, sent to the sugar-growing colonies, the farmers in the provinces pronouncing it "too hot" for the ground. The same complaint, I may observe, has been made of the French manufactured cesspool manure. I heard, on the other hand, opinions from scientific and practical gentlemen, that the sewer-water of London was so diluted, it was not profitably serviceable for the irrigation of land. All, however, agreed that the sewage of the metropolis ought not to be wasted, as it was certain that perseverance in experiment (and perhaps a large outlay) were certain to make sewage of value.

The following results, which the Board of Health have just issued in a Report, containing "Minutes of Information attested on the Application of Sewer-water and Town Manures to Agricultural Production," supply the latest information on this subject. The Report says first, that "to be told that the average yield of a county is 30 bushels of wheat per acre, or that the average weight of the turnip crop is 15 tons per acre, means very little, and there is little to be learned from such intelligence; but if it is shown that a certain farm under the usual mode of culture yielded certain weights per acre, and that the same land, by improved applications of the same manure, by the use of machinery, and by *employing double the number of hands, at increased wages*, is made to yield *fourfold* the weight of crop and of *better quality* than was previously obtained, a lesson is set before us worth learning."

It then proceeds to cite the following statements, on the authority of the Hon. Dudley Fortescue, as to the efficiency of sewage-water as a liquid manure applied to land.

"The first farm we visited was that of Craigentinney, situated about one mile and a half south-east of Edinburgh, of which 260 Scotch acres" (a Scotch acre is one-fourth more than any English acre) "receive a considerable proportion of such sewerage as, under an imperfect system of house-drainage, is at present derived from half the city. The meadows of which it chiefly consists have been put under irrigation at various times, the most recent addition being nearly 50 acres laid out in the course of last year and the year previous, which, lying above the level of the rest, are irrigated by means of a steam-engine. The meadows first laid out are watered by contour channels following the inequalities of the ground, after the fashion commonly adopted in Devonshire; but in the more recent parts the ground is disposed in 'panes' of half an acre, served by their respective feeders, a plan which, though somewhat more expensive at the outset, is found preferable in practice. The whole 260 acres take about 44 days to irrigate; the men charged with the duty of shifting the water from one pane to another give to each plot about two hours' irrigation at a time; and the engine serves its 50 acres in ten days, working day and night, and employing one man at the engine and another to shift the water. The produce of the meadows is sold by auction on the ground, 'rouped,' as it is termed, to the cow-feeders of Edinburgh, the purchaser cutting and carrying off all he can during the course of the letting, which extends from about the middle of April to October, when the meadows are shut up, but the irrigation is continued through the winter. The lettings average somewhat over 20*l.* the acre; the highest last year having brought 31*l.*, and the lowest 9*l.*; these last were of very limited extent, on land recently denuded in laying out the ground, and consequently much below its natural level of productiveness. There are four cuttings in the year, and the collective weight of grass cut in parts was stated at the extraordinary amount of 80 tons the imperial acre. The only cost of maintaining these meadows, except those to which the water is pumped by the engine, consists in the employment of two hands to turn on and off the water, and in the expense of clearing out the channels, which was contracted for last year at 29*l.*, and the value of the refuse obtained was considered fully equal to that sum, being applied in manuring parts of the land for a crop of turnips, which with only this dressing in addition to irrigation with the sewage-water presented the most luxuriant appearance. The crop, from present indications, was estimated at from 30 to 40 tons the acre, and was expected to realize 15*s.* the ton sold on the land. From calculations made on the spot we estimated the produce of the meadows during the eight months of cutting at the keep of ten cows per acre, exclusive of the distillery refuse they consume in addition, at a cost of 1*s.* to 1*s.* 6*d.* per head per week. The sea-meadows present a particularly striking example of the

effects of the irrigation; these, comprising between 20 and 30 acres skirting the shores between Leith and Musselburgh, were laid down in 1826 at a cost of about 700*l.*; the land consisted formerly of a bare sandy tract, yielding almost absolutely nothing; it is now covered with luxuriant vegetation extending close down to high-water mark, and lets at an average of 20*l.* per acre at least. From the above statement it will be seen how enormously profitable has been the application in this case of town refuse in the liquid form; and I have no hesitation in stating that, great as its advantages have been, they might be extended four or five fold by greater dilution of the fluid. Four or five times the extent of land might, I believe, be brought into equally productive cultivation under an improved system of drainage in the city, and a more abundant use of water. Besides these Craigentinney meadows, there are others on this and on the west side of Edinburgh, which we did not visit, similarly laid out, and I believe realizing still larger profits, from their closer proximity to the town, and their lying within the toll-gates."*

Such, then, are said to be the results of a practical application of sewer-water. The preliminary remark of the Board of Health, however, applies somewhat to the statement above given; for we are not told what the *same land* produced before the liquid manure was applied; nor are we informed as to the peculiar condition and quantity of the land near Craigentinney, and how it differs from the land near London.

The other returns are of liquid manures, of which sewer-water formed no part, and, therefore, require no special notice of them. The following observations are, however, worthy of attention:—

"The cases above detailed furnish some measure of the possible results attainable in cultivation, especially corroborated as they are by others which did not on this occasion come under our personal observation, but one of which I may mention, having recently examined into it, that of Mr. Dickinson, at Willesden, who estimates his yield of Italian rye-grass at from 80 to 100 tons an acre, and gets 8 or 10 cuttings, according to the season; and as there is no peculiar advantage of soil or climate (the former ranging from almost pure sands to cold and tenacious clays, and the latter being inferior to that of a large proportion of England) to prevent the same system being almost universally adopted, they give some idea of the degree to which the productiveness of land may be raised by a judicious appliance of the means within our reach. When it is considered that such results may, in the vicinity of towns and villages, be most effectually brought about by the instant removal of all those matters which, when allowed to remain in them, are among the most fruitful sources of social degradation, disease, and death, one cannot but earnestly desire the furtherance of such measures as will ensure this double result of purifying the town and enriching the country; and as the facts I have stated came at the same time under the notice of the gentleman I mentioned above, under whose able superintendence the arrangements for the water-supply and drainage of several towns are now in course of execution, I trust it will not be long before this most advantageous mode of disposing of the refuse of towns may be brought into practical operation in various parts of the country.

"I have, &c.,

"D. F. Fortescue.

"General Board of Health."

* The following note appears in Mr. Fortescue's statement:—"In some trial works near the metropolis sewer water was applied to land, on the condition that the value of half the extra crop should be taken as payment. The dressings were only single dressings. The engineer making the valuation reported, that there was at the least one sack of wheat and one load of straw per acre extra from its application on one breadth of land; on another, full one quarter of wheat more, and one load of straw extra per acre. The reports of the effects of sewer-water in increasing the yield of oats as well as of wheat were equally good. It is stated by Captain Vetch that in South America irrigation is used with great advantage for wheat."

Of the New Plan of Sewerage.

This branch of the subject hardly forms part of my present inquiry, but, having pointed out the defects of the sewers, it seems but reasonable and right to say a few words on the measures determined upon for their improvement. It is only necessary for me, however, to indicate the principal characteristics of the new, or rather intended, mode of sewerage, as the work may be said to have been but commenced, or hardly commenced in earnest, the Report of Mr. Frank Forster (the engineer) bearing the date of Jan. 30, 1851.

In the carrying out of the engineer's plan—which from its magnitude, and, in all human probability, from its cost, when completed, would be *national* in other countries, but is here only *metropolitan*—in the carrying out of this scheme, I say, two remarkable changes will be found. The one is the employment of the power of steam in sewerage; the other is the diversion of the sewage from the current of the Thames. The ultimate uses of this sewage, agriculturally or otherwise, form no part of the present consideration.

I should, however, first enumerate the general principles on which the best authorities have agreed that the London sewers should be constructed so as to ensure a proper disposal of the sewage, for these principles are said to be at the basis of Mr. Forster's plan.

I condense under the following heads the substance of a mass of Reports, Committee Meetings, Suggestions, Plans, &c.:—

1. The channels, or pipeage, or other means of conveying away house-refuse, should be so made that the removal will be *immediate*, more especially of any refuse or filth capable of suspension in water, since its immediate carrying off, it is said, would leave no time for the generation of miasma.

2. Means should be provided for such disposal of sewage as would prevent its tainting any stream, well, or pool, or, by its stagnation or obstruction, in any way poisoning the atmosphere. And, as a natural and legitimate result, it should be *so collected that it could be applied to the cultivation of the land* at the most economical rate.

3. In the providing works of deposit or storage in low districts, or "of discharge where the natural outlets are free," such works should be provided as would not subject any place, or any man's property, to the risk of inundation, or any other evil consequence; while in the construction of the drainage of the substratum, the works should be at such a depth below the foundation of all buildings that tenements should not be exposed to that continued damage from exhalation and dampness which leads to the dry rot in timber, and to an immature decay of materials and a general unhealthiness.

There are other points insisted upon in many Reports to which I need but allude, such as

(*a.*) The channels containing sewage should be of enduring and impermeable material, so as to prevent all soakage.

(*b.*) There should be throughout the channels of the subterranean metropolis a fall or inclination which would suffice to prevent the accumulation of any sewage deposit, with its deleterious influence and ultimate costliness.

(*c.*) Similar provisions should be used were it but to prevent the creation of the noxious gases which now permeate many houses (especially in the quarters inhabited by the poor) and escape into many streets, courts, and alleys, for until improvements are effected the pent-up sewage and the saturated brickwork of the sewers and older drains must generate such gases.

(*d.*) No tidal stream should ever receive a flow of sewage, because then the cause of evil is never absent, for the filth comes back with the tide; and as the Thames water constitutes the grand fount of metropolitan consumption, the water companies, with very trifling exceptions, give us back much of our own excrement, mixed with every conceivable, and sometimes noxious, nastiness, with which we may brew, cook, and wash—and drink, if we can. Filtering remedies but a portion of the evil.

Now it would appear that not one of these requirements, the necessity of which is unquestioned and unquestionable, is fully carried out by the present system of sewerage, and hence the need of some new plan in which the defects may be remedied, and the proper principles carried out.

The instructions given by the Court were to the following effect:—

A. The Thames should be kept free from sewage whatever the state of the tide.

B. There should be intercepting drains to carry off the sewage (so keeping the Thames unsoiled by it) wherever practicable.

C. The sewage should be raised by artificial means into a main channel for removal.

D. The intercepting sewers should be so constructed as to secure the largest amount of effective drainage without artificial appliances.

In preparing his plan, Mr. Forster had the advice and assistance of Mr. Haywood, of the City Court of Sewers.

The metropolis is divided into two portions—"the northern portion of the metropolis," or rather that portion of the metropolis which is on the north or Middlesex bank of the Thames; and the southern portion, or that which is on the south or Surrey side of the river.

The northern portion is in the new plan considered to "divide itself into two separate areas," and to these two areas different modes of sewerage are to be applied:

"1. The interception of the drainage of that district, which, from its elevation above the level of the outlet, is capable of having its sewage and rainfall carried off by gravitation.

"2. The interception of the drainage of that district, which, from its low lying position, will require its sewage, and in most localities its rainfall, to be lifted by steam-power to a proper level for discharge."

The first district runs from Holsden-green (beyond the better-known Kensall-green) in the west, to the Tower Hamlets in the east. Its form is irregular, but not very much so, merely narrowing from Westbourn-green to its western extremity, the country then becoming rural or woodland. Its highest reaches to the north are to Highgate and Stamford-hill. The nearest approach to the south is to a portion of the Strand, between Charing-cross and Drury-lane. Care has evidently been taken to skirt this district, so to speak, by the canals and the railroads. This division of the northern portion is described as "the district for natural drainage."

The area of this division is about 25½ square miles.

The second division meets the first at the highway separating Kensington-gardens from Bayswater; and runs on, bordering the river, all the way to the West India Dock. Its shape is irregular, but, abating the roundness, presents somewhat of that sort of figure seen in the instrument known as a dumb-bell, the narrowest or handpart being that between Charing-cross and Drury-lane, skirting the river as its southern bound. At its eastern end this second district widens abruptly, taking in Victoria-park, Stratford, and Bromley.

The area of this division of the northern portion is 16⅛ square miles.

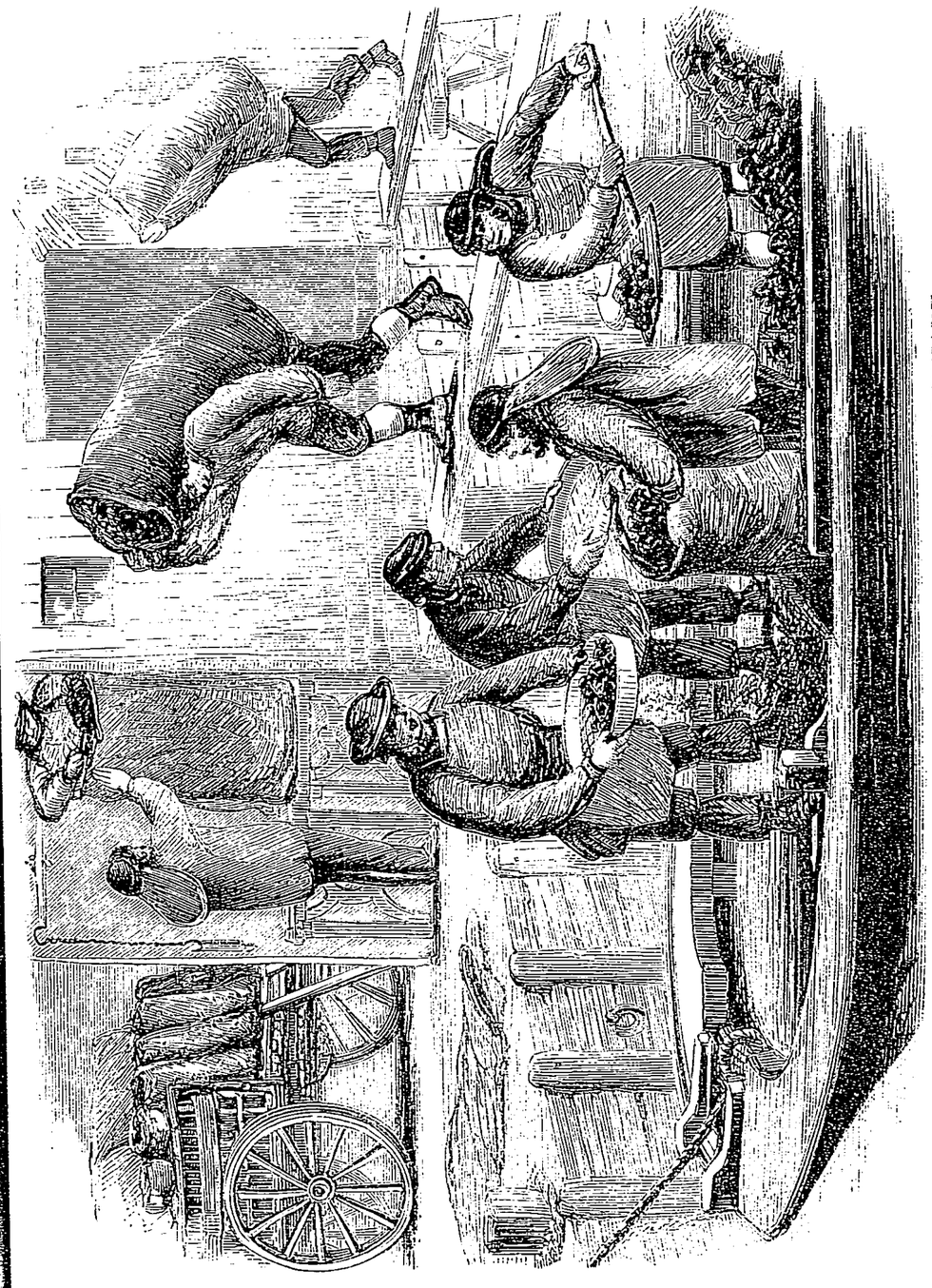
There are, moreover, two small tracts, comprising the southern part of the Isle of Dogs, and a narrow slip on the west side of the river Lea, which are intended to allow the rainfall to run into the Thames and the Lea respectively.

The area of the two is 1¾ square mile.

The area to be drained by natural outfall comprises, then, 25⅛ square miles as regards rainfall, and the same extent as regards sewage; while the area to the drainage of which steam power is to be applied comprises 14⅓ square miles of rainfall, and 16⅛ square miles of sewage; the two united areas of rainfall and sewage respectively being 39½ and 41⅛ square miles.

The length of the great "high-level sewerage" will be, as regards the main sewer, 19 miles and 106 yards; that of the "low-level sewerage," 14 miles and 1501 yards.

I will now describe the course of each of these constructions.



COAL-PORTERS FILLING WAGGONS AT COAL-WHARF.
[*From a Sketch.*]

No. 65.

On the eastern bank of the Lea the sewage of both districts is to be concentrated. The high-level sewer will commence and *cross* the Lea near the "Four Mills." It is then to proceed "in a westerly direction under the East and West India Dock Railway and the Blackwall Extension Railway, beneath the Regent's-canal, to the east end of the Bethnal-green-road, at the crossing of the Cambridge-heath-road, at which point it will be joined by the proposed northern division of the Hackney-brook, which drains an extensive district up to the watershed line north of London, including Hackney, Stoke Newington and Holloway, and part of Highgate and Hampstead; from thence the main sewer proceeds along the Bethnal-green-road, Church-street, Old-street, Wilderness-row (where a short branch from Coppice-row will join) to Brook-street-hill; from thence to Little Saffron-hill, where a distance of about 100 yards is proposed to be carried by an aqueduct over the Fleet-valley; thence along Liquorpond-street, at the end of which it will receive a branch from Piccadilly, on the south side, and a diversion of the Fleet-river, on the north side; thence along Theobald's-road, Bloomsbury- square, Hart-street, New Oxford-street, to Rathbone-place (where it will receive a diversion of the Regent-street sewer from Park-crescent), along Oxford-street, and extending thence across Regent-circus to South Molton-lane (where it will intercept the King's Scholars' Pond sewer), continuing still along Oxford-street to Bayswater-place, Grand Junction-road, Uxbridge-road, where it is joined by the Ranelagh sewer, the sewage of which it is capable of receiving, and at this point it terminates."

It is difficult to convey to a reader, especially to a reader who may not be familiar with the localities of London generally, any adequate notion of the largeness, speaking merely of extent, of this undertaking. Even a map conveys no sufficient idea of it.

Perhaps I may best be able to suggest to a reader's mind a knowledge of this largeness, when I state that in the district I have just described, which is but *one* portion (although the greatest) of the sewerage of but *one* side of the Thames, more than half a million of persons, and nearly 100,000 houses are, so to speak, to be sewered.

The low-level tract sewerage, also, concentrates on the Lea, "near to Four Mill's distillery, taking the north-western bank of the Limehouse Cut, at which point it receives the branch intended to intercept the sewage of the Isle of Dogs; thence continuing along the bank of Limehouse Cut, through a portion of the Commercial-road, Brook-street, and beneath the Sun Tavern Fields, into High-street, or Upper Shadwell; thence along Ratcliffe-highway and Upper East Smithfield, across Tower-hill, through Little and Great Tower-streets, Eastcheap, Cannon-street, Little and Great St. Thomas Apostle, Trinity-lane, Old Fish-street, and Little Knight Rider-street; thence beneath houses in Wardrobe-terrace, and on the eastern side of St. Andrew's-hill, along Earl-street to Blackfriars-road. From Blackfriars Bridge it is proposed to construct the sewer along the river shore to the junction of the Victoria-street sewer at Percy-wharf; which sewer between Percy-wharf and Shaftesbury-terrace, Pimlico, becomes thus an integral portion of the intercepting line; at Bridge-street, Westminster, a branch from the Victoria-street sewer is intended to proceed along Abingdon and Millbank-streets, as far as and for the purpose of taking up the King's Scholars' Pond and other sewers at their outlets into the Thames. From Shaftesbury-terrace the Victoria-street sewer is proposed to be extended through Eaton-square and along the King's-road, Chelsea, to Park-walk, intercepting all the sewers along its line, and terminating at a point where the drainage of Kensington may be brought into it without pumping."

The lines of sewerage thus described are, then, all to the *west* of the Lea, and all, whether from the shore of the Thames, or the northern reaches in Highgate and Hampstead, converging to a pumping station or sewage-concentration, on the *east* bank of the Lea, in West Ham. By this new plan, then, the high-level sewer is to *cross* the Lea, but that arrangement is impossible as respects the second district described, which is *below* the level of the Lea, so that its course is to be *beneath* that river, a little below where it is crossed by the high-level line. To dispose of the sewage, therefore, conveyed from the low-level tract, there will be a sewer of a "depth of *forty-seven* feet *below*" the invert of the high-level sewer. This sewer, then, at the depth of 47 feet, will run to the point of concentration containing the low-level sewage.

At this point of the works, in order that the sewage may be collected, so as to be disposed of ultimately in one mass, it has to be *lifted* from the low to the high-level sewer. The invert of the high-level sewer will at the lifting or pumping station be 20 feet *above* the ordnance datum, while that of the low-level sewer will be 27 feet *below* the same standard. Thus a great body of metropolitan sewage, comprising among other districts the refuse of the whole City of London, must be lifted no less than 47 feet, in order to be got rid of along with what has been carried to the same focus by its natural flow.

The lifting is to be effected by means of steam, and the pumping power required has been computed at 1100-horse power. To supply this great mechanical and scientific force, there are to be provided two engines, each of 550-horse power, with a third engine of equal capacity, to be available in case of accident, or while either of the other engines might require repairs of some duration.

The northern sewage of London (or that of the Middlesex bank of the Thames, covered by that division of the capital) having been thus brought to a sort of central reservoir, or meeting point, will be conveyed in two parallel lines of sewerage to the bank of the river Roding, being the eastern extremity of Gallion's Reach (which is below Woolwich Reach), in the Thames. The Roding flows into the Thames at Barking Creek mouth. The length of this line will be four miles.

"At this point," it is stated in the Report

"the level of the inverts of the parallel sewers will be eight feet below high-water mark, and here it is intended to collect the sewage into a reservoir during the flood-tide, and discharge the same with the ebb-tide immediately after high-water; and, as it is estimated that the reservoir will be completely emptied during the first three hours of the ebb, it may be safely anticipated that no portion of the sewage will be returned, with the flood-tide, to within the bounds of the metropolis."

The whole of the sewage and rainfall, then, will be thus diverted to *one* destination, instead of being issued into the river through a multiplicity of outlets in every part of the northern shore where the population is dense, and will be carried into the Thames at Barking Creek, unless, as I have intimated, a market be found for the sewage; when it may be disposed of as is most advantageous. The only exceptions to this carrying off will be upon the occurrence of long-continued and heavy rains or violent storms, when the surplus water will be carried off by some of the present outlets into the river; but even on such occasions, the *first scour* or cleansings of the sewerage will be conveyed to the main outlet at the river Roding.

The inclination which has been assigned to the whole of the lines of sewers I have described, is, with some unimportant exceptions, 4 feet per mile, or 1 in 1320. These new sewers are, or rather will be, calculated to carry off a fall of rain, equal to ½ inch in 24 hours, in addition to the average daily flow of sewage.

Mr. Forster concludes his Report:—"I am only able to submit approximately that I estimate the cost of the whole of the lines of sewers, the pumping engines, and station, the reservoir, tidal gates, and other apparatus, at one million and eighty thousand pounds (1,080,000*l.*). This estimate does not include the sums required for the purchase of land and houses, which may be needed for the site of the pumping engine-house, or compensation for certain portions of the lines of sewers."

As regards the improvements in the sewerage on the south side of the Thames (the great fever district of the metropolis, and consequently the most important of all, and where the drainage is of the worst kind), I can be very brief, as nothing has been positively determined.

A somewhat similar system will be adopted on the south side of the Thames, where it is proposed to form one main intercepting sewer; but, owing to the physical configuration of this part of the town, none of the water will flow away entirely by gravitation. There will be a pumping station on the banks of the Ravensbourne, to raise the water about 25 feet; and a second pumping station to raise the water from the continued sewer in the reservoir, in Woolwich Marsh, which is to receive it during the intervals of the tides. The waters are to be discharged into the river at the last-named point. The main sewer on the south side will be of nearly equally colossal proportions; for its total length is proposed to be about 13 miles 3 furlongs, including the main trunk drain of about 2 miles long, and the respective branches. The area to be relieved is about proportionate to the length of the drain; but the steam power employed will be proportionally greater upon the southern than upon the northern side.

There are divers opinions, of course, as to the practicability and ultimate good working of this plan; speculations into which it is not necessary for me to enter. Mr. Forster has, moreover, resigned his office, adding another to the many changes among the engineers, surveyors, and other employés under the Metropolitan Commission; a fact little creditable to the management of the Commissioners, who, with one exception, may be looked upon as irresponsible.

Of the Management of the Sewers and the late Commissions.

The Corporation of the City of London may be regarded as the first Commission of Sewers in the exercise of authority over such places as regards the removal of the filth of towns. In time, but at what time there is no account, the business was consigned to the management of a committee, as are now the markets of the City (Markets Committee), and even what may be called the management of the Thames (Navigation Committee). It is not at all necessary that the members of these committees should understand anything about the matters upon which they have to determine. A staff of officers, clerks, secretaries, solicitors, and surveyors, save the members the trouble of thought or inquiry; they have merely to vote and determine. It was stated in evidence before a Select Committee of the House of Commons on the subject of the Thames steamers, that at that period the Chairman of the *Navigation* Committee was a bread and biscuit baker, but "a very-firm-minded man." In time, but again I can find no note of the precise date, the *Committee* became a *Court* of Sewers, and so it remains to the present time. Commissions of sewers have been issued by the Crown since the 25th year of the reign of Henry VIII., except during the era of the Commonwealth, when there seems to have been no attention paid to the matter.

As the metropolis increased rapidly in size since the close of the last century, the public sewers of course increased in proportion, and so did Commissions of Sewers in the newly-built districts. Up to 1847 these Commissions or Court of Sewers were *eight* in number, the metropolis being divided into that number of districts.

The districts were as follows:—

1. The City.
2. The Tower Hamlets.
3. St. Katherine.
4. Poplar and Blackwall.
5. Holborn and Finsbury.
6. Westminster and part of Middlesex.
7. Surrey and Kent.
8. Greenwich.

Each of these eight Commissions had its own Act of Parliament; its own distinct, often irregular and generally uncontrolled plan of management; each had its own officers; and each had its own patronage. Each district court—with almost unlimited powers of taxation—pursued its own plans of sewerage, little regardful of the plans of its neighbour Commission. This wretched system—the great recommendation of which, to its promoters and supporters, seems to have been patronage—has given us a sewerage unconnected and varying to the present day in almost every district; varying in the dimensions, form, and inclination of the structures.

The eight commission districts, I may observe, had each their sub-districts, though the general control was in the hands of the particular Court or Board of Commissioners for the entire locality. These subdivisions were chiefly for the facilities of rate-collecting, and were usually "western," "eastern," and "central."

The consequence of this immethodical system has been that, until the surveys and works now in progress are completed, the precise character, and even the precise length, of the sewers must be unknown, though a sufficient approximation may be deduced in the interim.

To show the conflicting character of the sewerage, I may here observe that in some of the old sewers have been found walls and arches crumbling to pieces. Some old sewers were found to be not only of ample proportions, but to contain subterranean chambers, not to say halls, filled with filth, into which no man could venture. While in a sewer in the newly-built district of St. John's-wood, Mr. Morton, the Clerk of Works, could only advance stooping half double, could not turn round when he had completed his examination, but had most painfully—for a long time feeling the effects—to back out along the sewer, stooping, or doubled up, as he entered it. Why the sewer was constructed in this manner is not stated, but the work appears, inferentially, to have been *scamped*, which, had there been a proper supervision, could hardly have been done with a modern public sewer, down a thoroughfare of some length (the Woronzow-road).

But the conflicting and disjointed system of sewerage was not the sole evil of the various Commissions. The mismanagement and jobbery, not to say peculation, of the public moneys, appear to have been enormous. For instance, in the "Accountant's Report" (February, 1848), prepared by Mr. W. H. Grey, 48, Lincoln's-inn-fields, I find the following statements relative to the *Book-keeping* of the several Commissions:—

"The *Westminster* plan is full of unnecessary repetition. It is deficient in those real general accounts which concentrate the information most needed by the Commissioners, and it contains *fictions* which are very inconsistent with any sound system of book-keeping.

"The ledger of the Westminster Commission does not give a true account of the actual receipt and expenditure of each district.

"The *Holborn and Finsbury* books are still more defective than those of the Westminster Commission. . . . . There are the same kind of *fictions*. . . . . But the extraordinary defect in these books consists in the utter want of system throughout them, by keeping one-sided accounts only in the ledger, with respect to the different sewers in each district, showing only the amount *expended* on each.

"The *Tower Hamlets* books have been kept on a regular system, though by no means one conveying much general information."

"With respect to the *Surrey and Kent* accounts," says Mr. Grey, "the books produced are the most incomplete and unsatisfactory that ever came under my observation. The ledger is always thought to be a *sine quâ non* in book-keeping; but here it has been dispensed with altogether, for that which is so marked is no ledger at all."

Under these circumstances, the Report continues, "It cannot be wondered at that debts should have been incurred, or that they should have swollen to the amount of 54,000*l.*, carrying a yearly interest of 2360*l.*, besides annuities granted to the amount of 1125*l.* a year.

"The *Poplar and Greenwich* accounts (I quote the official Report), confined as they are to mere cash books, offer no subjects for remark. . . . . .

"No books of account have been produced with respect to the *St. Katherine's* Commission."

On the 16th December, 1847, the new Commissioners ordered all the books to be sent to the office in Greek-street; but it was not until the 21st February, 1848, that all the minute-books were produced. There were no indexes for many years even to the proceedings of the Courts; and the account-books of one of the local Courts, if they might be so called, were in such a state that the book called "ledger" had for several years been cast up in pencil only.

This refers to what may be characterised, with more or less propriety, as *mismanagement* or *neglect;* though in such mismanagement it is hardly possible to escape *one* inference. I now come to what are direct imputations of *Jobbery,* and where *that* is flourishing or easy, no system can be other than vicious.

In a paper "printed for use of Commissioners" (Sept. 7, 1848), entitled "Draft Report on the Surrey Accounts," emanating from a "General Purposes' Committee," I find the following, concerning the parliamentary expenses of obtaining an Act which it was "found necessary to repeal." The cost was, altogether, upwards of 1800*l.*, which of course had to be defrayed out of the taxes.

"This Act," says the Report, "authorized an almost unlimited borrowing of money; and *immediately upon its passing,* in July, 1847, notices were issued for works estimated to amount to 100,000*l.*; and others, we understand, were projected for early execution to the amount of 300,000*l.* . . . . . Considering the general character of the works executed, and from them judging of those projected, it may confidently be averred that the *whole sum* of 300,000*l.*, the progressive expenditure of which was stayed by the 'supersedeas' of the old Commission, would have been *expended in waste.*" [The *Italics* are not those of the Reports.]

The Report continues, "It is to be observed that each of the district surveyors would have participated in the sum of 15,000*l.* percentage on the expenditure for the extension of the Surrey works. Thus the surveyors, with their percentages on the works executed, and the clerk, by the fees on contracts, &c., had *a direct interest in a large expenditure.*"

Instances of the same dishonest kind might be multiplied to almost any extent.

After the above evidences of the incompetency and dishonesty of the several district Commissions—and the Reports from which they are copied contain many more examples of a similar and even worse description—it is not to be wondered at that in the year 1847 the district courts were, with the exception of the City, superseded by the authority of the Crown, and formed into one body, the present Metropolitan Commission of Sewers, of the constitution and powers of which I shall now proceed to speak.

Of the Powers and Authority of the present Commissions of Sewers.

In 1847 the eight separate Commissions of Sewers were abolished, and the whole condensed, by the Government, into *one* Commission, with the exception of the City, which seems to supply an exception in most public matters.

The Act does not fix the number of the Commissioners. To the Metropolitan Commissioners, five City Commissioners are added (the Lord Mayor for the year being one *ex officio*); these have a right to act as members of the Metropolitan Board, but their powers in this capacity are loosely defined by the Act, and they rarely attend, or perhaps never attend, unless the business in some way or other affects their distinct jurisdiction.

The Commissioners (of whom twelve form a quorum) are unpaid, with the exception of the chairman, Mr. E. Lawes, a barrister, who has 1000*l.* a year. They are appointed for the term of two years, revocable at pleasure.

The authority of the City Commission, as distinct from the Metropolitan, for there are two separate Acts, seems to be more strongly defined than that of the others, but the principle is the same throughout. The Metropolitan Act bears date September 4, 1848; and the City Act, September 5, 1848.

The Metropolitan Commissioners have the control over "the sewers, drains, watercourses, weirs, dams, banks, defences, gratings, pipes, conduits, culverts, sinks, vaults, cesspools, rivers, reservoirs, engines, sluices, penstocks, and other works and apparatus for the collection and discharge of rainwater, surplus land or spring-water, waste water, or filth, or fluid, or semi-fluid refuse of all descriptions, and for the protection of land from floods or inundation within the limits of the Commission." Ample as these powers seem to be, the Commissioners' authority does not extend over the Thames, which is in the jurisdiction of the Lord Mayor and Corporation of the City of London; and it appears childish to give men control over "rivers," and to empower them to take measures "for the protection of land from floods or inundation," while over the great metropolitan stream itself, from Yantlet Creek, below Gravesend, to Oxford, they have no power whatever.

The Commissioners (City as well as Metropolitan) are empowered to enforce proper house-drainage wherever needed; to regulate the building of new houses, in respect of water-closets, cesspools, &c.; to order any street, staircase, or passage not effectually cleansed to be effectually cleansed; to remedy all nuisances having insanitary tendencies; to erect *public* water-closets and urinals, free from any charge to the public; to order houses and rooms to be whitewashed; to erect places for depositing the bodies of poor persons deceased until interment; and to regulate the cleanliness, ventilation, and even accommodation of low lodging-houses.

The jurisdiction of the Metropolitan Commissioners of Sewers extends over "all such places or parts in the counties of Middlesex, Surrey, Essex, and Kent, or any of them *not more than twelve miles distant in a straight line from St. Paul's Cathedral, in the City of London,* but not being within the City of London or the liberties thereof."

This, it must be confessed, is an exceedingly broad definition of the extent of the jurisdiction of the *Metropolitan* Commission, giving the Commissioners an extraordinary amount of *latitude.*

In our days there are many Londons. There is the London (or the metropolitan apportionment of the capital) as defined by the Registrar-General. This, as we have seen, has an area of 115 square miles, and therefore may be said to comprise as nearly as possible all those places which are rather more than *five miles* distant from the Post Office.

There is the *Metropolis* as defined by the Post-Office functionaries, or the limits assigned to what is termed the "*London* District Post." This London District Post seems, however, to have three different metropolises:—First, there is the Central Metropolis, throughout which there is an hourly delivery of letters after mid-day, and which deliveries are said to be confined to "*London.*" Then there is the six-delivery *Metropolis,* or that throughout which the letters are despatched and received six times per day; this is said to extend to such of the "environs" as are included within a circle of *three miles* from the General Post Office. Then there is the *six-mile Metropolis* with special privileges. And lastly, the *twelve-mile Metropolis,* which, being the extreme range of the *London* District Post, may be said to constitute the metropolis of the General Post Office.

There is, again, the metropolis of the Metropolitan Commissioners of Police, before the region of rural police and country and parish constables is attained; a jurisdiction which covers 96 square miles, as I have shown at pp. 163–166 of the present volume, and reaches—generally speaking—to such places as are included within a circle of *five miles and a half* from the General Post Office.

There is, moreover, the metropolis, as defined by the Hackney-Carriage Act, which comprises all such places as are within *five miles* of the General Post Office.

And further, there is the Metropolis of the London City Mission, which extends to *eight miles* from the Post Office, and the Metropolis, again, of the London Ragged Schools, which reaches to about *three miles* from the Post Office.

This, however, is not all, for there are divers districts for the registration and exercise of votes, parliamentary, or municipal; there are ecclesiastical and educational districts; there is a thorough complication of parochial, extra-parochial, and chartered districts; there is a world of subdivisions and of sub-subdivisions, so ramified here and so closely blended there, and often with such preposterous and arbitrary distinctions, that to describe them would occupy more than a whole Number.

My present business, however, is the extent of the jurisdiction of the Metropolitan Commissioners of Sewers, or rather to ascertain the boundaries of that *metropolis* over which the Metropolitan Commissioners are allowed to have sway.

The many discrepancies and differences I have explained make it difficult to *define* any district for the London sewerage; and in the Reports, &c., which are presented to Parliament, or prepared by public bodies, little or no care seems to be taken to observe any distinctiveness in this respect.

For instance: The jurisdiction of the Metropolitan Commission of Sewers, which is said to extend to all such places as are not more than 12 miles distant in a straight line from St. Paul's Cathedral, in the City of London, comprises an area of 452 square miles; the metropolis, that of the Registrar-General, presenting a radius of 6 miles (with a fractional addition), contains 115 square miles; yet in official documents 58 square miles, or a circle of about 4½ miles radius, are given as the extent of the *metropolis* sewered by the Metropolitan Commission. By what calculations this 58 miles are arrived at, whether it has been the *arbitrium* of the authorities to consider the sewers, &c., as occupying *the half* of the area of the Registrar-General's metropolis, or what other reason has induced the computation, I am unable to say.

The boundaries of the several metropolises may be indicated as follows:—

The *Three-Mile Circle* includes Camberwell; skirts Peckham; seems to divide Deptford (irregularly); touches the West India Dock; includes portions of Limehouse, Stepney, Bromley, Stratford-le-Bow, and about the half of Victoria-park, Hackney. It likewise comprises a part of Lower Clapton, Dalston, and a portion of Stoke Newington; and closely touching upon or containing small portions of Lower Holloway, and Kentish-town, sweeps through the Regent's and Hyde parks, includes a moiety of Chelsea, and crossing the river at the Red-house, Battersea, completes the circle. This is the six-delivery district of the General Post Office.

In this three-mile district are chiefly condensed the population, commerce, and wealth of the greatest and richest city in the world.

The *Six-Mile Circle* runs from Streatham (on the south); just excludes Sydenham; contains within its exterior line Lewisham, Greenwich, and a part of Woolwich; also, wholly or partially, East Ham, Laytonstone, Walthamstow, Tottenham, Hornsey, Highgate, Hampstead, Kensall-green, Hammersmith, Fulham, Wandsworth, and Upper Tooting. The portion without the three-mile circle, and within the six, is the *suburban* portion or the immediate environs of the metropolis, and still presents rural and woodland beauties in different localities. This may be termed the metropolis of the Registrar-General and Commissioners of Metropolitan Police.

The *Twelve-Mile Circle,* or the extent of the jurisdiction of the *Metropolitan* Commissioners of Sewers, as well as the "*London* District Post," includes Croydon, Wickham, Paul's Cray, Foot's Cray, North Cray, and Bexley; crosses the river at the Erith-reach; proceeds across the Rainham-marshes; comprises Dagenham; skirts Romford; includes Henhault-forest and the greater portion of Epping-forest; touches Waltham-abbey and Cheshunt; comprehends Enfield and Chipping-Barnet; runs through Elstre and Stanmore; comprehends Harrow-on-the-Hill, Norwood, and Hounslow; embraces Twickenham and Teddington; seems to divide somewhat equally the domains of Bushey-park and of Hampton-court Palace; then, crossing the river about midway between Thames Ditton and Kingston, the boundary line passes between Cheam and Ewell, and completes the circuit.

Over this large district, then, the jurisdiction of the Metropolitan Commissioners of Sewers is said to extend, and one of the outlets of the *London* sewers has already been spoken of as being situate at Hampton. The district yielding the amount of sewage which is assumed as being the gross wet house-refuse of the metropolis is, as we have seen, taken at 58 square miles, and is comprised within a circle of about 4½ miles radius; this reaches only to Brixton, Dulwich, Greenwich, East India Docks, Layton, Highgate, Hampstead, Bayswater, Kensington, Brompton, and Battersea. The actual jurisdiction of the Commissioners is, then, nearly eight times larger than the portion to which the estimated amount of the sewage of the metropolis refers.

The metropolitan district is still distinguished by the old divisions of the Tower Hamlets, Poplar and Blackwall, Holborn and Finsbury, Westminster, &c.; but many of these divisions are now incorporated into one district; of which there would appear to be but four at present; or five, inclusive of the City.

These are as follows:—

1. Fulham and Hammersmith, Counter's Creek and Ranelagh districts.
2. Westminster (Eastern and Western), Regent-street, and Holborn.
3. Finsbury, Tower Hamlets, Poplar, and Blackwall.
4. Districts south of the Thames, Eastern and Western.
5. City.

The practical part or working of the Commis-

sion of Sewers is much less complicated at present than it was in the times of the independent districts and independent commissions.

The orders for all work to be done emanate from the court in Greek-street, but the several surveyors, &c. (whose salaries, numbers, &c., are given below), can and do order on their responsibility any repair of a temporary character which is evidently pressing, and report it at the next court day. The Court meets weekly and monthly, and what may be styled the heavier portion of the business, as regards expenditure on great works, is more usually transacted at the monthly meetings, when the attendance is generally fuller; but the Court can, and sometimes does, meet much more frequently, and sometimes has adjourned from day to day.

Any private individual or any public body may make a communication or suggestion to the Court of Sewers, which, if it be in accordance with their functions, is taken into consideration at the next accruing court day, or as soon after as convenient. The Court in these cases either comes to a decision of adoption or rejection of any proposition, or refers it to one of their engineers or surveyors for a report, or to a committee of the Commissioners, appointed by the Court; if the proposition be professional, as to defects, or alleged and recommended improvements in the local sewers, &c., it is referred to a professional gentleman for his opinion; if it be more general, as to the extension of sewerage to some new undertaking or meditated undertaking in the way of building new markets, streets, or any places, large and public; or in applications for the use and appropriation by enterprising men of sewage manure, it is referred to a committee.

On receiving such reports the Court makes an order according to its discretion. If the work to be done be extensive, it is entrusted to the chief engineer, and perhaps to a principal surveyor acting in accordance with him; if the work be more local, it is consigned to a surveyor. One or other of these officers provides, or causes to be prepared, a plan and a description of the work to be done, and instructs the clerk of the works to procure estimates of the cost at which a contractor will undertake to execute this work, or, as it is often called by the labouring class, to "complete the *job*" (a word at one time singularly applicable). The estimates are sent by the competing builders, architects, general speculators, or by any one wishing to contract, to the court house (without the intervention of any person, officially or otherwise) and they are submitted to the Board by their clerk. The lowest contract, as the sum total of the work, is most generally adopted, and when a contract has been accepted, the matter seems settled and done with, as regards the management of the Commissioners; for the contractor at once becomes responsible for the fulfilment of his contract, and may and does employ whom he pleases *and at what rates he pleases*, without fear of any control or interference from the Court. The work, however, is superintended by the surveyors, to ensure its execution according to the provisions of the agreement. The contractor is paid by direct order of the Court.

The surveyors and clerks of works are mostly limited as to their labours to the several districts; but the superior officers are employed in all parts, and so, if necessary, are the subordinate officers when the work requires an extra staff.

According to the Returns, the following functionaries appear to be connected with the undermentioned districts:—

Fulham, Hammersmith, Counter's Creek, and Ranelagh.
1 Surveyor.
3 Clerks of the Works.
1 Inspector of Flushing.

Eastern and Western Divisions of Westminster and Regent-street.
1 Surveyor, who has also the Holborn division to attend to.
2 Clerks of the Works.
6 Flap and Sluice keepers.

Holborn.
2 Clerks of the Works.
1 Inspector of Flushing.

Finsbury.
1 Clerk of the Works.
1 Inspector of Flushing.

Tower Hamlets, and Poplar and Blackwall.
1 Surveyor, who has also the Finsbury division included in his district.
2 Clerks of the Works.
2 Inspectors of Flushing.

South of the Thames.
Western Districts.
1 Surveyor.
2 Clerks of the Works.
2 Inspectors of Flushing.

Eastern Districts.
1 Surveyor.
2 Clerks of the Works.
2 Inspectors of Flushing.

What may be called the working staff of the Metropolitan Commissioners consists of the following functionaries, receiving the following salaries:—

	£	s.
Chairman, with a yearly salary of	1,000	0
Secretary, with a yearly salary of (besides an allowance of £100, in lieu of apartments)	800	0
Clerk of minutes	350	0
Two clerks of do., (each with a salary of £150)	300	0
One do., with a salary of	120	0
One do. do.	105	0
One do. do.	95	0
One do. do.	90	0
Accountant do.	350	0
Accountant's clerk do.	150	0
Do do.	80	0
Clerk of surveyors' and contractors' accounts	200	0
Do. do.	125	0
Do. do.	110	0
Clerk of rates	250	0
Another do.	180	0
Do. do.	110	0
Do. do.	90	0
Engineer	1,000	0
For travelling expenses	200	0
Surveyor for Fulham and Hammersmith, Counter's Creek, and Ranelagh districts	350	0
Clerk of works (Hammersmith)	150	0
Do. (Counter's Creek)	150	0
Do. (Ranelagh)	150	0
Inspector of flushing	80	0
Surveyor of eastern and western divisions of Westminster, and of Regent-st. and Holborn divisions	360	0
Two clerks of works (eastern and western and Regent-street), with a salary of £300 each	600	0
Two do. (Holborn), with a salary of £150 each	300	0
Inspector of flushing	80	0
Surveyor of Finsbury, Tower Hamlets, and Poplar and Blackwall	300	0
Clerk of works (Finsbury)	150	0
Inspector of flushing	80	0
Two clerks of works (Tower Hamlets, and Poplar and Blackwall), with a salary of £150 each	300	0
Two inspectors of flushings with a salary of £80 each	160	0
One marsh bailiff	65	0
Surveyor of the western districts south of the Thames	300	0
Do., eastern do.	250	0
Clerk of works (eastern portion)	164	0
Two inspectors of flushing, £80 each	160	0
One wallreeve	22	8
Clerk of works (western portion)	164	0
Do. do.	150	0
Two inspectors of flushing, with a salary of £80 each	160	0
Two engineer's clerks, with a salary of £150 each	300	0
One do.	150	0
One do.	100	0
One do.	80	0
One by-law clerk	150	0
Twenty-two flap and sluice keepers	892	12
Surveyor (of the surveying and drawing staff)	250	0
Drawing clerk	150	0
Two do., with a salary of £130 each	260	0
Five do., with a salary of £105 each	525	0
One do.	50	0
Six surveyors, with a salary of £100 each	600	0
Six chainmen, 18s. a week each	280	0
Office-keeper and crier (general service)	120	0
Bailiff, &c.	100	0
Strong-room keeper	80	0
One messenger	70	0
Two do., £40 each	80	0
Three errand-boys, £32 each	96	0
Housekeeper	150	0
Yearly total	£13,674	0

This is called a "reduced" staff, and the reduction of salaries is certainly very considerable.

If we consider the yearly emoluments of tradesmen in businesses requiring no great extent of education or general intelligence, the salaries of the surveyors, clerk of the works, &c., must appear very far from extravagant; and when we consider their responsibility and what may be called their removability, some of the salaries may be pronounced mean; for I think it must be generally admitted by all, except the narrow-minded, who look merely at the immediate outlay as the be-all and the end-all of every expenditure, that if the surveyors, clerks of works, inspectors of flushing, &c., be the best men who could be procured (as they ought to be), or at any rate be thorough masters of their craft, they are rather underpaid than overpaid.

The above statement may be analysed in the following manner:—

	£	s.	£
Chairman			1,000
Secretary and 7 clerks	1860	0	
Accountant and 5 clerks	1015	0	
Clerk of rates and 3 clerks	630	0	
			3,505
Engineer and 5 clerks	1830	0	
7 surveyors, of surveying and drawing staff, with 9 chainmen and 9 drawing clerks	2125	0	
5 district surveyors	1500	0	
12 clerks of works	2278	0	
9 inspectors of flushing	720	0	
22 flap and sluice keepers	892	12	
Bailiff, marsh-bailliff, and wallreeve	187	8	
			9,533
Office keeper, strong-room keeper, and housekeeper	350	0	
3 messengers and 3 errand-boys	246	0	
			596
			£14,634

The cost of rent, taxes, stationery, and office incidentals, is now 4440*l.*, which makes the total yearly outlay amount to upwards of 19,000*l.* The annual cost of the staff in the secretary's department is said to have been reduced from 3962*l.* 4*s.* to 3605*l.*; in the engineers' department from 16,437*l.* 3*s.* to 8973*l.* 16*s.* In the general service there has been an increase from 606*l.* 16*s.* to 696*l.*

A deputation who waited lately upon Lord John Russell is said to have declared the expenses of the Commissioners' office to be at the rate of from 25 to 30 per cent. on the amount of rate collected. The sum collected in the year 1850 averaged 89,341*l.* The cost of management in that year was 23,465*l.*; this, it will be seen, is 26 per cent of the gross income.

The annual statement of the receipts and expenditure under the Commission for the year 1851 has just been published, but not *officially*; from this it appears that in February, 1851—

	£	s.	d.
The balance of cash in hand was	5,750	9	11
The total receipts during the year have amounted to	129,000	0	9
Making together	134,750	10	8

The expenditure, as returned under the general head, is—

For work (This item includes the cost of supervision and compensation for damages.)	£95,539	19	3
The cost of surveys has been	6,332	19	9
Management	16,430	9	2
Loans	10,442	10	2
Contingencies	2,749	1	1
Total payments	131,494	19	5
Balance in hand	£3,355	11	3

As an instance of the mismanagement of the sewers work of the metropolis, it is but right that the subjoined document should be published.

I need not offer any comment on the following "Return to an Address of the Honourable the House of Commons, dated 28th July, 1851," except that I was told early in January, on good authority, that the matter was now worse than it was when reported as follows:—

"*Privy Gardens, Whitehall Yard, Scotland Yard, &c., Public Sewer.*

"With reference to the two orders of the Commissioners of Her Majesty's Woods, &c., I have the honour to state that, since the 15th of November (when I last sent in a memorandum), I have frequently visited the several Crown buildings affected by the building of the main public sewer

for draining Westminster; viz., the Earl of Malmsbury's, the Exchequer Bill Office, the United Service Museum, Lord Liverpool's, Mr. Vertue's, Mr. Alderman Thompson's, and Messrs. Dalgleish's.

"All these buildings have been more or less damaged by the construction of the sewer; the Exchequer Bill Office, the United Service Museum, and Mr. Vertue's, in a manner that, in my opinion, can *never be effectually repaired.*

"At Lord Malmsbury's, the party wall next to the Exchequer Bill Office has *moved,* as shown by some cracks in the staircase; but for this house it may not be necessary to require more to be done than stopping and painting.

"At the Exchequer Bill Office, the old Gothic groins have been cracked in several places, and several settlements have taken place in the walls over and near to where the sewer passes under the building. The shores are still standing against this building, but it would now be better to remove them; the cracks in the groins and walls *can never be repaired* to render the building so substantial as it was before. The cracks in the basement still from month to month show a very slight movement; those in the staircase and roof also appear to increase. As respects this building, I would submit to the Commissioners of Woods that it *would not be advisable to permit the surveyors of the Commissioners of Sewers to enter and make only a surface repair of plaster and paint;* but I would suggest that a careful survey be made by surveyors appointed respectively by the Board of Woods and the Commissioners of Sewers, and that a thorough repair of the building be made (so far as it is susceptible of repair), under the Board of Woods; the Commissioners of Sewers paying such proportion of the cost thereof as may fairly be deemed to have been occasioned by their proceedings.

"At the United Service Museum, the settlements on the side next the sewer appear to me very serious.

"The house occupied by Lord Liverpool, as also Mr. Vertue's house, of which his Lordship is Crown lessee, were both affected, the former to some extent, but not seriously; of the latter, the west front sunk, and pulled over the whole house with it; but as respects these two houses the interference of the Board is, I believe, unnecessary, Mr. Hardwicke (one of the Sewer Commissioners) having, as architect for Lord Liverpool, caused both to be repaired.

"A like repair has also been made in the kitchen offices of Mr. Alderman Thompson's house, where alone any cracks appeared.

"At Messrs. Dalgleish and Taylor's, very serious injury has been done to both their buildings and their trade. The Commissioners of Sewers have a steam-engine still at work on those premises, and have not yet concluded their operations there. Some of the sheds which entirely fell down they have rebuilt; and others, which appear in a very defective if not dangerous state, it is understood they propose to repair or rebuild; but as eventually Messrs. Dalgleish and Taylor will have a very heavy claim against them for interference with business, and as the extent of damage to the buildings which has been done, or may hereafter arise, cannot at present be fully ascertained, it would probably be advisable to postpone this part of the subject, giving notice, however, to the Commissionors of Sewers that it must hereafter come under consideration.

(Signed) "JAMES PENNETHORNE.

"10th May, 1851."

"*Sewer, Whitehall Yard, &c.*

"Under the order of the Commissioners of Her Majesty's Woods, &c., of yesterday's date, endorsed on a letter from Mr. Tonna, I have inspected the United Service Institution in Whitehall Yard, and find most of the cracks have moved.

"The movement, though slight, and not showing immediate danger, is more than I had anticipated would occur within so short a period when I reported on the 10th instant. It tends to confirm the opinion therein given, and shows the necessity for immediate precaution, and for a thorough repair.

(Signed) "JAMES PENNETHORNE.

"16th May, 1851.

"SEYMOUR,
"CHARLES GORE,
} Commissioners of Her Majesty's Woods, Forests, Land Revenues, Works, and Buildings.

"Office of Woods, &c.
"5th August, 1851."

OF THE SEWERS RATE.

HAVING shown the expenditure of the Commission of Sewers, we now come to consider its income.

The funds available for the sewerage and drainage of the several towns throughout the kingdom, are raised by means of a particular property tax, termed the Sewers Rate. This forms part of what are designated the *Local* Taxes of England and Wales.

Local taxes are of two classes:—

I. Rates raised upon property in *defined* districts, as parishes, jurisdictions, counties, &c.

II. Tolls, dues, and fees charged for particular services on particular occasions, as turnpike tolls, harbour dues, &c., &c.

The rates or sums raised upon the property lying within a certain circumscribed locality, admit of being subdivided into two orders—

1. The rates of *independent* districts, or those which, being required for a particular district (as the parish or some equivalent territorial limit), are not only levied within the bounds of that district, but expended for the purposes of it alone; as is the case with the poor rate.

2. The rates of *aggregate* districts, or those which, though required to be expended for the purposes of a given district (such as the county), are raised in detail in the several inferior districts (such as the various parishes) which compose the larger one, and which contribute the sums thus levied to one common fund; such is the case with the county rate.

But the rates of independent districts may be further distinguished into two orders, viz.—

i. Those which are levied on the same classes of persons, the same kinds of property, and the same principles of valuation as the poor rate; such are the highway rate, the lighting and watching, and the militia rate among the independent rates; and the police, borough, and county rates among the aggregate rates.

ii. Those which are *not* levied on the same basis as the poor rate. The church and sewers rates are familiar instances of this peculiarity.

The sewers rate, then, is a local tax required for an *independent* rather than an *aggregate* district, and is *not* levied upon the basis of the poor law.

The assessment of the poor rate, for instance, includes tithes of every kind, that of the sewers rate extends to such tithes only as are in the hands of laymen. Again, the sewers rate embraces some incorporeal hereditaments to which the poor rate does not extend; but stock in trade, which of late years has been specially exempted from the poor rate, was never subject to the sewers rate.

A sewers rate, however, was known as early as the sixth year of Henry VI. (1427), though "commissions" were not instituted till the time of Henry VIII. The Act which now regulates the collection of the funds required for the cleansing, building, repairs, and improvements of the sewers, is 4 and 5 Vict. (1841). This statute gives the "Courts" or "Commissions" of Sewers, power "to tax in the gross" in each parish, &c., all lands, &c., within the jurisdiction of such courts, for the requirements of the public sewerage. This impost is not periodically levied, nor at any stated or even regularly recurring term, but "as occasion requires:" perhaps once in two or three years. It is (with some exceptions, which require no notice) what is commonly called "a landlord's tax" in the metropolis, that is, the sewers-rate collector must be paid by the occupier of the premises, who, on the production of the collector's receipt, can deduct the amount from his rent. If this arrangement were meant to convey a notion to the public that the sewers tax was a tax on property—on the capitalist who owns, and not on the tenant who merely occupies—it is a shallow device, for every one must know that the more sewers rate a tenant pays *for* his landlord, the more rent he must pay *to* him.

The sewers rate is levied according to the rateable value put upon property by the surveyors and assessors appointed by the Commissioners, who may make the rate "by such ways and means, and in such manner and form, as to them may seem most convenient." It seems a question yet to be determined whether or not there is a right of appeal against the sewers rate, but the general opinion is that there is *no appeal.* The rate can be mortgaged by the Commissioners if an advance of money is considered desirable. The maximum of 1s. in the pound on the net annual value of the property was fixed by the Act. The Commissioners have also the power to levy a "special rate" on any district not connected with the general system of sewerage, but which it has been resolved should be so connected; also an "improvement rate," at a maximum of 10 per cent. on the rack rent, "in respect of works they may judge to be of private benefit," a provision which has called forth some comments.

The metropolitan sewers rate is now collected in nine districts.

There are at present 42 Commissions or Courts of Sewers throughout England and Wales.

The only return which has yet been prepared of the annual amount assessed and collected under the authority of the Metropolitan Commission of Sewers, is one presented to the House of Commons in 1843. It includes the sum assessed in four of the eight districts within the jurisdiction of the Metropolitan Commissioners from 1831 to 1840 inclusive.

Districts.	Total in the 10 years.	Annual Average.
	£	£
Westminster . .	235,397	23,539 7/10
Holborn and Finsbury	123,317	12,331 7/10
Tower Hamlets . .	82,468	8,246 8/10
From East Moulsey, in Surrey, to Ravensbourne, in Kent .	175,137	17,513 7/10
	616,319	61,631 9/10

The following amounts were returned to Parliament as that expended in two other of the metropolitan districts in the year 1833:—

In the City	£17,718 5/10
Poplar district	2,746 9/10
	£20,465 1/10
Annual average of the four above-mentioned districts . . .	61,631 9/10
Yearly total	£82,097

The two districts excluded from the above total are the minor ones of St. Katherine and Greenwich, so that altogether the gross sum levied within the jurisdiction of the Metropolitan Commissioners must have been between 85,000*l.* and 90,000*l.*

The annual amount of the local rates in England and Wales is, according to a work on the subject ("The Local Taxes of the United Kingdom"), published "under the direction of the Poor Law Commissioners" in 1846, 8,801,838*l.** In this large sum only the average annual outlay on the six districts of the sewers of the metropolis is included (82,097*l.*), and it is stated that not even an approximate average could be arrived at as regards the expenditure on sewers in the country districts. Such absence of statistical knowledge,—and it is a want continually observable—is little creditable to the legislative, executive, and administrative powers of the State.

I shall now proceed to show, from the best data at my command, the present outlay on the metropolitan sewers.

* The following statement may, according to the work above alluded to, be presented as an approximate

According to the present law, the Commissioners are required to submit to Parliament yearly returns of the money collected on account of, and expended in, the sewerage of the metropolis.

I need only state, that in the latest and, indeed, the sole returns upon the subject, the rates in 1845–6–7, under the former separate commissions, were 1*d.* and 2*d.* in the pound on land, and from 3*d.* (Ranelagh and Westminster) to 1*s.* 10*d.* (Greenwich) on houses.

The rates made under the combined and consolidated Commissions, from 30th Nov., 1847, to 8th Oct., 1849, were all 6*d.*, excepting the Western division of Westminster sewers, which were 3*d.*, and a part of the Surrey and Kent district, 8*d.*

The rates under the present Metropolitan Commission, from 8th October, 1849, to 31st July, 1851, are all 6*d.*, with a similar exception in Surrey and Kent. The following are the only further returns bearing immediately on the subject:—

RETURN OF THE PERCENTAGE ON THE TOTAL RATEABLE ANNUAL VALUE OF THE PROPERTY ASSESSED, to which the Rates collected under the separate Commissions, between January, 1845, and November, 1847, amounted; Similar Return as to the combined and consolidated Commissions, from November, 1847, to October, 1849; and as to the present Commission, from October, 1849, to July 31, 1851.

	Total Rateable Annual Value of the Districts on November 30, 1847, and October 8, 1849, and July 31, 1851, respectively.	Average Amount collected for One Year.	Amount of the Percentage of the Rates collected on the Rateable Annual Value.
	£ s. d.	£ s. d.	£ s. d.
Under the old separate Commissions of Sewers, between January, 1845, and November 30, 1847	6,683,896 0 0	81,738 11 0	1 4 5 or 2¾*d.* ·72 in the pound per annum.
Under the combined and consolidated Commissions, from November 30, 1847, to October 8, 1849 (including first Metropolitan Commission)	7,128,111 0 0	67,707 16 3	0 18 11¾ or 2¼*d.* ·11 in the pound per annum.
Under the present Metropolitan Commission of Sewers, from October 8, 1849, to July 21, 1851	8,135,090* 0 0 8,820,325† 0 0	89,341 16 0	1 1 11 or 2½*d.* ·52 in the pound per annum. 1 0 3 or 2¼*d.* ·72 in the pound per annum.

* Rental of the districts now rated.

† Rental of the districts within the active jurisdiction in which expenses have been incurred, and which are about to be rated.

August, 1851.

THOMAS COGGIN,
Clerk of Rates and Collections.

return of the present annual amount of the local rates in England and Wales.

I. RATES.

A. Rates of Independent Districts.

1. *On the basis of the poor rate.*

The poor rate, including the purposes of— The workhouse building rate The survey and valuation rate Relief of the poor	£4,976,093
Other objects	567,567
Contributions to county and borough rates (see below). Jail fees rate Constables rate	unknown
Highway rates	1,312,812
Lighting and watching rate	unknown
Militia rate	not needed
2. *Not on the basis of the poor rate.*	
Church rates	506,812
Sewers rate— General sewers tax— In the metropolis	82,097
In the rest of the country	unknown
Drainage and inclosure rates Inclosure rate Regulated pasture rate	unknown

B. Rates of Aggregate Districts.

County rates Hundred rate Borough rates (Contributed from the poor rate.)	1,356,457
Total rates of England and Wales	£8,801,834

The amount of the taxation in the shape of tolls, dues, and fees is as follows:—

II. TOLLS, DUES, AND FEES.

Turnpike tolls		£1,348,085
Borough tolls and dues	£172,911	
City of London	205,100	
		378,011
Light dues		257,776
Port dues		554,645
Church dues and fees Marriage fees Registration fees		unknown
Justiciary fees—		
Clerks of the Peace	£11,057	
Justices' clerks	57,668	
		68,725
Total tolls, dues, and fees of England and Wales		£2,607,241

The subjoined, then adds the same work, founded on the preceding details, may be regarded as exhibiting an approximate estimate of the present amount of the local taxes in England and Wales, *being, however, obviously below the actual total.*

Rates	£8,801,838	
Tolls, dues, and fees	2,607,241	
		£11,409,079

"The annual amount of the local taxation of England and Wales may at the present time be stated, in round numbers, at not less than £12,000,000;" or we may say that the local taxation of the country is one-fourth of the amount of the general taxation.

RETURN OF THE COST OF MANAGEMENT PER ANNUM ON THE TOTAL RATEABLE ANNUAL VALUE OF THE DISTRICTS.

YEARS.	Total Rateable Annual Value of the Districts.	Cost of Management per Annum.	Rate per Cent. per Annum of Cost of Management on the Rateable Annual Value of the Districts.
	£ s. d.	£ s. d.	£ s. d.
1845	6,320,331 0 0	18,591 4 3	0 5 10½
1846	6,423,909 0 0	18,097 5 1	0 5 7½
1847	6,683,896 0 0	24,371 16 9	0 7 3½
1848	6,783,111 0 0	20,008 7 10	0 5 10¾
1849	8,077,591 0 0	20,005 7 6	0 4 11¼
1850	8,791,967 0 0	23,465 18 7	0 5 4

G. S. HATTON,
Accountant.

August 7, 1851.

Of the Cleansing of the Sewers—Ventilation.

There are two modes of purifying the sewers; the one consists in removing the foul air, the other in removing the solid deposits. I shall deal first with that mode of purification which consists in the mechanical removal or chemical decomposition of the noxious gases engendered within the sewers.

This is what is termed the Ventilation of the Sewers, and forms a very important branch of the inquiry into the character and working of the underground refuse-channels, for it relates to the risk of explosions and the consequent risk of destruction to men's lives; while, if the sewer be ill-ventilated, the surrounding atmosphere is often prejudicially affected by the escape of impure air from the subterranean channels.

A survey as to the ventilation, &c., of the sewers was made by Mr. Hawkins, Assistant-Surveyor, and Mr. Jenkins, Clerk of the Works. Four examinations took place of sewers; of those in Bloomsbury; those from Tottenham-court-road to Norfolk-street, Strand; from the Guard-room in Buckingham Palace to the Horseferry-road, Millbank; and in Grosvenor-square and the streets adjacent. There were difficulties attending the experiment. From Castle-street to Museum-street there was a drop of 4 feet in the levels, so that the examiners had to advance on their hands and knees, and it was difficult to make observations. In some places in Westminster also the water and silt were knee deep, and the lamps (three were used) splashed all over. In Bloomsbury the sewers gave no token of the presence of any gas, but in the other places its presence was very perceptible, especially in a sewer on the west side of Grosvenor-square, a very low one, in which the gas was ignited within the wire shade of one of the lamps, but without producing any effect beyond that of immediately extinguishing the light. There was also during the route, in the neighbourhood of Sir Henry Meux's brewery and of an adjoining distillery in Vine-street, a considerable quantity of steam in the sewer, but it had no material effect upon the light.

The examiners came to the conclusion that where there was any liability to an explosion from the presence of carburetted hydrogen, or other causes, the Improved Davy Lamp afforded an almost certain protection.

The attention of the Commissioners seems to have been chiefly given of late, as regards ventilation and indeed general improvement, to the sewers on the Surrey side of the metropolis. Among these a new sewer along Friar-street, running from the Blackfriars to the Southwark-bridge-road, is one of the most noticeable.

Friar-street is one of the smaller off thoroughfares, the character of which is, perhaps, little suspected by those who pass along the open Blackfriars-road. As you turn out of that road to the left hand, advancing from the bridge, almost opposite the Magdalen Hospital, is Friar-street. On its left hand, as you proceed along it, are gas-works, and the factories, or work places, of tradesmen in the soap-boiling, tallow-melting, cat and other gut manufacturing, bone-boiling, and other noisome callings. On the right hand are a series of short and often neatly-built streets, but the majority of them have the look of unmistakable squalor or poverty, though *not* of the poverty of the industrious. Across Flint-street, Green-street, and other ways, few of them horse thoroughfares, hang, on a fair day, lines of washed clothes to dry. Yellow-looking chemises and petticoats are affixed alongside men's trowsers and waistcoats; coarse-featured and brazen-looking women, with necks and faces reddened, as if with brick-dust, from exposure to the weather, stand at their doors and beckon to the passers by. Perhaps in no part of the metropolis is there a more marked manifestation of moral obsceneness on the one hand, and physical obsceneness on the other. With the low prostitution of this locality is mixed the low and the bold crime of the metropolis. Some of the off-shoots from Friar-street communicate with places of as nefarious a character. Hackett, whom his newspaper admirers seem to wish to elevate into the fame of a second Jack Sheppard, resided in this quarter. The gang who were last winter repulsed in their burglarious attack on Mr. Holford's villa in the Regent's-park favoured the same locality, and were arrested in their old haunts. Public-houses may

be seen here and there—houses, perhaps, not greatly discouraged by the police—which are at once the rendezvous and the trap of offenders, for to and from such resorts they can be readily traced. And all over this place of moral degradation extends the stench of offensive manufactures and ill-ventilated sewers. Certainly there is now an improvement, but it is still bad enough.

A Report of the 21st September, 1848, shows that a new sewer, 1500 feet in length, had been "put in along Friar-street, with a fall of 15 inches from the level of the sewer in Blackfriars-road to Suffolk-street. The sewer," states the Report, "with which it communicates at its upper end in the Blackfriars-road contains nearly 2 feet in depth of soil; it in consequence has silted up to that level with semi-fluid black filth, principally from the factories, of the most poisonous and sickening description, forming an *elongated cesspool* 1500 feet in length, the filth at its lower end being upwards of 3 feet in depth. Since the building of this sewer, the foul matter so discharged into it has been in a state of decomposition, constantly giving off pestilential and poisonous gases, which have spread into and filled the adjoining sewers; thence they are being drawn into the houses by the house-drains, and into the streets by the street-drains, to such a fearful extent as to infect the whole atmosphere of the neighbourhood, and so to cause the very offensive odour so generally complained of there. Sulphuretted hydrogen is present in these sewers in large quantities, as metals, silver and copper, are attacked and blackened by it; and the smell from it is so sickening as to be almost unbearable."

On the question of how best to deal with sewers such as the Friar-street, Messrs. John Roe and John Phillips (surveyors) and Mr. Henry Austin (consulting engineer) have agreed in the following opinion:—

"The most simple and convenient method would be by placing large strong fires in shafts directly over the crown of the sewers. The expense of each furnace, with the inclosure around it, will be about 20*l*. The fires would be fed almost constantly, by which little smoke would be generated. The heat to be produced from these fires would rarefy the air so much as to create rapidly ascending currents in the shafts, and strong draughts through the sewers, the foul air in which would then be drawn to the fires and there consumed; and as it was being destroyed fresh air would be drawn in at all the existing inlets of house and street drains, pushing forward and supplying the place of the foul air."

Concerning the explosions of, or deaths in, the sewers from the impure gases, there is, I believe, no statistical account. The most remarkable catastrophe of this kind was the death of five persons in a sewer in Pimlico, in October, 1849; of these, three were regular sewer-men, and the others were a policeman and Mr. Wells, a surgeon, who went into the sewer in the hopes of giving assistance. Mr. Phillips, the then chief surveyor of the Commission of Sewers, stated that the cause of these deaths in the sewers was entirely an exceptional case, and the gas which had caused the accident inquired into was not a sewer gas. "There is often," he said, "a great escape of gas from the mains, which found its way into the sewers. The gas, however, which has done the mischief in the present instance would not explode."

Dr. Ure's opinion was, that the deceased men died from asphixia, caused by inhaling sulphuretted hydrogen and carbonic acid gas in mixture with prussic vapour, and that these noxious emanations were derived from the refuse lime of gas-works thrown in with other rubbish to make up the road above the sewer. Other scientific gentlemen attributed the five deaths to the action of sulphuretted hydrogen gas, or, according to Dr. Lyon Playfair, to be chemically correct, hydro-sulphate of ammonia. The coroner (Mr. Bedford), in summing up, said that Mr. Phillips wished it to be supposed that gas lime was the cause of the foul gas; and Dr. Ure said that gas lime had to do with the calamity. But Dr. Miller, Mr. Richard Phillips, Mr. Campbell, and Dr. Playfair, more especially the latter, were perfectly sure that lime had nothing to do with it. The verdict was the following:—"We find that Daniel Pert, Thomas Gee, and John Attwood died from the inhalation of noxious gas generated in a neglected and unventilated sewer in Kenilworth-street. And we find that Henry Wells and John Walsh met their deaths from the same cause, in their laudable endeavours to save the lives of the first three sufferers. The jury unanimously consider the commissioners and officers of the Metropolitan Sewers are much to blame for having neglected to avail themselves of the unusual advantages offered, from the local situation of the Grosvenor-canal, for the purpose of flushing the sewers in this district."

Of "Flushing" and "Plonging," and other Modes of Washing the Sewers.

The next step in our inquiry—and that which at present concerns us more than any other—is the mode of removing the solid deposits from the sewers, as well as the condition of the workmen connected with that particular branch of labour. The sewers are the means by which a larger proportion of the wet refuse of the metropolis is removed from our houses, and we have now to consider the means by which the more solid part of this refuse is removed from the sewers themselves. The latter operation is quite as essential to health and cleanliness as the former; for to allow the filth to collect in the channels which are intended to remove it, and there to remain decomposing and vitiating the atmosphere of the metropolis, is manifestly as bad as not to remove it at all; and since the more solid portions of the sewage *will* collect and form hard deposits at the bottom of each duct, it becomes necessary that some means should be devised for the periodical purgation of the sewers themselves.

There have been two modes of effecting this object. The one has been the *carting* away of the more solid refuse, and the other the *washing* of it away, or, as it is termed, *flushing* in the case of the *covered* sewers, and *plonging* in the case of the *open* ones. Under both systems, whether the refuse be carted or flushed away, the hard deposit has to be first loosened by manual labourers—the difference consisting principally in the means of after-removal.

The first of these systems—viz., the cartage method—was that which prevailed in the metropolis till the year 1847. I shall therefore give a brief description of this mode of cleansing the sewers before proceeding to treat of the now more general mode of "flushing."

Under the old system, the clearing away of the deposit was a "nightman's" work, differing little, except in being more toilsome, offensive to the public, and difficult. A hole was made from the street down into the sewer where the deposit was thickest, and the deposit was raised by means of a tub filled below, drawn up to the street, and emptied into a cart, or spread in mounds in the road to be shovelled into some vehicle. A nightman told me that this mode of work was sometimes a great injury to his trade, because "when it was begun on a night many of the householders sleeping in the neighbourhood used to say to themselves, or to their missusses, as they turned in their beds, 'It's them ere cussed cesspools again! I wish they was done away with.' An' all the time, sir, the cesspools was as hinnocent and as sweet as a hangel."

This clumsy and filthy process is now but occasionally resorted to. A man who had superintended a labour of this kind in a narrow, but busy thoroughfare in Southwark, told me that these sewer labourers were the worst abused men in London. No one had a good word for them.

But there have been other modes of removing the indurated sewage, besides that of cartage; and which, though not exactly flushing, certainly consisted in allowing the deposit to be washed away. Some of these contrivances were curious enough.

I learn from a Report printed in 1849, that the King's Scholars' Pond Sewer, in the city of Westminster, running near the Abbey, contained a continuous bed of deposit, of soil, sand, and filth, from 10 to 30 inches in depth, and this for a mile and a half next the river—the first mile yielding more than 6000 loads of matter. This sewer was to be cleansed.

"We first used a machine," says Mr. J. Lynder Hale, "in the form of a plough and harrow combined; a horse dragged it through the deposit in the sewer; one man attended the horse, and another guided the plough. The work done by this machine, in cutting a channel through the soil and causing the water to move through it quickly, was effectual to remove the deposit; but as the sewer is a tidal sewer, and its sole entrance for a horse being its outlet, the machine could only be used for a small part of any day. Sometimes with a strong breeze up the river, the tide would not recede sufficiently to permit the horse to get in at all (and it did not appear advisable to incur the expense of 50*l*. to build a sideway entrance for the animal), so that under these circumstances we were obliged to discontinue the use of the horse and plough; which, under other circumstances, would have been very effective." From this time, I understand, the sewers of London have remained unploughed by means of horse labour.

But the plough was not altogether abandoned, and as horse-power was not found very easily applicable, water-power was resorted to. The plough and harrow were attached to a barge, which was introduced into the sewer. The sluice gates were kept shut until the ebb of the tide made the difference of level between the contents of the sewer and the surface of the Thames equal to some eight feet. "The gates were then suddenly opened, and the rapid and deep current of water following, was then sufficient to bring the barge and plough down the sewer with a force equal to five or six horse-power."

This last-mentioned method was also soon abandoned. We now come to the more approved plan of "flushing."

"The term '*flushing* sewers' implies," says Mr. Haywood, in his Report, "cleansing by the application of *bodies* of water in the sewers; this is periodically effected, varying in intervals according to the necessities of the sewerage or other circumstances."

The flushing system has a two-fold object, viz., to remove old deposits and prevent the accumulation of new. When the deposit is not allowed to accumulate and harden, "flushing consists," says Mr. Haywood, "simply in heading back and letting off *flush at once*" (hence the origin of the term) "that which has been delivered into the sewers in a certain number of hours by the various houses draining into them, diluted with large quantities of water specially employed for the purpose."

Though the operation of "flushing" is one of modern introduction, as regards the metropolis—one, indeed, which may be said to have originated in the modern demand for improved sanitary regulations—it has been practised in some country parts since the days of Henry VIII.

Flushing was practised also by those able engineers, the ancient Romans. One of the grand architectural remains of that people, the best showing their system of flushing, is in the Amphitheatre at Nismes, in France. The site of the ruined amphitheatre presents a large elliptical area, 114,251 superficial feet comprising its extent. Around the arena ran a large sewer 3 feet 6 inches in width, and 4 feet 9 inches in height. With this sewer, elliptical in shape, 348 pipes communicated, carrying into it the rain-fall and the refuse caused by the resort of 23,000 persons, for the seats alone contained that number. "The system of flushing, practised here," says Mr. Cresy, "with such advantage, deserves to be noticed, there being means of driving through this elliptical sewer a volume of water at pleasure, with such force that no solid matter could by any possibility remain within any of the drains or sewers. An aqueduct, 2 feet 8 inches in width, and 6 feet in height, brought this water from the reservoirs of Nismes, not only to fill but to purge

the whole of these sewers; after traversing the arena, it deviated a little to the south-west, where it was carried out at the sixth arcade, east of the southern entrance. Man-holes and steps to descend into this capacious vaulted aqueduct were introduced in several places; and there can be no doubt that by directing for some hours such a stream of water through it, the greatest cleanliness was preserved throughout all the sewers of the building."

The flushing of sewers appears to have been introduced into the metropolis by Mr. John Roe in the year 1847, but did not come into general use till some years later. There used to be a partial flushing of the London sewers twelve years ago. The mode of flushing as at present practised is as follows:—

In the first instance the inspector examines and reports the condition of the sewer, and receives and issues his orders accordingly. When the sewer is ordered to be flushed—and there is no periodical or regular observance of time in the operation—the men enter the sewers and rake up the deposit, loosening it everywhere, so as to render the whole easy to be swept along by the power of the volume of water. The sewers generally are, in their widest part, provided with grooves, or, as the men style them, "framings." Into these framings are fitted, or permanently attached, what I heard described as "penstocks," but which are spoken of in some of the reports as "traps," "gates," or "sluice gates." They are made both of wood and iron. By a series of bolts and adjustments, the penstocks can be fixed ready for use when the tide is highest in the sewer, and the volume of water the greatest. They then, of course, are in the nature of dams, the water having accumulated in consequence of the stoppage. The deposit having been loosened, the bolts are withdrawn, when the gates suddenly fly back, and the accumulated water and stirred-up sewage sweeps along impetuously, while the men retreat into some side recesses adapted for the purpose. The same is done with each penstock until the matter is swept through the outlet. The men always follow the course of this sewage-current when the sewer is of sufficient capacity to enable them to do so, throwing or pushing forward any more solid matter with their shovels.

"To flush we generally go and draw a slide up and let a flush of water down," said one man to me, "and then we have iron rakers to loosen the stuff. We have got another way that we do it as well; one man stands here, when the flush of water 's coming down, with a large board; then he lets the water rise to the top of this board, and then there 's two or three of us on ahead, with shovels, loosening the stuff—then he ups with this board and lets a good heavy flush of water come down. Precious hard work it is, I can assure you. I've had many a wet shirt. We stand up to our fork in the water, right to the top of our jack-boots, and sometimes over them." "Ah, I should think you often get over the top of yours, for you come home with your stockings wet enough, goodness knows," exclaimed his wife, who was present. "When there 's a good flush of water coming down," he resumed, "we 're obligated to put our heads fast up against the crown of the sewer, and bear upon our shovels, so that we may not be carried away, and taken bang into the Thames. You see there 's nothing for us to lay hold on. Why, there was one chap went and lifted a slide right up, when he ought to have had it up only 9 or 10 inches at the furthest, and he nearly swamped three of us. If we should be taken off our legs there 's a heavy fall—about 3 feet—just before you comes to the mouth of the sewer, and if we was to get there, the water is so rapid nothing could save us. When we goes to work we nails our lanterns up to the crown of the sewer. When the slide is lifted up the rush is very great, and takes all before it. It roars away like a wild beast. We 're always obliged to work according to tide, both above and below ground. When we have got no water in the sewer we shovels the dirt up into a bank on both sides, so that when the flush of water comes down the loosened dirt is all carried away by it. After flushing, the bottom of the sewer is as clean as this floor, but in a couple of months the soil is a foot to 15 inches deep, and middling hard."

"Flushing-gates," an engineer has reported, "are chiefly of use in sewers badly constructed and without falls, but containing plenty of water; and they are of very little use where the gate has to be shut 24 hours and longer, before a head of water has accumulated; but where intermittent flushing is practised, strong smells are often caused *solely* by the stagnation of the water or sewage while accumulating behind the gate."

The most general mode of flushing at present adopted is not to keep in the water, &c., which has flowed into the sewer from the streets and houses, as well as the tide of the river, but to convey the flushing water from the plugs of the water companies into the kennels, and so into the sewers. I find in one of the Reports acknowledgments of the liberal supplies granted for flushing by the several companies. The water of the Surrey Canal has been placed, for the same object, at the disposal of the Sewer Commissioners.

It is impossible to "flush" at all where a sewer has a "dead-end;" that is, where there is a "block," as in the case of the Kenilworth-street sewer, Pimlico, in which five persons lost their lives in 1848.

There is no difference in the system of flushing in the Metropolitan and City jurisdictions, except that for the greater facilities of the process, the City provides water-tanks in Newgate-market, where the heads of three sewers meet, and where the accumulation of animal garbage, and the fierceness and numbers of the rats attracted thereby, were at one time frightful; at Leadenhall-market, and elsewhere, such tanks were also provided to the number of ten, the largest being the Newgate-market tank, which is a brick cistern of 8000 gallons capacity. Of these tanks, however, only four are now kept filled, for this collection of water is found unnecessary, the regular

BALLAST-HEAVERS AT WORK IN THE POOL.
[*From a Sketch.*]

system of flushing answering the purpose without them; and I understand that in a little time there will be no tanks at all. The tank is filled, when required, by a water company, and the penstocks being opened, the water rushes into the sewers with great force. There is also another point peculiar to the City—in it all the sewers are flushed regularly twice a week; in the metropolitan sewers, only when the inspector pronounces flushing to be required. The City plan appears the best to prevent the accumulation of deposit.

There still remains to be described the system of "*plonging*," or mode of cleansing the open sewers, as contradistinguished from "*flushing*," or the cleansing of the covered sewers.

"When we go plonging," one man said, "we has long poles with a piece of wood at the end of them, and we stirs up the mud at the bottom of the ditches while the tide's a going down. We has got slides at the end of the ditches, and we pulls these up and lets out the water, mud, and all, into the Thames." "Yes, for the people to drink," said a companion drily. "We're in the water a great deal," continued the man. "We can't walk along the sides of all of 'em."

The difference of cost between the old method of removal and the new, that is to say, between carting and flushing, is very extraordinary.

This cartage work was done chiefly by contract and according to a Report of the surveyors to the Commissioners (Aug. 31, 1848), the usual cost for such work (almost always done during the night) was 7*s.* the cubic yard; that is, 7*s.* for the removal of a cubic yard of sewage by manual labour and horse and cart. In February, 1849 (the date of another Report on the subject), the cost of removing a cubic yard by the operation of flushing, was but 8*d.* This gives the following result, but in what particular time, instance, or locality, is not mentioned:—

79,483 cubic yards of deposit removed by the contract flushing system, at 8*d.* per cubic yard	£2,649
Same quantity by the old system of casting and cartage, 7*s.* per cubic yard .	27,819
Difference . . .	£25,170

"It appears, therefore," says Mr. Lovick, "that by the adoption of the contract flushing system, a saving has been effected within the comparatively short period of its operation over the filthy and clumsy system formerly practised, of 25,170*l.*, showing the cost of this system to be ten and a half times greater than the cost of flushing by contract."

An official Report states: "When the accumulations of years had to be removed from the sewers, the rate of cost per lineal mile has varied from about 40*l.* to 58*l.*, or from 6*d.* to 8*d.* per lineal yard. The works in these cases (excepting those in the City) have not exceeded nine lineal miles."

"On an average of weeks," says Mr. Lovick, in his Report on flushing operations, a few months after the introduction of the contract system, in Sept., 1848, "under present arrangements, about 62 miles of sewers are passed through each week, and deposit prevented from accumulating in them by periodic (weekly) flushing. The average cost per lineal mile per week is about 2*l.* 10*s.*

"The nature of the agreements with the contractors or gangers are now for the prevention of accumulations of deposit in a district. For this purpose the large districts are subdivided, each subdivision being let to one man. In the Westminster district there are four, in the Holborn and Finsbury two, in the Surrey and Kent, seven subdivisions.

"The Tower Hamlets and Poplar districts are each let to one man.

"In the Tower Hamlets it will be perceived that a reduction of 8*l.* has been effected for the performance of precisely the same work as that heretofore performed; the rates of charge standing thus:—

"Under the day-work system 23*l.* per week.
" contract " 15*l.* "

"In those portions specially contracted for, the work has been let by the lineal measure of the sewer, in preference to the amount of deposit removed.

"In the Surrey and Kent districts the open ditches have been cleansed thrice as often as formerly.

"A large proportion of the deposit removed is from the open ditches; in these the accumulations are rapid and continuous, caused chiefly by their being the receptacles for the ashes and refuse of the houses, the refuse of manufactories, and the sweepings of the roads.

"In the covered sewers one of the chief sources of accumulation is the detritus and mud from the streets, swept into the sewers.

"The accumulations from these sources will not, I think, be over-estimated at two-thirds of the whole amount of deposit removed.

"The contracts in operation, February, 1849, with the districts which they embrace, are as follows:—

"TABLE No. I.

Districts.	Sewers let for Prevention of Accumulations of Deposit.	Average Rate of Work performed in Sewers passed through each Week.	Contract Charge per Week.
	Lineal Feet.	Lineal Feet.	£ *s.* *d.*
Westminster	485,795	150,615	40 0 0
Holborn & Finsbury	355,085	118,000	23 0 0
Tower Hamlets	223,733	30,000	15 0 0
Surrey and Kent ..	440,642	40,000	75 0 0
Poplar	26,000	2,000	6 16 0
	1,531,260	340,615	159 16 0
Westminster—Attendance on Flaps, &c.			4 0 0
			£163 16 0

"The weekly cost prior to the contract system was in the several districts as follows:—

"Table No. II.

	£	s.	d.
In the Westminster District	78	10	0
,, Holborn and Finsbury do.	24	17	0
,, Tower Hamlets do.	23	0	0
,, Surrey and Kent do.	56	8	0
,, Poplar do.	6	13	0
	189	8	0

Hence there would appear to have been a saving of 25*l.* 12*s.* effected. But by what means was this brought about? It is the old story, I regret to say—a reduction of the wages of the labouring men. But this, indeed, is the invariable effect of the contract system. The wages of the flushermen previous to Sept., 1848, were 24*s.* to 27*s.* a week; under the present system they are 21*s.* to 22*s.* Here is a reduction of 4*s.* per week per man, at the least; and as there were about 150 hands employed at this period, it follows that the gross weekly saving must have been equal to 30*l.*, so that, according to the above account, there would have been about 5*l.* left for the contractors or middlemen. It is unworthy of *gentlemen* to make a parade of economy obtained by such ignoble means.

The engineers, however, speak of flushing as what is popularly understood as but "a makeshift"—as a system imperfect in itself, but advantageously resorted to because obviating the evils of a worse system still.

"With respect to these operations," says Mr. Lovick, in a Report on the subject, in February, 1849, "I may be permitted to state that, although I do not approve of the flushing as an ultimate system, or as a system to be adopted in the future permanent works of sewerage, or that its use should be contemplated with regulated sizes of sewers, regulated supplies of water, and proper falls, it appears to be the most efficacious and economical for the purpose to which it is adapted of any yet introduced."

A gentleman who was at one time connected professionally with the management of the public sewerage, said to me,—

"Mr. John Roe commenced the general system of flushing sewers in London in 1847. It is, however, but a clumsy expedient, and quite incompatible with a perfect system of sewerage. It has, nevertheless, been usefully applied as an auxiliary to the existing system, though the cost is frightful."

Of the Working Flushermen.

When the system of sewer cleansing first became general, as I have detailed, the number of flushermen employed, I am assured, on good authority, was about 500. The sewers were, when this process was first resorted to, full of deposit, often what might be called "coagulated" deposit, which could not be affected except by constantly repeated efforts. There are now only about 100 flushermen, for the more regularly flushing is repeated, the easier becomes the operation.

Until about 18 months ago, the flushermen were employed directly by the Court of Sewers, and were paid ("in Mr. Roe's time," one man said, with a sigh) from 24*s.* to 27*s.* a week; now the work is *all done by contract.* There are some six or seven contractors, all builders, who undertake or are responsible for the whole work of flushing in the metropolitan districts (I do not speak of the City), and they pay the working flushermen 21*s.* a week, and the gangers 22*s.* This wage is always paid in money, without drawbacks, and without the intervention of any other middleman than the contractor middleman. The flushermen have no perquisites except what they may chance to find in a sewer. Their time of labour is 6½ hours daily.

The state of the tide, however, sometimes, as a matter of course, compels the flushermen to work at every hour of the day and night. At all times they carry lights, common oil lamps, with cotton wicks; only the inspectors carry Davy's safety-lamp. I met no man who could assign any reason for this distinction, except that "the Davy" gave "such a bad light."

The flushermen wear, when at work, strong blue overcoats, waterproofed (but not so much as used to be the case, the men then complaining of the perspiration induced by them), buttoned close over the chest, and descending almost to the knees, where it is met by huge leather boots, covering a part of the thigh, such as are worn by the fishermen on many of our coasts. Their hats are fan-tailed, like the dustmen's. The flushermen are well-conducted men generally, and, for the most part, fine stalwart good-looking specimens of the English labourer; were they not known or believed to be temperate, they would not be employed. They have, as a body, no benefit or sick clubs, but a third of them, I was told, or perhaps nearly a third, were members of general benefit societies. I found several intelligent men among them. They are engaged by the contractors, upon whom they call to solicit work.

"Since Mr. Roe's time," and Mr. Roe is evidently the popular man among the flushermen, or somewhat less than four years ago, the flushermen have had to provide their own dresses, and even their own shovels to stir up the deposit. To contractors, the comforts or health of the labouring men must necessarily be a secondary consideration to the realization of a profit. New men can always be found; safe investments cannot.

The wages of the flushermen therefore have been not only decreased, but their expenses increased. A pair of flushing-boots, covering a part of the thigh, similar to those worn by sea-side fishermen, costs 30*s.* as a low price, and a flusherman wears out three pairs in two years. Boot stockings cost 2*s.* 6*d.* The jacket worn by the men at their work in the sewers, in the shape of a pilot-jacket, but fitting less loosely, is 7*s.* 6*d.*; a blue smock, of coarse common cloth (generally), worn over the dress, costs 2*s.* 6*d.*; a shovel is 2*s.* 6*d.* "Ay, sir," said one man, who was greatly dissatisfied with this change, "they 'll make soldiers find their own regimentals next; and, may be, their own guns, a'cause they can always get rucks of men for soldiers or labourers. I know there 's plenty would work for less than we get, but what of that? There always is. There 's hundreds would do the work for half what tne surveyors and inspectors gets; but it 's all right among the nobs."

Nor is the labour of the flushermen at all times so easy or of such circumscribed hours as I have stated it to be in the regular way of flushing. When small branch-sewers have to be flushed, the deposit must first be loosened, or the water, instead of sweeping it away, would flow over it, and in many of these sewers (most frequent in the Tower Hamlets) the height is not more than 3 feet. Some of the flushermen are tall, bulky, strong fellows, and cannot stand upright in less than from 5 feet 8 inches to 6 feet, and in loosening the deposit in low narrow sewers, "we go to work," said one of them, "on our bellies, like frogs, with a rake between our legs. I 've been blinded by steam in such sewers near Whitechapel Church from the brewhouses; I couldn't see for steam; it was a regular London fog. You must get out again into a main sewer on your belly; that 's what makes it harder about the togs, they get worn so."

The division of labour among the flushermen appears to be as follows:—

The *Inspector*, whose duty it is to go round the several sewers and see which require to be flushed.

The *Ganger*, or head of the working gang, who receives his orders from the inspector, and directs the men accordingly.

The *Lock-keeper*, or man who goes round to the sewers which are about to be flushed, and fixes the "penstocks" for retaining the water.

The *Gang*, which consists of from three to four men, who loosen the deposit from the bottom of the sewer. Among these there is generally a "for'ard man," whose duty it is to remove the penstocks.

The ganger gets 1*s.* a week over and above the wages of the men.

TABLE SHOWING THE DISTRICTS UNDER THE MANAGEMENT OF THE COMMISSIONERS OF SEWERS; ALSO THE NUMBER AND SALARIES OF THE CLERKS OF THE WORKS, ASSISTANT CLERKS OF THE WORKS, AND INSPECTORS OF FLUSHING, PAID BY THE COMMISSIONERS, AND THE NUMBER AND WAGES PAID TO THE FLUSHERMEN BY THE GENERAL CONTRACTORS.

	Paid by the Commissioners of Sewers.									Paid by Contractors.				
Districts.	Clerks of Works.		Assist. Clerks of Works *.		Inspectors of Flushings.		Flap & Sluice Keepers.		Aggregate Total.	Gangers.		Flushers.		Aggregate Total.
	No.	Annual Salary of the whole.	No.	Rate of Annual Salary.	No.	Annual Salary of the whole.	No.	Yearly Wages of the whole.		No.	Weekly Wage of each.	No.	Weekly Wage of each.	
		£		£		£		£	£		s.			£ s.
Fulham and Hammersmith.—Counter's Creek and Ranelagh Districts	3	450	4	400	1	120	..	..	970	2	22	13	21	824 4
Westminster Sewers.—Western Division, Eastern Division, Regent-street District, Holborn Division	4	600	3	390	1	80	6	390	1370	3	22	30	21	1809 12
Finsbury Division.—Tower Hamlets Levels, and Poplar and Blackwall Districts	3	450	2	200	3	280	1	70	1000	3	22	27	21	1645 16
Districts south of the Thames	3	450	6	600	4	320	12	374	1744	2	22	22	21	1315 12
Total	13	1950	15	1500	9	800	19	834	5084	10	..	92	..	5595 4
City	..	..	..	..	1	80	3	148	228	1	22	9	21	548 12

Total cost of flushing the sewers . . . . . £12,000 per annum.

* These officers are paid only during the period of service, and are chiefly engaged on special works.

The corresponding officers for London are under the City Commissioners.

** The above division of districts is the one adopted by the Commissioners of Sewers, but the districts of the Flushermen are more numerous than those above given, being as follows:—

	Ganger.		Flushermen.	
Fulham and Hammersmith	employing	1	and 6	1st District of Commissioners.
Counter's Creek and Ranelagh Districts	,,	1	,, 7	
Westminster (Western Division)	,,	1	,, 10	2nd District of Commissioners
Ditto (Eastern Division)	,,	1	,, 12	
Holborn Division	,,	1	,, 8	
Finsbury Division	,,	1	,, 9	3rd District of Commissioners.
Tower Hamlets Levels	,,	1	,, 10	
Poplar and Blackwall	,,	1	,, 8	
Districts south of the Thames	,,	2	,, 22	4th District of Commissioners.
City	,,	1	,, 9	

Holborn and Finsbury districts are under one contractor, and so are the two divisions of Westminster. The same men who flush Holborn flush the Finsbury district also, 17 being the average number employed; but the Finsbury district requires rather more men than the Holborn; and the same men who work on the western division of Westminster flush also the eastern, the number of flushers in the western district being more, on account of its being the larger division.

The inspector receives 80*l.* per annum.

The table on p. 429 shows the number of clerks of the works, inspectors of flushing, flap and sluice keepers, gangers, and flushermen employed in the several districts throughout the metropolis, as well as the salaries and wages of each and the whole.

None of the flushermen can be said to have been "brought up to the business," for boys are never employed in the sewers. Neither had the labourers been confined in their youth to any branch of trade in particular, which would appear to be consonant to such employment. There are now among the flushermen men who have been accustomed to "all sorts of ground work:" tailors, pot-boys, painters, one jeweller (some time ago there was also one gentleman), and shoemakers. "You see, sir," said one informant, "many of such like mechanics can't live above ground, so they tries to get their bread underneath it. There used to be a great many pensioners flushermen, which weren't right," said one man, "when so many honest working men haven't a penny, and don't know which way to turn theirselves; but pensioners have often good friends and good interest. I don't hear any complaints that way now."

Among the flushermen are some ten or twelve men who have been engaged in sewer-work of one kind or another between 20 and 30 years. The cholera, I heard from several quarters, did not (in 1848) attack any of the flushermen. The answer to an inquiry on the subject generally was, "Not one that I know of."

"It is a somewhat singular circumstance," says Mr. Haywood, the City Surveyor, in his Report, dated February, 1850, "*that none of the men employed in the City sewers in flushing and cleansing, have been attacked with, or have died of, cholera during the past year; this was also the case in* 1832–3. I do not state this to prove that the atmosphere of the sewers is not unhealthy—I by no means believe an impure atmosphere is healthy—but I state the naked fact, as it appears to me a somewhat singular circumstance, and leave it to pathologists to argue upon."

"I don't think flushing work disagrees with my husband," said a flusherman's wife to me, "for he eats about as much again at that work as he did at the other." "The smell underground is sometimes very bad," said the man, "but then we generally take a drop of rum first, and something to eat. It wouldn't do to go into it on an empty stomach, 'cause it would get into our inside. But in some sewers there 's scarcely any smell at all. *Most of the men are healthy who are engaged in it; and when the cholera was about many used to ask us how it was we escaped.*"

The following statement contains the history of an individual flusherman:—

"I was brought up to the sea," he said, "and served on board a man-of-war, the *Racer*, a 16-gun brig, laying off Cuba, in the West Indies, and thereaway, watching the slavers. I served seven years. We were paid off in '43 at Portsmouth, and a friend got me into the *shores*. It was a great change from the open sea to a close *shore*—great; and I didn't like it at all at first. But it suits a married man, as I am now, with a family, much better than being a seaman, for a man aboard a ship can hardly do his children justice in their schooling and such like. Well, I didn't much admire going down the man-hole at first—the 'man-hole' is a sort of iron trap-door that you unlock and pull up; it leads to a lot of steps, and so you get into the *shore*—but one soon gets accustomed to anything. I 've been at flushing and *shore* work now since '43, all but eleven weeks, which was before I got engaged.

"We work in gangs from three to five men." [Here I had an account of the process of flushing, such as I have given.] "I 've been carried off my feet sometimes in the flush of a *shore*. Why, to-day," (a very rainy and windy day, Feb. 4,) "it came down Baker-street, when we flushed it, 4 foot plomb. It would have done for a mill-dam. One couldn't smoke or do anything. Oh, yes, we can have a pipe and a chat now and then in the *shore*. The tobacco checks the smell. No, I can't say I felt the smell very bad when I first was in a *shore*. I 've felt it worse since. I 've been made innocent drunk like in a *shore* by a drain from a distiller's. That happened me first in Vine-street *shore*, St. Giles's, from Mr. Rickett's distillery. It came into the *shore* like steam. No, I can't say it tasted like gin when you breathed it—only intoxicating like. It was the same in Whitechapel from Smith's distillery. One night I was forced to leave off there, the steam had such an effect. I was falling on my back, when a mate caught me. The breweries have something of the same effect, but nothing like so strong as the distilleries. It comes into the *shore* from the brewers' places in steam. I 've known such a steam followed by bushels of grains; ay, sir, cart-loads washed into the *shore*.

"Well, I never found anything in a *shore* worth picking up but once a half-crown. That was in the Buckingham Palace sewer. Another time I found 16*s.* 6*d.*, and thought that *was* a haul; but every bit of it, every coin, shillings and sixpences and joeys, was bad—all smashers. Yes, of course it was a disappointment, naturally so. That happened in Brick-lane *shore*, Whitechapel. O, somebody or other had got frightened, I suppose, and had shied the coins down into the drains. I found them just by the chapel there."

A second man gave me the following account of his experience in flushing:—

"You remember, sir, that great storm on the 1st August, 1848. I was in three *shores* that fell in—Conduit-street and Foubert's-passage, Regent-street. There was then a risk of being drowned in the *shores*, but no lives were lost. All the house-drains were blocked about Carnaby-market—that 's the Foubert's-passage *shore*—and the poor people was what you might call houseless. We got in up to the neck in water in some places, 'cause we had to stoop, and knocked about the rubbish as well as we could, to give a way to the water. The police put up barriers to prevent any carts or carriages going that way along the streets. No, there was no lives lost in the *shores*. One man was so overcome that he was falling off into a sort of sleep in Milford-lane *shore*, but was pulled out. I helped to pull him. He was as heavy as lead with one thing or other—wet, and all that. Another time, six or seven year ago, Whitechapel High-street *shore* was almost choked with butchers' offal, and we had a great deal of trouble with it."

Of the Rats in the Sewers.

I will now state what I have learned from long-experienced men, as to the characteristics of the rats in the sewers. To arrive even at a conjecture as to the numbers of these creatures—now, as it were, the population of the sewers—I found impossible, for no statistical observations have been made on the subject; but all my informants agreed that the number of the animals had been greatly diminished within these four or five years.

In the better-constructed sewers there are no rats. In the old sewers they abound. The sewer rat is the ordinary house or brown rat, excepting at the outlets near the river, and here the water-rat is seen.

The sewer-rat is the common brown or Hanoverian rat, said by the Jacobites to have come in with the first George, and established itself after the fashion of his royal family; and undoubtedly such was about the era of their appearance. One man, who had worked twelve years in the sewers before flushing was general, told me he had never seen but *two* black (or old English) rats; another man, of ten years' experience, had seen but one; others had noted no difference in the rats. I may observe that in my inquiries as to the sale of rats (as a part of the live animals dealt in by a class in the metropolis), I ascertained that in the older granaries, where there were series of floors, there were black as well as brown rats. "Great black fellows," said one man who managed a Bermondsey granary, "as would frighten a lady into asterisks to see of a sudden."

The rat is the only animal found in the sewers. I met with no flusherman or other sewer-worker who had ever seen a lizard, toad, or frog there, although the existence of these creatures, in such circumstances, has been presumed. A few live cats find their way into the subterranean channels when a house-drain is being built, or is opened for repairs, or for any purpose, and have been seen by the flushermen, &c., wandering about, looking lost, mewing as if in misery, and avoiding any contact with the sewage. The rats also—for they are not of the water-rat breed—are exceedingly averse to wetting their feet, and "take to the sewage," as it was worded to me, only in prospect of danger; that is, they then swim across or along the current to escape with their lives. It is said that when a luckless cat has ventured into the sewers, she is sometimes literally worried by the rats. I could not hear of such an attack having been witnessed by any one; but one intelligent and trustworthy man said, that a few years back (he believed about eight years) he had in one week found the skeletons of two cats in a particular part of an old sewer, 21 feet wide, and in the drains opening into it were perfect colonies of rats, raging with hunger, he had no doubt, because a system of trapping, newly resorted to, had prevented their usual ingress into the houses up the drains. A portion of their fur adhered to the two cats, but the flesh had been eaten from their bones. About that time a troop of rats flew at the feet of another of my informants, and would no doubt have maimed him seriously, "but my boots," said he, "stopped the devils." "The sewers generally swarms with rats," said another man. "I runs away from 'em; I don't like 'em. They in general gets away from us; but in case we comes to a stunt end where there 's a wall and no place for 'em to get away, and we goes to touch 'em, they fly at us. They 're some of 'em as big as good-sized kittens. One of our men caught hold of one the other day by the tail, and he found it trying to release itself, and the tail slipping through his fingers; so he put up his left hand to stop it, and the rat caught hold of his finger, and the man 's got an arm now as big as his thigh." I heard from several that there had been occasionally battles among the rats, one with another.

"Why, sir," said one flusherman, "as to the number of rats, it ain't possible to say. There hasn't been a census (laughing) taken of them. But I can tell you this—I was one of the first flushermen when flushing came in general—I think it was before Christmas, 1847, under Mr. Roe—and there was cart-loads and cart-loads of drowned rats carried into the Thames. It was in a West Strand *shore* that I saw the most. I don't exactly remember which, but I think Northumberland-street. By a block or a hitch of some sort, there was, I should say, just a bushel of drowned rats stopped at the corner of one of the gates, which I swept into the next stream. I see far fewer drowned rats now than before the *shores* was flushed. They 're not so plenty, that 's one thing. Perhaps, too, they may have got to understand about flushing, they 're that 'cute, and manage to keep out of the way. About Newgate-market was at one time the worst for rats. Men couldn't venture into the sewers then, on account of the varmint. It 's bad enough still, I hear, but I haven't worked in the City for a few years."

The rats, from the best information at my command, do not derive much of their sustenance from the matter in the sewers, or only in particular localities. These localities are the sewers neighbouring a connected series of slaughter-houses, as in Newgate-market, Whitechapel, Clare-market, parts adjoining Smithfield-market, &c. There, animal offal being (and having been to a much greater extent five or six years ago) swept into the drains and sewers, the rats find their food. In the sewers, generally, there is little food for them, and none at all in the best-constructed sewers, where there is a regular and sometimes rapid flow, and little or no deposit.

The sewers are these animals' breeding grounds. In them the broods are usually safe from the molestation of men, dogs, or cats. These "breeding grounds" are sometimes in the holes (excavated by

the industry of the rats into caves) which have been formed in the old sewers by a crumbled brick having fallen out. Their nests, however, are in some parts even more frequent in places where old rotting large house-drains or smaller sewers, empty themselves into a first-class sewer. Here, then, the rats breed, and, in spite of precautions, find their way up the drains or pipes, even through the openings into water-closets, into the houses for their food, and almost always at night. Of this fact, builders, and those best informed, are confident, and it is proved indirectly by what I have stated as to the deficiency of food for a voracious creature in all the sewers except a few. One man, long in the service of the Commissioners of Sewers, and in different capacities, gave me the following account of what may be called a rat settlement. The statement I found confirmed by other working men, and by superior officers under the same employment.

"Why, sir, in the Milford-lane sewer, a goodish bit before you get to the river, or to the Strand —I can't say how far, a few hundred yards perhaps—I've seen, and reported, what was a regular chamber of rats. If a brick didn't fall out from being rotted, the rats would get it out, and send it among other rubbish into the sewer, for this place was just the corner of a big drain. I couldn't get into the rat-hole, of course not, but I've brought my lamp to the opening, and—as well as others—have seen it plain. It was an open place like a lot of tunnels, one over another. Like a lot of rabbit burrows in the country—as I've known to be—or like the partitions in the pigeon-houses: one here and another there. The rat-holes, as far as I could tell, were worked one after another. I should say, in moderation, that it was the size of a small room; well, say about 6 yards by 4. I can't say about the height from the lowest tunnel to the highest. I don't see that any one could. Bless you, sir, I've sometimes heerd the rats fighting and squeaking there, like a parcel of drunken Irishmen—I have indeed. Some of them were rare big fellows. If you threw the light of your lamp on them sudden, they'd be off like a shot. Well, I should say, there was 100 pair of rats there—there might be more, besides all their young-uns. If a poor cat strayed into that sewer, she dursn't tackle the rats, not she. There's lots of such places, sir, here, and there, and everywhere."

"I believe rats," says a late enthusiastic writer on the subject, under the cognomen of Uncle James, "to be one of the most fertile causes of national and universal distress, and their attendants, misery and starvation."

From the author's inquiries among practical men, and from his own study of the natural history of the rat, he shows that these animals will have six, seven, or eight nests of young in the year, for three or four years together; that they have from twelve to twenty-three at a litter, and breed at three months old; and that there are more female than male rats, by ten to six.

The author seems somewhat of an enthusiast about rats, and as the sewerage is often the headquarters of these animals—their "breeding-ground" indeed—I extract the following curious matter. He says:—

"Now, I propose to lay down my calculations at something less than one-half. In the first place, I say four litters in the year, beginning and ending with a litter, so making thirteen litters in three years; secondly to have eight young ones at a birth, half male and half female; thirdly, the young ones to have a litter at six months old.

"At this calculation, I will take one pair of rats; and at the expiration of three years what do you suppose will be the amount of living rats? Why no less a number than 646,808.

"Mr. Shaw's little dog 'Tiny,' under six pounds weight, has destroyed 2525 pairs of rats, which, had they been permitted to live, would, at the same calculation and in the same time, have produced 1,633,190,200 living rats!

"And the rats destroyed by Messrs. Shaw and Sabin in one year, amounting to 17,000 pairs, would, had they been permitted to live, have produced, at the above calculation and in the same time, no less a number than 10,995,736,000 living rats!

"Now, let us calculate the amount of human food that these rats would destroy. In the first place, my informants tell me that six rats will consume day by day as much food as a man; secondly, that the thing has been tested, and that the estimate given was, that eight rats would consume more than an ordinary man.

"Now, I—to place the thing beyond the smallest shadow of a doubt—will set down ten rats to eat as much as a man, not a child; nor will I say anything about what rats waste. And what shall we find to be the alarming result? Why, that the first pair of rats, with their three years' progeny, would consume in the night more food than 64,680 men the year round, and leaving eight rats to spare!"

The author then puts forth the following curious statement:—

"And now for the vermin destroyed by Messrs. Shaw and Sabin—34,000 yearly! Taken at the same calculation, with their three years' progeny—can you believe it?—they would consume more food than the whole population of the earth! Yes, if Omnipotence would raise up 29,573,600 more people, these rats would consume as much food as them all! You may wonder, but I will prove it to you:—The population of the earth, including men, women, and children, is estimated to be 970,000,000 souls; and the 17,000 rats in three years would produce 10,995,736,000: consequently, at ten rats per man, there would be sufficient rats to eat as much food as all the people on the earth, and leaving 1,295,736,000. So that if the human family were increased to 1,099,573,600, instead of 970,000,000, there would be rats enough to eat the food of them all! Now, sirs, is not this a most appalling thing, to think that there are at the present time in the British Empire thousands—nay, millions—of human beings in a state of utter starvation, while rats are consuming that which would place them and their families in a state of affluence and comfort? I ask this simple question: Has not Parliament, ere now, been summoned upon matters of far less importance to the empire? I think it has."

The author then advocates the repeal of the "rat-tax," that is, the tax on what he calls the "true friend of man and remorseless destroyer of rats," the well-bred terrier dog. "Take the tax off rat-killing dogs" he says, "and give a legality to rat-killing, and let there be in each parish a man who will pay a reward per head for dead rats, which are valuable for manure (as was done in the case of wolves in the old days), and then rats would be extinguished for ever!" Uncle James seems to be a perfect Malthus among rats. The over-population and over-rat theories are about equal in reason.

Of the Cesspoolage and Nightmen of the Metropolis.

I have already shown—it may be necessary to remind the reader—that there are two modes of removing the wet refuse of the metropolis: the one by carrying it off by means of sewers, or, as it is designated, *sewerage;* and the other by depositing it in some neighbouring cesspool, or what is termed *cesspoolage*.

The object of sewerage is "to transport the wet refuse of a town to a river, or some powerfully current stream, by a series of ducts." By the system of cesspoolage, the wet refuse of the household is collected in an adjacent tank, and when the reservoir is full, the contents are removed to some other part.

The gross quantity of wet refuse annually produced in the metropolis, and which consequently has to be removed by one or other of the above means, is, as we have seen,—liquid, 24,000,000,000 gallons; solid, 100,000 tons; or altogether, by admeasurement, 3,820,000,000 cubic feet.

The quantity of this wet refuse which finds its way into the sewers by street and house-drainage is, according to the experiments of the Commissioners of Sewers (as detailed at p. 388), 10,000,000 cubic feet per day, or 3,650,000,000 cubic feet per annum, so that there remain about 170,000,000 cubic feet to be accounted for. But, as we have before seen, the extent of surface from which the amount of so-called *Metropolitan* sewage was *removed* was only 58 square miles, whereas that from which the calculation was made concerning the gross quantity of wet refuse *produced* throughout the metropolis was 115 square miles, or double the size. The 58 miles measured by the Commissioners, however, was by far the denser moiety of the town, and that in which the houses and streets were as 15 to 1; so that, allowing the remaining 58 miles of the suburban districts to have produced 20 times less sewage than the urban half of the metropolis, the extra yield would have been about 180,500,000 cubic feet. But the greater proportion, if not the whole, of the latter quantity of wet house-refuse would be drained into open ditches, where a considerable amount of evaporation and absorption is continually going on, so that a large allowance must be made for loss by these means. Perhaps, if we estimate the quantity of sewage thus absorbed and evaporated at between 10 and 20 per cent of the whole, we shall not be wide of the truth, so that we shall have to reduce the 182,000,000 cubic feet of suburban sewage to somewhere about 150,000,000 cubic feet.

This gives us the quantity of wet refuse carried off by the sewers (covered and open) of the metropolis, and deducted from the gross quantity of wet house-refuse, annually *produced* (3,820,000,000 cubic feet), leaves 20,000,000 cubic feet for the gross quantity carried off by other means than the sewers; that is to say, the 20,000,000 cubic feet, if the calculation be right, should be about the quantity deposited every year in the London cesspools. Let us see whether this approximates to anything like the real quantity.

To ascertain the absolute quantity of wet refuse annually conveyed into the metropolitan cesspools, we must first ascertain the number and capacity of the cesspools themselves.

Of the city of London, where the sewer-cesspool details are given with a minuteness highly commendable, as affording statistical data of great value, Mr. Heywood gives us the following returns:—

"House-Drainage of the City.

"The total number of premises drained during the year was . .	310
"The approximate number of premises drained at the expiration of the year 1850 was	10,923
"The total number of premises which may now therefore be said to be drained is	11,233
"And undrained	5,067

"I am induced," adds Mr. Heywood, "to believe, from the reports of the district inspectors, that a very far larger number of houses are already drained than are herein given. Indeed my impression is, that as many as 3000 might be deducted from the 5067 houses as to the drainage of which you have no information.

"Now, until the inspectors have completed their survey of the whole of the houses within the city," continues the City surveyor, "precise information cannot be given as to the number of houses yet undrained; such information appears to me very important to obtain speedily, and I beg to recommend that instructions be given to the inspectors to proceed with their survey as rapidly as possible."

Hence it appears, that out of the 16,299 houses comprised within the boundaries of the City, rather less than one-third are *reported* to

have cesspools. Concerning the number of cesspools without the City, the Board of Health, in a Report on the cholera in 1849, put forward one of its usual *extraordinary* statements.

"At the last census in 1841," runs the Report, "there were 270,859 houses in the metropolis. *It is* KNOWN *that there is scarcely a house without a cesspool under it, and that a large number have two, three, four, and* MORE *under them;* so that the number of such receptacles in the metropolis may be taken at 300,000. The exposed surface of each cesspool measures on an average 9 feet, and the mean depth of the whole is about 6½ feet; so that each contains 58½ cubic feet of fermenting filth of the most poisonous, noisome, and disgusting nature. The exhaling surface of all the cesspools (300,000 × 9) = 2,700,000 feet, or equal to 62 acres nearly; and the total quantity of foul matter contained within them (300,000 × 58½) = 17,550,000 cubic feet; or equal to one enormous elongated stagnant cesspool 50 feet in width, 6 feet 6 inches in depth, and extending through London from the Broadway at Hammersmith to Bow-bridge, a length of 10 miles.

"This," say the Metropolitan Sanitary Commissioners, a body of functionaries so intimately connected with the Board, that the one is ever ready to swear to what the other asserts, "there is reason to believe is an *under estimate!*"

Let us now compare this statement, which declares it to be *known* that there is scarcely a house in London without a cesspool, and that many have two, three, four, and even more under them—let us compare this, I say, with the facts which were elicited by the same functionaries by means of a house-to-house inquiry in three different parishes—a poor, a middle-class, and a rich one—the average rental of each being 22*l*., 119*l*., and 128*l*.

RESULTS OF A HOUSE-TO-HOUSE INQUIRY IN THE PARISHES OF ST. GEORGE THE MARTYR, SOUTHWARK, ST. ANNE'S, SOHO, AND ST. JAMES'S, AS TO THE STATE OF THE WORKS OF WATER SUPPLY AND DRAINAGE.

CONDITION OF THE HOUSES.		PARISHES. St. George the Martyr, Southwark.	St. Anne's, Soho.	St. James's.
From which replies have been received	(Number)	5,713	1,339	2,960
With supply of Water—				
To the house or premises	(Per cent)	80·97	95·56	96·48
Near the privy	"	48·87	38·99	43·42
Butts or cisterns, covered	(Number)	1,879	776	1,621
" " uncovered	"	2,074	294	393
With a sink	(Per cent)	48·31	89·29	86·70
With a Well—				
On or near premises	"	5·32	13·97	13·85
Well tainted or foul	"	46·92	3·71	7·36
Houses damp in lower parts	"	52·13	30·90	26·67
Houses with stagnant water on premises	"	18·54	7·95	2·95
Houses flooded in times of storm	"	18·15	5·04	4·05
Houses with Drain—				
To premises	"	87·56	97·12	96·42
Houses with drains emitting offensive smells	"	45·11	37·62	21·41
Houses with drains stopped at times	"	22·37	28·50	13·97
Houses with dust-bin	"	42·69	92·34	89·80
Houses receiving offensive smells from adjoining premises	"	27·82	22·54	16·74
Houses with privy	"	97·03	70·63	62·53
Houses with cesspool	"	82·12	47·27	36·62
Houses with water-closet	"	10·06	45·99	65·56

In this minute and searching investigation there is not only an official guide to an estimation of the number of cesspools in London, but a curious indication of the character of the houses in the respective parishes. In the poorer parish of St. George the Martyr, Southwark, the cesspools were to every 100 houses as 82·12; in the aristocratic parish of St. James, Westminster, as only 36·62; while in what may be represented, perhaps, as the middle-class parish of St. Anne, Soho, the cesspools were 47·27 per cent. The number of wells on or near the premises, and the proportion of those tainted; the ratio of the dampness of the lower parts of the houses, of the stagnant water on the premises, and of the flooding of the houses on occasions of storms, are all significant indications of the difference in the circumstances of the inhabitants of these parishes—of the difference between the abodes of the rich and the poor, the capitalists and the labouring classes. But more significant still, perhaps, of the domestic wants or comforts of these dwellings, is the proportion of water-closets to the houses in the poor parish and the rich; in the one they were but 10·06 per cent; in the other 65·86 per cent.

These returns are sufficient to show the extravagance of the Board's previous statement, that there is "scarcely a house in London without a cesspool under it," while "a large number have two, three, four, and more," for we find that even in the poorer parishes there are only 82 cesspools to 100 houses. Moreover, the engineers, after an official examination and inquiry, reported that in the "fever-nest, known as Jacob's-island, Bermondsey," there were 1317 dwelling-houses and 648 cesspools, or not quite 50 cesspools to 100 houses.

In rich, middle-class, and poor parishes, the proportion of cesspools, then, it appears from the *inquiries* of the Board of Health (their *guesses* are of no earthly value), gives us an average of something between 50 or 60 cesspools to every 100 houses. A subordinate officer whom I saw, and who was engaged in the cleansing and the filling-up of cesspools when condemned, or when the houses are to be drained anew into the sewers and the cesspools abolished, thought from his own experience, the number of cesspools to be less than one-half, but others thought it more.

On the other hand, a nightman told me he was confident that every two houses in three throughout London had cesspools; in the City, however, we perceive that there is, at the utmost, only one house in every three undrained. It will, therefore, be safest to adopt a middle course, and assume 50 per cent of the houses of the metropolis to be still without drainage into the sewers.

Now the number of houses being 300,000, it follows that the number of cesspools within the area of the metropolis are about 150,000; consequently the next step in the investigation is to ascertain the average capacity of each, and so arrive at the gross quantity of wet house-refuse annually deposited in cesspools throughout London.

The average size of the cesspools throughout the metropolis is said, by the Board of Health, to be 9 feet by 6½, which gives a capacity of 58½ cubic feet, and this for 150,000 houses = 8,775,000 cubic feet. But according to all accounts these cesspools require on an average two years to fill, so that the gross quantity of wet refuse annually deposited in such places can be taken at only half the above quantity, viz. in round numbers, 4,500,000 cubic feet. This by weight, at the rate of 35·9 cubic feet to the ton, gives 125,345 tons. This, however, would appear to be of a piece with the generality of the statistics of the Board of Health, and as wide of the truth as was the statement that there was scarcely a house in London without a cesspool, while many had *three, four, and even more.* But I am credibly informed that the average size of a cesspool is rather more than 5 feet square and 6½ deep, so that the ordinary capacity would be 5¾ × 5¼ × 6½ = 197 cubic feet, and this multiplied by 150,000 gives an aggregate capacity of 29,550,000 cubit feet. But as the cesspools, according to all accounts, become full only once in two years, it follows that the gross quantity of cesspoolage annually deposited throughout the metropolis must be only one-half that quantity, or about 14,775,000 cubic feet.

The calculation may be made another way, viz. by the experience of the nightmen and the sewer-cesspoolmen as to the average quantity of refuse removed from the London cesspools whenever emptied, as well as the average number emptied yearly.

The contents of a cesspool are never estimated for any purpose of sale or labour by the weight, but always, as regards the nightmen's work, by the load. Each night-cart load of soil is considered, on an average, a ton in weight, so that the nightmen readily estimate the number of tons by the number of cart-loads obtained. The men employed in the cleansing of the cesspools by the new system of pumping agree with the nightmen as to the average contents of a cesspool.

As a general rule, a cesspool is filled every two years, and holds, when full, about five tons. One man, who had been upwards of 30 years in the nightman's business, who had worked at it more or less all that time himself, and who is now foreman to a parish contractor and master-nightman in a large way, spoke positively on the subject. The cesspools, he declared, were emptied, as an average, by nightmen, once in two years, and their average contents were five loads of night-soil, it having been always understood in the trade that a night-cartload was about a ton.* The total of the cesspool matter is not affected by the frequency or paucity of the cleansing away of the filth, for if one cesspool be emptied yearly, another is emptied every second, third, fourth, or fifth year, and, according to the size, the fair average is five tons of cesspoolage emptied from each every other year. One master-nightman had emptied as much as

* In one of their Reports the Board of Health has spoken of the yearly cleansing of the cesspools; but a cesspool, I am assured, is rarely emptied by manual labour, unless it be full, for as the process is generally regarded as a nuisance, it is resorted to as seldom as possible. It may, perhaps, be different with the cesspool-emptying by the hydraulic process, which is *not* a nuisance.

fourteen tons of night-soil from a cesspool or soil-tank, and a contractor's man had once emptied as many as eighteen tons, but both agreed as to the average of five tons every two years from all. Neither knew the period of the accumulation of the fourteen or the eighteen tons, but supposed to be about five or six years.

According to this mode of estimate, the quantity of wet house-refuse deposited in cesspools would be equal to 150,000 × 5, or 750,000 tons every two years. This, by admeasurement, at the rate of 35·9 cubic feet to the ton, gives 26,925,000 cubic feet; and as this is the accumulation of two years, it follows that 13,462,500 cubic feet is the quantity of cesspoolage deposited yearly.

There is still another mode of checking this estimate.

I have already given (see p. 385, *ante*) the average production of each individual to the wet refuse of the metropolis. According to the experiments of Boussingault, confirmed by Liebig, this, as I have stated, amounted to ¼ lb. of solid and 1¼ lb. of liquid excrement from each individual per diem (= 150 lbs. for every 100 persons), while, including the wet refuse from culinary operations, the average yield, according to the surveyor of the Commissioners of Sewers, was equal to about 250 lbs. for every 100 individuals daily. I may add that this calculation was made officially, with engineering minuteness, with a view to ascertain what quantity of water, and what inclination in its flow, would be required for the effective working of a system of drainage to supersede the cesspools.* Now the census of 1841 shows us that the average number of inhabitants to each house throughout the metropolis was 7·6, and this for 150,000 houses would give 1,140,000 people; consequently the gross quantity of wet refuse proceeding from this number of persons, at the rate of 250 lbs. to every 100 people daily, would be 464,400 tons per annum; or, by admeasurement, at the rate of 35·9 cubic feet to the ton, it would be equal to 16,670,950 cubic feet.

A small proportion of this amount of cesspoolage ultimately makes its appearance in the sewers, being pumped into them directly from the cesspools when full by means of a special apparatus, and thus tends not only to swell the bulk of sewage, but to decrease in a like proportion the aggregate quantity of wet house-refuse, which is removed by cartage; but though the proportion of cesspoolage which finally appears as sewage is daily increasing, still it is but trifling compared with the quantity removed by cartage.

Here, then, we have three different estimates as to the gross quantity of the London cesspoolage, each slightly varying from the other two.

	Cubic Feet.
The first, drawn from the average capacity of the London cesspools, makes the gross annual amount of cesspoolage	14,775,000
The second, deduced from the average quantity removed from each cesspool . .	13,462,500
And the third, calculated from the individual production of wet refuse . . .	16,670,950

The mean of these three results is, in round numbers, 15,000,000 cubic feet, so that the statement would stand thus:—

The quantity of wet house-refuse annually carried off by sewers (chiefly covered) from the urban moiety of the metropolis is (in cubic feet) . .	3,650,000,000
The quantity annually carried off by sewers (principally open) from the suburban moiety of the metropolis . .	150,000,000
The total amount of wet house-refuse annually carried off by the sewers of the metropolis	3,800,000,000
The gross amount of wet house-refuse annually deposited in cesspools throughout the metropolis . . .	15,000,000
The total amount of sewage and cesspoolage of the metropolis	3,815,000,000

Thus we perceive that the total quantity of wet house-refuse annually *removed*, corresponds so closely with the gross quantity of wet house-refuse annually *produced*, that we may briefly conclude the gross sewage of London to be equal to 3,800,000,000 cubic feet, and the gross cesspoolage to be equal to 15,000,000 cubic feet.

The accuracy of the above conclusion may be tested by another process; for, unless the Board of Health's conjectural mode of getting at *facts* be adopted, it is absolutely necessary that statistics not only upon this, but indeed any subject, be checked by all the different modes there may be of arriving at the same conclusion. False facts are worse than no facts at all.

The number of nightmen may be summed up as follows:—

Masters	521
Labourers	200,000

The number of cesspools emptied during the past year by these men may be estimated at 50,692; and the quantity of soil removed, 253,460 loads, or tons, and this at the rate of 35.9 cubic ft. to the ton gives a total of 6,099,214 cubic ft.

It might, perhaps, be expected, that from the quantity of fæcal refuse proceeding from the inhabitants of the metropolis, a greater quantity would be found in the existent cesspools; but there are many reasons for the contrary.

* It was ascertained that 3 gallons (half a cubic foot) of water would carry off 1 lb. of the more solid excrementitious matter through a 6-inch pipe, with an inclination of 1 in 10.

One prime cause of the dispersion of cesspoolage is, that a considerable quantity of the night-soil does not find its way into the cesspools at all, but is, when the inhabitants have no privies to their dwellings, thrown into streets, and courts, and waste places.

I cannot show this better than by a few extracts from Dr. Hector Gavin's work, published in 1848, entitled, "Sanitary Ramblings; being Sketches and Illustrations of Bethnal Green, &c."

"*Digby-walk, Globe-road.*—Part of this place is private property, and the landlord of the new houses has built a cesspool, into which to drain his houses, but he will not permit the other houses to drain into this cesspool, unless the parish pay to him 1*l.*, a sum which it will not pay." Of course the inhabitants throw their garbage and filth into the street or the by-places.

"*Whisker's-gardens.*—This is a very extensive piece of ground, which is laid out in neat plots, as gardens. The choicest flowers are frequently raised here, and great taste and considerable refinement are evidently possessed by those who cultivate them. Now, among the cultivators are the poor, even the very poor, of Bethnal-green. . . . . Attached to all these little plots of ground are summer-houses. In the generality of cases they are mere wooden sheds, cabins, or huts. It is very greatly to be regretted that the proprietors of these gardens should permit the slight and fragile sheds in them to be converted into abodes for human beings. . . . Sometimes they are divided into rooms; they are planted on the damp undrained ground. The privies are sheds erected over holes in the ground; the *soil itself* is removed from these holes and is *dug into the ground* to promote its fertility.

"*Three Colt-lane.*—A deep ditch has been dug on either side of the Eastern Counties Railway by the Company. These ditches were dug by the Company to prevent the foundations of the arches being endangered, and are in no way to be considered as having been dug to promote the health of the neighbourhood. The double privies attached to the new houses (22 in number) are immediately contiguous to this ditch, and are constructed so that the night-soil shall drain into it. For this purpose the cesspools are small, and the bottoms are above the level of the ditch."

It would be easy to multiply such proofs of night-soil not finding its way into the cesspools, but the subject need not be further pursued, important as in many respects it may be. I need but say, that in the several reports of the Board of Health are similar accounts of other localities. The same deficiency of cesspoolage is found in Paris, and from the same cause.

What may be the quantity of night-soil which becomes part of the contents of the street scavenger's instead of the nightman's cart, no steps have been taken, or perhaps can be taken, by the public sanitary bodies to ascertain. Many of the worst of the nuisances (such as that in Digby-street) have been abolished, but they are still too characteristic of the very poor districts. The fault, however, appears to be with the owners of property, and it is seldom *they* are coerced into doing their duty. The doubt of its "paying" a capitalist landlord to improve the unwholesome dwellings of the poor seems to be regarded as a far more sacred right, than the right of the people to be delivered from the foul air and vile stenches to which their poverty may condemn them.

There is, moreover, the great but unascertained waste from cesspool evaporation, and it must be recollected that of the 2½lbs. of cesspool refuse, calculated as the daily produce of each individual, 2¼lbs. are liquid.

The gross cesspoolage of Paris should amount to upwards of 600,000 cubic mètres, or more than 21,000,000 cubic feet, at the estimate of three pints daily per head. The quantity actually collected, however, amounts to only 230,000 cubic mètres, or rather more than 8,000,000 cubic feet, which is 13,000,000 cubic feet less than the amount produced.

In London, the cesspoolage of 150,000 *undrained* houses should, at the rate of 2½lbs. to each individual and 15 inhabitants to every two houses, amount to 16,500,000 cubic feet, or about 460,000 loads, whereas the quantity collected amounts to but little more than 250,000 loads, or about 9,000,000 cubic feet. Hence, the deficiency is 210,000 loads, or 7,500,000 cubic feet, which is nearly half of the entire quantity.

In Paris, then, it would appear that only 38 per cent of the refuse which is not removed by sewers is collected in the cesspools, whereas in London about 54½ per cent is so collected. The remainder in both cases is part deposited in by-places and removed by the scavenger's cart, part lost in evaporation, whereas a large proportion of the deficiency arises from a less quantity of water than the amount stated being used by the very poor.

We have now to see the means by which this 15,000,000 cubic feet of cesspoolage is annually removed, as well as to ascertain the condition and incomes of the labourers engaged in the removal of it.

Of the Cesspool System of London.

A CESSPOOL, or some equivalent contrivance, has long existed in connexion with the structure of the better class of houses in the metropolis, and there seems every reason to believe—though I am assured, on good authority, that there is no public or official record of the matter known to exist—that their use became more and more general, as in the case of the sewers, after the rebuilding of the City, consequent upon the great fire of 1665.

The older cesspools were of two kinds—"soil-tanks" and "bog-holes."

"Soil-tanks" were the filth receptacles of

the larger houses, and sometimes works of solid masonry; they were almost every size and depth, but always perhaps much deeper than the modern cesspools, which present an average depth of 6 feet to 6½ feet.

The "bog-hole" was, and is, a cavity dug into the earth, having less masonry than the soil-tank, and sometimes no masonry at all, being in like manner the receptacle for the wet refuse from the house.

The difference between these old contrivances and the present mode is principally in the following respect: the soil-tank or bog-hole formed a receptacle immediately under the privy (the floor of which has usually to be removed for purposes of cleansing), whereas the refuse is now more frequently carried into the modern cesspool by a system of drainage. Sometimes the soil-tank was, when the nature of the situation of the premises permitted, in some outer place, such as an obscure part of the garden or court-yard; and perhaps two or more bog-holes were drained into it, while often enough, by means of a grate or a trap-door, any kind of refuse to be got rid of was thrown into it.

I am informed that the average contents of a bog-hole (such as now exist) are a cubic yard of matter; some are round, some oblong, for there is, or was, great variation.

Of the few remaining soil-tanks the varying sizes prevent any average being computable.

What the old system of cesspoolage *was* may be judged from the fact, that until somewhere about 1830 no cesspool matter could, without an indictable offence being committed, be drained into a sewer! *Now*, no new house can be erected, but it is an indictable offence if the cesspool (or rather water-closet) matter be drained anywhere else than into the sewer! The law, at the period specified, required most strangely, so that "the drains and sewers might not be choked," that cesspools should "be not only periodically emptied, but *made* by nightmen."

The principal means of effecting the change from cesspoolage to sewerage was the introduction of Bramah's water-closets, patented in 1808, but not brought into general use for some twenty years or more after that date. The houses of the rich, owing to the refuse being drained away from the premises, improved both in wholesomeness and agreeableness, and so the law was relaxed.

There are two kinds of cesspools, viz. *public* and *private*.

The *public cesspools* are those situated in courts, alleys, and places, which, though often packed thickly with inhabitants, are not horse-thoroughfares, or thoroughfares at all; and in such places one, two, or more cesspools receive the refuse from all the houses. I do not know that any official account of public cesspools has been published as to their number, character, &c., but their number is insignificant when compared with those connected with private houses. The public cesspools are cleansed, and, where possible, filled up by order of the Commissioners of Sewers, the cost being then defrayed out of the rate.

The *private cesspools* are cleansed at the expense of the occupiers of the houses.

Of the Cesspool and Sewer System of Paris.

As the Court of Sewers have recently adopted some of the French regulations concerning cesspoolage, I will now give an account of the cesspool system of France.

When after the ravages of the epidemic cholera of 1848–9, sanitary commissioners under the authority of the legislature pursued their inquiries, it was deemed essential to report upon the cesspool system of Paris, as that capital had also been ravaged by the epidemic. The task was entrusted to Mr. T. W. Rammell, C.E.

Even in what the French delight to designate —and in some respects justly—the most refined city in the world, a filthy and indolent custom, once common, as I have shown, in England, still prevails. In Paris, the kitchen and *dry* house-refuse (and formerly it was the fæcal refuse also) is deposited in the dark of the night in the streets, and removed, as soon as the morning light permits, by the public scavengers. But the refuse is not removed unexamined before being thrown into the cart of the proper functionary. There is in Paris a large and peculiar class, the chiffonniers (literally, in Anglo-Saxon rendering, the *raggers*, or rag-finders). These men nightly traverse the streets, each provided with a lantern, and generally with a basket strapped to the back; the poorer sort, however—for poverty, like rank, has its gradations—make a bag answer the purpose; they have also a pole with an iron hook to its end; and a small shovel. The dirt-heaps or mounds of dry house-refuse are carefully turned over by these men; for their morrow's bread, as in the case of our own street-finders, depends upon *something* saleable being acquired. Their prizes are bones (which sometimes they are seen to gnaw); bits of bread; wasted potatoes; broken pots, bottles, and glass; old pans and odd pieces of old metal; cigar-ends; waste-paper, and rags. Although these people are known as rag-pickers, rags are, perhaps, the very thing of which they pick the least, because the Parisians are least apt to throw them away. In some of the criminal trials in the French capital, the chiffonniers have given evidence (but not much of late) of what they have found in a certain locality, and supplied a link, sometimes an important one, to the evidence against a criminal. With these refuse heaps is still sometimes mixed matter which should have found its way into the cesspools, although this is an offence punishable, and occasionally punished.

Before the habits of the Parisians are too freely condemned, let it be borne in mind that the houses of the French capital are much larger than in London, and that each floor is often the dwelling-place of a family. Such is generally the case in London in the poorer districts, but in Paris it pervades almost all districts. There, some of the houses contain 70, not fugitive but permanent, inmates. The average number of inhabitants to each house, according to the last census, was upwards of *twenty-four* (in London the average is 7·6), the extremes being eleven to each house in St. Giles's and between five and six in the immediate suburbs (see p. 165, *ante*). Persons who are circumstanced then, as are the Parisians, can hardly have at their command the proper means and appliances for a sufficient cleanliness, and for the promotion of what we consider—but the two words are unknown to the French language—the *comforts* of a *home*.

"The greater portion of the liquid refuse," writes Mr. Rammell, "including water, which has been used in culinary or cleansing processes, is got rid of by means of open channels laid across the court-yards and the foot pavements to the street gutters, along which it flows until it falls through the nearest gully into the sewers, and ultimately into the Seine. If produced in the upper part of a house, this description of refuse is first poured into an external shoot branching out of the rainwater pipe, with one of which every floor is usually provided. Iron pipes have been lately much introduced in place of the open channels across the foot pavements; these are laid level with the surface, and are cast with an open slit, about one inch in width, at the top, to afford facility for cleansing. During the busy parts of the day there are constant streams of such fluids running through most of the streets of Paris, the smell arising from which is by no means agreeable. In hot weather it is the practice to turn on the public stand pipes for an hour or two, to dilute the matter and accelerate its flow."

"With respect to fæcal refuse," says Mr. Rammell, "and much of the house-slops, particularly those of bed-chambers, the *cesspool* is universally adopted in Paris as the immediate receptacle."

By far the greater proportion of the wet house-refuse of Paris, therefore, is deposited in cesspools.

I shall, then, immediately proceed to show the quantity of matter thus collected yearly, as well as the means by which it is removed.

The aggregate *quantity* of the cesspool matter of Paris has greatly increased in quantity within the present century, though this might have been expected, as well from the increase of population as from the improved construction of cesspools (preventing leakage), and the increased supply of water in the French metropolis.

The following figures show both the aggregate quantity and the increase that has taken place in the cesspoolage of Paris, from 1810 to the present time:—

	Cub. Mètres.	Cub. Feet.
In 1810 the total quantity of refuse matter deposited in the basins at Montfaucon amounted to	50,151	= 1,770,330
In 1811 the quantity was	49,545	= 1,748,938
In 1812	49,235	= 1,737,995
Giving an average for the three years of .	49·877	= 1,760,658
The quantity at present conveyed to Montfaucon and Bondy amounts, according to M. Héloin (a very good authority), to from 600 to 700 cubic mètres daily, giving, in round numbers, an annual quantity of . . .	230,000	= 8,119,000

This shows an increase in 36 years of very nearly 400 per cent, but still it constitutes little more than one-half the cesspoolage of London.

The quantity of refuse matter which is daily drawn from the cesspools, Mr. Rammell states —and he had every assistance from the authorities in prosecuting his inquiries—at "between 600 and 700 cubic mètres; (21,180 and 24,710 cubic feet), giving, in round numbers, the annual quantity of 230,000 cubic mètres.

"Dividing this annual quantity at 230,000 cubic mètres (or 8,000,000 cubic feet) by the number of the population of Paris (94,721 individuals, according to the last census), we have 243 litres only as the annual produce from each individual. The daily quantity of matter (including water necessary for cleanliness) passing from each person into the cesspool in the better class of houses is stated to be 1¾ litre (3·08 pints), or 638 litres annually. The discrepancy between these two quantities, wide as it is, must be accounted for by the fact of a large proportion of the lower orders in Paris rarely or ever using any privy at all, and by allowing for the small quantity of water made use of in the inferior class of houses. There can be no doubt that this latter quantity of 1¾ litre daily is very nearly correct, and not above the average quantity used in houses where a moderate degree of cleanliness is observed. This proportion was ascertained to hold good in the case of some barracks in Paris, where the contents of the cesspools were accurately measured, the total quantity divided by the number of men occupying the barracks, and the quotient by the number of days since the cesspools had been last emptied; the result showing a daily quantity of 1¾ litre from each individual.

"The average charge per cubic mètre for extraction and transport of the cesspoolage is nine francs, giving a gross annual charge of 2,070,000 francs (82,800*l.* sterling), which sum, it would appear, is paid every year by the house-proprietors of Paris for the extraction of the matter from their cesspools, and its transport to the Voirie."

Mr. Rammell says that, were a tubular system of house-drainage, such as has been described under the proper head, adopted in Paris, in lieu of the present mode, it would cost less than one-tenth of the expense now incurred.

The principal place of deposit for the general refuse of Paris has long been at Montfaucon. A French writer, M. Jules Garnier, in a recent work, "A Visit to Montfaucon," says:—"For more than nine hundred years Montfaucon has been devoted to this purpose. There the citizens of Paris deposited their filth before the walls of the capital extended beyond what is now the central quarter. The distance between Paris and Montfaucon was then more than a mile and a half." Thus it appears that Montfaucon was devoted to its present purposes, of course in a much more limited degree, as early as the reign of King Charles the Simple.

This deposit of cesspool matter is the property of the commune (as in the city of London it would be said to belong to the "corporation"), and it is farmed out, for terms of nine years, to the highest bidders. The amount received by the commune has greatly increased, as the following returns, which are official, will show:—

A.D.		Francs	£
1808	the cesspoolage fetched	97,000, abt.	3,880
1817	,,	75,000, ,,	3,000
1834	,,	165,000, ,,	7,000
1843	,,	525,000, ,,	21,000

It is here that the "*poudrette*," * of which I have spoken elsewhere, is prepared. Besides this branch of commerce, Montfaucon has establishments for the extracting of ammonia from the cesspool matter, and the right of doing so is now farmed out for 80,000 francs a-year (3200*l*).

Montfaucon is on the north side of Paris, and the place of refuse deposit is known as

	Kilogr.
"Equivalent quantities of liquid blood of the abattoirs	1,333
Equivalent quantities of bones	650
Equivalent quantities of average of guano (two specimens are given)	512
Equivalent quantities of urine of the public urinals in fermentation, and incompletely dried	233

"M. Paulett estimates the loss of the ammoniacal products contained in the fæcal matters when they are withdrawn from the cesspools, by the time they have been ultimately reduced into poudrette, at from 80 to 90 per cent.

"I have not been able to meet with an analysis of the matters found in the fixed and movable cesspools of Paris, but in the 'Cours d'Agriculture,' of M. le Comte de Gasparin, I find an analysis by MM. Payen and Boussingault of some matter taken from the cesspools of Lille, and in the state in which it is ordinarily used in the suburbs of that city as manure. This matter was found to contain on the average 0·205 per cent of nitrogen, and thus by the rule observed in drawing up the above table, 19·512 kilogrammes of it would be necessary to produce the same effect upon one hectare of land as the other manures there mentioned. The wide difference between this quantity and that (1333 kilogrammes) stated for the mixed human excrements in their undiluted state, would lead to the conclusion that a very large proportion of water was present in the matter sent from Lille, unless we are to attribute a portion of the difference to the accidental circumstance of the bad quality of this matter. It appears that this is very variable, according to the style of living of the persons producing it. 'Upon this subject,' M. Paulet says, 'the case of an agriculturist in the neighbourhood of Paris is cited, who bought the contents of the cesspools of one of the fashionable restaurants of the Palais Royal. Making a profitable speculation of it, he purchased the matter of the cesspools of several barracks. This bargain, however, resulted in a loss, for the produce from this last matter came very short of that given by the first.'

"Poudrette weighs 70 kilogrammes the hectolitre (154 lbs. per 22 gallons), and the quantity usually spread upon one hectare of land (2½ acres nearly) is 1750 kilogrammes, being at the rate of about 1540 lbs. per acre English measure. It is cast upon the land by the hand, in the manner that corn is sown.

"Poudrette packed in sacks very soon destroys them. This is always the case, whether it is whole or has been newly prepared.

"A serious accident occurred in 1818, on board a vessel named the *Arthur*, which sailed from Rouen with a cargo of poudrette for Guadaloupe. During the voyage a disease broke out on board which carried off half the crew, and left the remainder in a deplorable state of health when they reached their destination. It attacked also the men who landed the cargo; they all suffered in a greater or less degree. The poudrette was proved to have been shipped during a wet season, and to have been exposed before and during shipment, in a manner to allow it to absorb a considerable quantity of moisture. The accident appears to have been due to the subsequent fermentation of the mass in the hold—increased to an intense degree by the moisture it had acquired, and by the heat of a tropical climate.

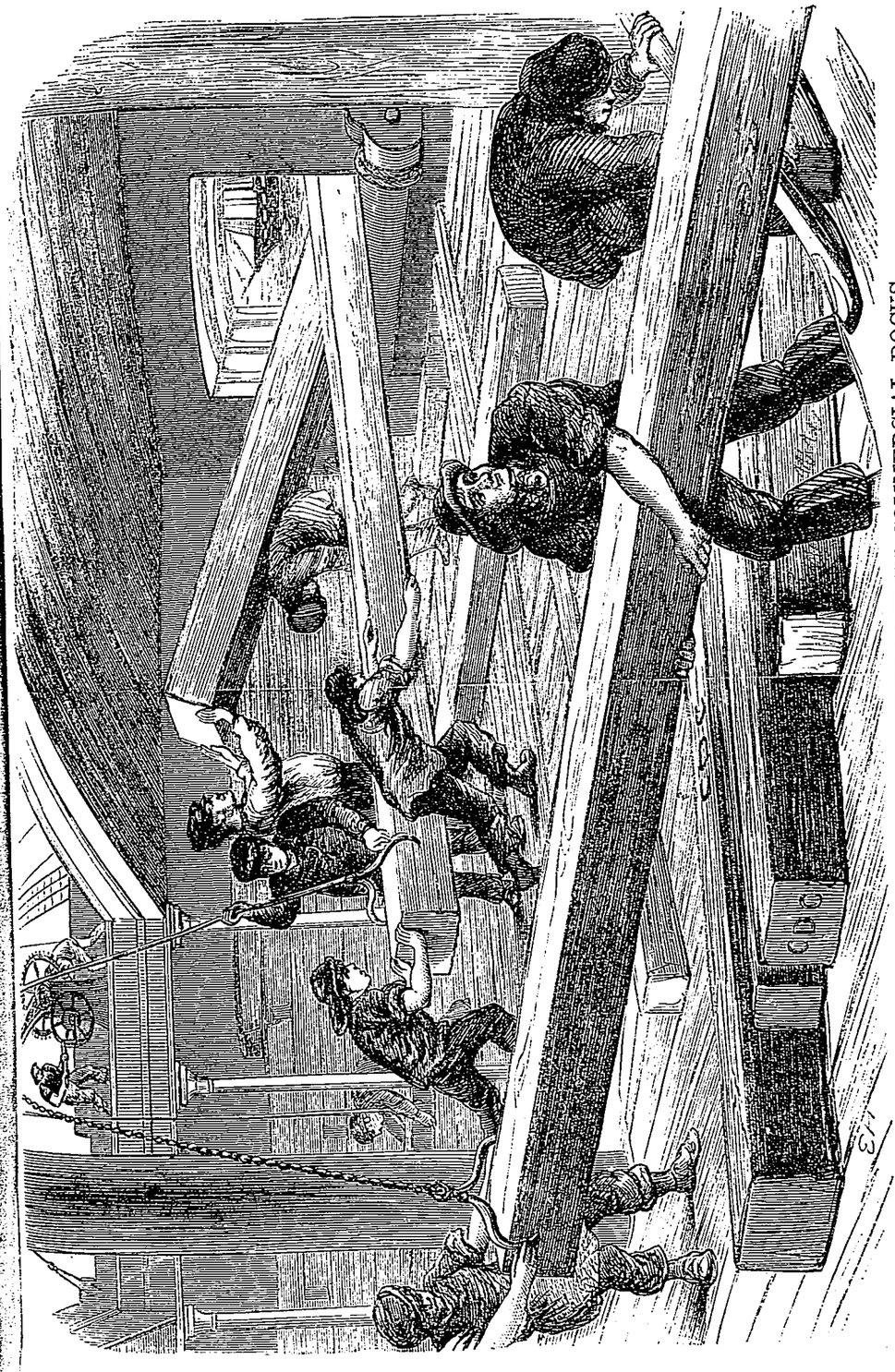
"M. Parent du Châtelet, to whom the matter was referred, recommended that to guard against similar accidents in future, the poudrette intended for exportation, in order to deprive it entirely of humidity, should be mixed with an absorbent powder, such as quicklime, and that it should be packed in casks to protect it from moisture during the voyage."

* Mr. Rammell supplies the following note on the use of "Poudrette."

"In connexion with this subject," he says, "a few observations upon the application of poudrette in agricultural process may not be without interest.

"With regard to the fertilizing properties of this preparation, M. Maxime Paulet, in his work entitled 'Théorie et Pratique des Engrais,' gives a table of the fertilizing qualities of various descriptions of manure, the value of each being determined by the quantity of nitrogen it contains. Taking for a standard good farm-yard dung, which contains on an average 4 per 1000 of nitrogen, and assuming that 10,000 kilogrammes (about 22,000 lbs. English) of this manure (containing 40 kilogrammes of nitrogen) are necessary to manure one hectare (2½ acres nearly) of land, the quantities of poudrette and of some other animal manures required to produce a similar effect would be as follows:—

	Kilogr.
"Good farm-yard dung, the quantity usually spread upon one hectare of land	10,000
Equivalent quantities of human urine, not having undergone fermentation	5,600
Equivalent quantities of poudrette of Montfaucon	2,550
Equivalent quantities of mixed human excrements (this quantity I have calculated from data given in the same work)	1,333



LUMPERS DISCHARGING TIMBER-SHIP IN COMMERCIAL DOCKS.

[*From a Sketch.*]

the Voirie. The following account of it, and of the manufacture of poudrette, is curious in many respects:—

"The area, which is about 40 acres in extent, is divided into three irregular compartments:—

"1. The system of basins.

"2. The ground used for spreading and drying the matter.

"3. The place where the matter is heaped up after having been dried.

"The basins, standing for the most part in gradations, one above another, by reason of the slope of the ground, are six in number. The two upper ones, which are upon a level, first receive the soil upon its arrival at the Voirie; the four others are receptacles for the more liquid portion as it gradually flows off from the upper basins.

"There is a great difference in the character of the soil brought; that taken from the upper part of the cesspools, and amounting to a large proportion of the whole, being entirely liquid; while the remainder is more or less solid, according to the depth at which it is taken. The whole, however, during winter or rainy weather, is indiscriminately deposited in the upper basins; but in dry weather, the nearly solid portion is at once thrown upon the drying-ground."*

"The quantity of poudrette sold in 1818 was:—

At the Voirie	50,000 setiers*
Sent into the departments	20,000 „
Total sale	70,000 „

at prices of 7, 8, and 9 francs the setier.

"This is equal, at the average price of 8 francs, to 22,400*l.* sterling.

"The refuse liquids, as fast as they overflow the basins, or are passed through the chemical works, are conducted into the public sewers, and through them into the Seine, nearly opposite the Jardin des Plantes. *They thus fall into the river at the very commencement of its course through Paris, and pollute its waters before they have reached the various works lower down and near the centre of the city, where they are raised and distributed for household purposes, for the supply of baths, and for the public fountains.*

"Rats are found by thousands in the Voirie, and their voracity is such, that I have often known them, during a single night, convert into skeletons the carcasses of twenty horses which had been brought thither the evening before. The bones are burnt to heat the coppers, or to get rid of them.

"Speaking of the disgusting practices at the Voirie, Mr. Gisquet says, 'I have seen men stark naked, passing entire days in the midst of the basins, seeking for any objects of value they might contain. I have seen others fishing for the rotten fish the market inspectors had caused to be thrown into the basins. Two cartloads of spoilt and stinking mackerel were thrown into the largest of the basins; two hours afterwards all the fish had disappeared.'

"The emanations from the Voirie are, as may well be supposed, most powerfully offensive. To a stranger unaccustomed to the atmosphere surrounding them it would be almost impossible to make the tour of the basins without being more or less affected with a disposition to nausea. Large and numerous bubbles of gas are seen constantly rising from a lake of urine and water, while evaporation of the most foul description is going on from many acres of surrounding ground, upon which the solid matter is spread to dry."

The late M. Parent du Châtelet, a high authority on this matter, stated (in 1833)

* "It is in the upper basins," adds the Reports, "that the first separation of the liquids and solids takes place, the latter falling to the bottom, and the former gradually flowing off through a sluice into the lower basins. This first separation, however, is by no means complete, a considerable deposit taking place in the lower basins. The mass in the upper basins, after three or four years, then appears like a thick mud, half liquid, half solid; it is of depth varying from 12 to 15 feet. In order entirely to get rid of the liquids, deep channels are then cut across the mass, by which they are drained off, when the deposit soon becomes sufficiently stiff to permit of its being dug out and spread upon the drying-ground, where, to assist the desiccation, it is turned over two or three times a-day by means of a harrow drawn by a horse.

"The time necessary for the requisite desiccation varies a good deal, according to the season of the year, the temperature, and the dry or moist state of the atmosphere. Ere yet it is entirely deprived of humidity, the matter is collected into heaps, varying in size usually from 8 to 10 yards high, and from 60 to 80 yards long, by 25 or 30 yards wide. These heaps or mounds generally remain a twelvemonth untouched, sometimes even for two or three years; but as fast as the material is required, they are worked from one of the sides by means of pickaxes, shovels, and rakes; the pieces separated are then easily broken and reduced to powder, foreign substances being carefully excluded. This operation, which is the last the matter undergoes, is performed by women. The poudrette then appears like a mould of a grey-black colour, light, greasy to the touch, finely grained, and giving out a particular faint and nauseous odour.

"The finer particles of matter carried by the liquids into the lower basins, and there more gradually deposited in combination with a precipitate from the urine, yield a variety of poudrette, preferred, by the farmers, for its superior fertilizing properties. In this case the drying process is conducted more slowly and with more difficulty than in the other, but more completely.

"In general the poudrette is dried with great difficulty; it appears to have an extreme affinity for water; few substances give out moisture more slowly, or absorb it more greedily from the air.

"A good deal of heat is generated in the heaps of desiccated matter. This is always sensible to the touch, and sometimes results in spontaneous combustion.

"The intensity of this heat is not in proportion to the elevation of temperature of the atmosphere. It is promoted by moisture. The only means of extinguishing the fire when it is once developed is to turn over the mass from top to bottom, in order to expose it to the air. Water thrown upon it, unless in very large quantities, would only increase its activity."

* 4¾ heaped bushels each, English measure.

that the emanations from the Voirie were insupportable within a circumference of 2000 mètres (about a mile and a quarter, English measure); while the winds carried them sometimes, as was shown when an official inquiry was made as to the ravages and causes of cholera, 2½ miles; and in certain states of the atmosphere, 8 French miles (not quite 5 English miles). The same high authority has also stated, that in addition to the emanations from the cesspool matter at the Voirie the greater part of the carcasses of about 12,000 horses, and between 25,000 and 30,000 smaller animals, were allowed to rot upon the ground there.

To abate this nuisance a new Voirie was, more than 20 years since, formed in the forest of Bondy, 8 miles from Paris. It consists of eight basins, four on each side of the Canal de l'Ourcq, arranged like those at Montfaucon. The area of these basins is little short of 96,000 square yards, and their collective capacity upwards of 261,000 cubic yards. The expectations of the relief that would be experienced from the establishment of the new Voirie in the forest have not been realized. The movable cesspools only have been conveyed there, by boats on the canal, to be emptied; the empty casks being conveyed back by the same boats. The basins are not yet full; for the conveyance by the Canal de l'Ourcq is costly, and in winter its traffic is sometimes suspended by its being frozen. In one year the cost of conveying these movable cesspools to Bondy was little short of 1500*l*.

In the latest Report on this subject (1835) the Commissioners, of whom M. Parent du Châtelet was one, recommend that all the cesspool matter at the Voiries should be disinfected. M. Salmon, after a course of chemical experiments (the Report of the Commission states), disinfected and carbonized a mass of mud and filth, containing much organic matter, deposited (from a sewer) on the banks of the Seine.

The Commissioners say, "The discovery of M. Salmon awakened the attention of the contractors of Montfaucon, who employed one of our most skilful chemists to find for them a means of disinfection other than that for which M. Salmon had taken out a patent. M. Sanson and some other persons made similar researches, and from their joint investigations it resulted that disinfection might be equally well produced with turf ashes, with carbonized turf, and with the simple *débris* of this very abundant substance; and that the same success might be obtained with sawdust, with the refuse matter of the tan-yards, with garden mould, so abundant in the environs of Paris, and with many other substances. A curious experiment has even shown, that after mixing with a clayey earth a portion of fæcal matter, it was only necessary, to carbonize this mixture to obtain a perfect disinfectant powder. Theory had already indicated the result.

This disinfection, however, has not been carried out in the Voiries, nor in the manufacture of poudrette.

From the account of the general refuse depositories of Paris we pass to the particular receptacles or cesspools of the French capital.

The Parisian cesspools are of two sorts:—

1. Fixed or excavated cesspools.
2. Movable cesspools.

"In early times the *excavated cesspools* or pits were constructed in the rudest manner, and cleaned out more or less frequently, or utterly neglected, at the discretion of their owners. As the city increased in size, however, and as the permeations necessarily taking place into the soil accumulated in the lapse of centuries, the evil resulting was found to be of grave magnitude, calling for prompt and vigorous interference on the part of the authorities. It appears certain that prior to the year 1819 (when a strict *ordonnance* was issued on the subject) the cesspools were very carelessly constructed. For the most part they were far from water-tight, and very probably were not intended to be otherwise. Consequently, nearly the whole of the fluid matter within them drained into the springs beneath the substratum, or became absorbed by the surrounding soil. Nor was this the only evil: the basement walls of the houses became saturated with the offensive permeations, and the atmosphere, more particularly in the interior of the dwellings, tainted with their exhalations.

"The *movable cesspools*, for the most part, consist simply of tanks or barrels, which, when full, are removed to some convenient spot for the purpose of their contents being discharged. This form of cesspool, though not leading to that contamination of the substratum which is naturally induced by the fixed or excavated cesspool, may occasion many offensive nuisances from carelessness in overfilling, or in the process of emptying."

"The movable cesspools are of two kinds; the one," says Mr. Rammell, "extremely simple and primitive in construction, the other more complicated. The former retains all the refuse, both liquid and solid, passed into it; the latter retains only the solid matter, the liquid being separated by a sort of strainer, and running off into another receptacle.

"The advantage of this separating apparatus is, that those cesspools provided with it require to be emptied less frequently than the others; the solid matter being alone retained in the movable part. The liquid portion is withdrawn from the tank into which it is received by pumping.

"The other kind of movable cesspool consists simply of a wooden cask set on end, and having its top pierced to admit the soil-pipe. It is intended to retain both solid and liquid matter. When full, it is detached, and the

aperture in the top having been closed by a tight-fitting lid secured by an iron bar placed across, it is removed, and an empty one immediately substituted for it.

"The movable cesspool last described is much more generally used than the other kind; very few are furnished with the separating apparatus. But the use of either sort, I am told, is not on the increase. The movable cesspools are found, on the whole, to be more expensive than the fixed, besides entailing many inconveniences, one of which is the frequent entrance of workmen upon the premises for the purpose of removing them, which sometimes has to be done every second or third day. Moreover, if the cask becomes in the slightest degree overcharged, there is an overflow of matter."

Indeed, the movable system of cesspools (it appears from further accounts) seems to be now adopted only in those places where fixed cesspools could not be altered in accordance with the ordonnance, or where it is desired to avoid the first cost of a fixed cesspool.

An ordonnance of 1819 enacts peremptorily that *all* cesspools, fixed or excavated, then existing, shall be altered in accordance with its provisions upon the first subsequent emptying after the date of the enactment, "or if that be found impracticable, they shall be filled up." This full delegation of power to a centralised authority was the example prompting our late stringent enactments as to buildings and sewerage.

The French ordonnance provides also that the walls, arches, and bottoms of the cesspools, shall be constructed of a very hard description of stone, known as "pierres meulières" (millstone); the mortar used is to be hydraulic lime and clean river sand. Each arch is to be 30 to 35 centimètres (12 to 14 inches) in thickness, and the walls 45 to 50 centimètres (18 to 20 inches); the interior height not to be less than 2 mètres (2 yards 6 inches). A soil-pipe is always to be placed in the middle of the cesspool; its interior diameter is not to be less than 9⅝ inches in pottery-ware piping, or 7⅞ inches in cast-iron. A vent-pipe, not less than 9⅞ inches in diameter, is to be carried up to the level of the chimney-tops, or to that of the chimneys of the adjoining houses. This is, if possible, to divert the smell from the house to which the cesspool is attached.

"A principal object of the *ordonnance*," it is stated in the Reports, "was to ensure the cesspools being thenceforth made water-tight; so that further pollution of the substratum and springs might be prevented; and the provisions for its attainment have been very strictly enforced by the police. The present cesspools are, in fact, water-tight constructions, retaining the whole of the liquids passed into them until the same are withdrawn by artificial means. The advantage has its attendant inconveniences, and, moreover, has been dearly paid for; for, independently of the cost of the alterations and the increased cost of making the cesspools in the outset—the liquids no longer draining away by natural permeation—the constant expense of emptying them has enormously increased. In the better class of houses, where water is more freely used, the operation has now to be repeated every three, four, or five months, whereas formerly the cesspool was emptied every eighteen months or two years. An increased water supply has added to the evil, moderate even now as the extent of that supply is."

"It is estimated that, in the better class of houses, the daily quantity of matter, including the water necessary for cleanliness and to ensure the passage of the solids through the soil-pipe, passing into the cesspool from each individual, amounts to 1¾ litre (3·08 English pints). Foreign substances are found in great abundance in the cesspools; the large soil-pipes permitting their easy introduction; so that the cesspool becomes the common receptacle for a great variety of articles that it is desired secretly to get rid of. Article 19 of the Police Regulations directs that nightmen finding any articles in the cesspools, especially such as lead to the suspicion of a crime or misdemeanor, shall make a declaration of the fact the same day to a Commissary of Police."

In all such matters the police regulations of France are far more stringent and exacting than those of England.

"The cesspools vary considerably in foulness," continues the Report; "and *it is remarkable that those containing the greatest proportion of water are the most foul and dangerous.* This is accounted for by the increased quantity of sulphuretted hydrogen gas evolved: and is more particularly the case where, from their large size, or from the small number of people using them, much time is allowed for the matter to stagnate and decompose in them. Soap-suds are said to add materially to their offensive and dangerous condition. *The* FOULNESS *of the cesspools, therefore, would appear to be in direct proportion to the* CLEANLY *habits of the inmates of the houses to which they respectively belong.* Where urine predominates ammoniacal vapours are given off in considerable quantities, and although these affect the eyes of those exposed to them—and the nightmen suffer much from inflammation of these organs—no danger to life results. The inflammation, however, is often sufficiently acute to produce temporary blindness, and from this cause the men are at times thrown out of work for days together." *

* I did not hear any of the London nightmen or sewermen complain of inflammation in the eyes, and no such effect was visible; nor that they suffered from temporary blindness, or were, indeed, thrown out of work from any such cause; they merely remarked that they were first dazzled, or "*daxed*," with the soil. But the labour of the Parisian is far more continuous and regular than the London nightman, owing in a great degree to the system of *movable cesspools* in Paris.

The *emptying of the cesspools* is the next point to be considered.

No cesspool is allowed to be emptied in Paris, and no nightman's cart, containing soil, is allowed to be in the streets from 8 A.M. to 10 P.M. from October 1st to March 31st, nor from 6 A.M. to 11 P.M. from April 1st to September 30th. In the winter season the hours of labour permitted by law are ten, and in the summer season seven, out of the twenty-four; while in London the hours of night-work are limited to five, without any distinction of season. These hours, however, only relate to the cleansing of the fixed cesspools of Paris.

Fixed or excavated cesspools are emptied into carts, which are driven to the receptacles. As far as regards the removal of night-soil along the streets, there are far more frequent complaints of stench and annoyance in Paris than in London. None of these cesspools can be emptied without authority from the police, and the police exercise a vigilant supervision over the whole arrangements; neither can any cesspool, after being emptied, be closed without a written authority, after inspection, by the Director of Health; nor can a cesspool, if found defective when emptied, be repaired without such authority.

"With regard to the movable cesspool," it is reported, "the process of emptying is very simple, though undoubtedly demanding a considerable expenditure of labour. The tank or barrel, when filled, is disconnected from the soil-pipe, an empty one being immediately substituted in its place, and the bung-hole being securely closed, it is conveyed away on a vehicle, somewhat resembling a brewer's dray (which holds about eight or ten of them), to the spot appointed as the depository of its discharged contents. The removal of movable cesspools is allowed to take place during the day."

In opening a cesspool in Paris, precautions are always taken to prevent accidents which might result from the escape or ignition of the gases.

The general, not to say universal, mode of emptying the fixed or excavated cesspools is to pump the contents into closed carts for transport.

"This operation is," says Mr. Rammell, "performed with two descriptions of pumps, one working on what may be called the *hydraulic* principle, the other on the *pneumatic*. In the former, the valves are placed in the pipe communicating between the cesspool and the cart, and the matter itself is pumped. In the latter, the valves are placed beyond the cart, and the air being pumped out of the cart, the matter flows into it to fill up the vacuum so occasioned. The real principle is of course the same in both cases, the matter being forced up by atmospheric pressure. One advantage of the pneumatic system is, that there are no valves to impede the free passage of matter through the suction-pipe; another, that it permits the use of a pipe of larger diameter.

"The cart employed for the pneumatic system consists of an iron cylinder, mounted sometimes upon four, but generally upon two wheels, the latter arrangement being found to be the more convenient. Previous to use at the cesspool, the carts are drawn to a branch establishment, situate just within the Barrière du Combat, where they are exhausted of air with an air-pump, worked by steam power. A 12-horse engine erected there is capable of exhausting five carts at the same time; the vacuum produced being equal to 28⅝ inches (72 centimètres) of mercury. A cart (in good repair, and upon two wheels) will preserve a practical vacuum for 48 hours after exhaustion."

The total weight of one of these carts when full is about 3 tons and 8 cwt. This is somewhat more than the weight of the contents of a London waggon employed in night-soil carriage. Three horses are attached to each cart.

When an opening into the cesspool has been effected, a suction-pipe on the pneumatic principle is laid from the cesspool to the cart. This pipe is 3 15/16 inches in diameter, and is in separate pieces of about 10 feet each, with others shorter (down even to 1 foot), to make up any exact length required. Two kinds are commonly used; one made of leather, having iron wire wound spirally inside to prevent collapse, the other of copper. The leather pipe is used where a certain degree of pliability is required; the copper for the straight parts of the line, and for determined curves; pieces struck from various radii being made for the purpose.

Gutta-percha has been tried as a substitute for leather in the piping, but was pronounced liable to split, and its use was abandoned. So with India-rubber in London.

The communication between the suction-pipe and the vehicle used by the nightmen is opened by withdrawing a plug by means of a forked rod into the "recess" (hollow) of the machine, an operation tasking the muscular powers of two men. This done, the cesspool contents rush into the cart, being forced up by the weight of the atmosphere to occupy the existing vacuum; this occupies about three minutes. The cart, however, is then but three-fourths filled with matter, the remaining fourth being occupied by the rarefied air previously in the cart, and by the air contained in the suction-pipe. This air is next withdrawn by the action of a small air-pump, worked usually by two, but sometimes by one man. The air-pump is placed on the ground at a little distance from the cesspool cart, and communicates with it by a flexible India-rubber tube, an inch in diameter. The air, as fast as it is pumped out, is forced through another India-rubber tube of similar dimensions, which communicates with a furnace, also placed on the ground at a little distance from the air-pump, the pump occupying the middle space between the cart and the furnace, the furnace and the pump being portable. To ascertain when the vehicle is full, a short glass tube is inserted in the end of the air-pipe (the end being of brass), and through this, with the help of a small lantern, the matter is seen to rise.

"The number of carts required for each operation," states Mr. Rammell, "of course varies according to the size of the cesspool to be emptied; but as these contain on the average about five cart-loads, that is the number usually sent.*

"In addition to the carts for the transport of the night-soil, a light-covered spring van drawn by one horse is used to carry the tools, &c., required in the process.

"These tools consist of—

"1. An air-pump when the work is to be done on the pneumatic system, and of an hydraulic pump when it is to be done on the hydraulic system.

"2. About 50 mètres of suction-pipe of various forms and lengths.

"3. A furnace for the purpose of burning the gases.

"4. Wooden hods for the removal of the solid night-soil.

"5. Pails, a ladder, pincers, levers, hammers, and other articles."

I have hitherto spoken of the *Pneumatic* System of emptying the Parisian cesspools. The results of the *Hydraulic* System are so similar, as regards time, &c., that only a brief notice is required. The hydraulic pump is worked by four men; it is placed on the ground in the place most convenient for the operation, and the cart is filled in the space of from three to five minutes.

A furnace is used.

"The furnace," says the Report, "consists of a sheet-iron cylinder, about nine inches in diameter, pierced with small holes, and covered with a conical cap to prevent the flame spreading. The vent-pipe first communicates underneath with a small reservoir, intended to contain the matter in case the operation should be carried too far. A piece is inserted in the bottom of this reservoir, by unscrewing which it may be emptied. The furnace is sometimes fixed upon a plank, which rests upon two projecting pieces behind the cart."

An indicator is also used to show the advancement of the filling of the cart; a glass tube and a cork float are the chief portions of the apparatus of the indicator.

"Towards the end of the operation, when the quantity of matter remaining in the cesspool, although sufficiently fluid, is too shallow for pumping, it is scooped into a large pail; and, the end of the suction-pipe being introduced, drawn up into the cart. When the matter is in too solid a state to pass through the pipe, it is carried to the cart in hods, unless it is in considerable quantity. In that case it is removed in vessels called *tinettes*, in the shape of a truncated cone, holding each about 3½ cubic feet. These vessels are closed with a lid, and are lifted into an open waggon for transport."

Of these two systems the pneumatic is the more costly, and is likely to be supplanted by the hydraulic. Each system, according to Mr. Rammell, is still a nuisance, as, in spite of every precaution, the gases escape the moment the cesspool emptying is commenced, and vitiate the atmosphere. They force their way very often through the joints of the pipes, and are insufficiently consumed in the furnaces. Mr. Rammell mentions his having twice, after witnessing two of these operations, suffered from attacks of illness. On the first occasion, the men omitted to burn the foul air, and the atmosphere being heavy with moisture, the odour was so intense that it was smelt from the Rue du Port Mahon to the Rue Menars, more than 400 yards distant.

The emptying of the cesspools is let by contract, the commune acting in the light of a proprietor. To obtain a contract, a man must have license or permission from the prefect of police, and such license is only granted after proof that the applicant is provided with the necessary apparatus, carts, &c., and also with a suitable dépôt for the reception of the pumps, carts, &c., when not in use. The stock-in-trade of a contractor is inspected at least twice a-year, and if found inadequate or out of repair the license is commonly withdrawn. The "gangs" of nightmen employed by the contractors are fixed by the law at four men each (the number employed in London), but without any legal provision on the subject. The terms of these contracts are not stated, but they appear to have ceased to be undertakings by individual capitalists, being all in the hands of companies, known as *compagnies de vidanges* (filth companies). There are now eight companies in Paris carrying on these operations. More than half of the whole work, however, is accomplished by one company, the "*Compagnie Richer*." The capital invested in their working stock is said to exceed 4,800,000 francs (200,000*l*.). They now require the labour of 350 horses, and the use of 120 vehicles of different descriptions.

The construction of a cesspool in Paris costs about 18*l*. as an average. The houses containing from 30 to 70 inmates may have two, and occasionally more, cesspools. Taking the average at one and a half, the capital sunk in a cesspool is 27*l*. Mr. Rammell says:—

"Adopting these calculations of the number of cesspools to each house, and their cost, and allowing only the small quantity of 1½ litre (3·08

* It must be recollected, to account for the greater quantity of matter between the cesspools of Paris and London, that the French fixed cesspool, from the greater average of inmates to each house, must necessarily contain about three times and a half as much as that of a London cesspool. If the dwellers in a Parisian house, instead of averaging twenty-four, averaged between seven and eight, as in London, the cesspool contents in Paris would, at the above rate, be between four and five tons (as it is in London) for the average of each house.

pints) of matter to each individual, the annual expense of the cesspool system in Paris, per house containing 24 persons, will be,—

"For interest, at 5 per cent upon capital sunk in works of construction, 1*l.* 7*s.*

"For extraction and removal of matter, 5*l.* 11*s.*

"Total, 6*l.* 18*s.*

"The annual expense per inhabitant will be 5*s.* 9*d.*

"The latter, then, may be taken as the average yearly sum per head actually paid by that portion of the inhabitants of Paris who use the cesspools."

The following, among others before shown, are the conclusions arrived at by Mr. Rammell:—

1. "That with the most perfect regulations, and the application of machines constructed upon scientific principles, the operation of emptying cesspools is still a nuisance, not only to the inmates of the house to which it belongs, but to those of the neighbouring houses, and to persons passing in the street.

2. "That the cesspool system of Paris presents an obstacle to the proper extension of the water supply, and consequently represses the growth of habits of personal and domestic cleanliness, with their immense moral results; and that in this respect it may be said to be inconsistent with a high degree of civilization of the masses of any community.

3. "That, compared with a tubular system of refuse drainage, it is an exceedingly expensive mode of disposing of the fæcal refuse of a town."

Of the Emptying of the London Cesspools by Pump and Hose.

Having now ascertained the quantity of wet house-refuse annually deposited in the cesspools of the metropolis, the next step is to show the means by which these 15,000,000 cubic feet of cesspoolage are removed, and whence they are conveyed, as well as the condition of the labourers engaged in the business.

There are two methods of removing the soil from the tanks:—

1. By pump and hose, or the hydraulic method;

2. By shovel and tube, or manual labour.

The first of these is the new French mode, and the other the old English method of performing the work. The distinctive feature between the two is, that in the one case the refuse is discharged by means of pipes into the sewers, and in the other that it is conveyed by means of carts to some distant night-yard.

According to the French method, therefore, the cesspoolage ultimately becomes sewage, the refuse being deposited in a cesspool for a greater or a less space of time, and finally discharged into the sewers; so that it is a kind of intermediate process between the cesspool system and the sewer system of defecating a town, being, as it were, a compound of the two.

The great advantage of the sewer system, as contradistinguished from the cesspool system of defecation, is, that it admits of the wet refuse being removed from the neighbourhood of the house as soon as it is produced; while the advantage of the cesspool system, as contradistinguished from the sewer system, is, that it prevents the contamination of the river whence the town draws its principal supply of water. The cesspool system of defecation remedies the main evil of the sewer system, and the sewer system the main evil of the cesspool system. The French mode of emptying cesspools, however, appears to have the peculiar property of combining the ill effects of both systems without the advantages of either. The refuse of the house not only remains rotting and seething for months under the noses of the household, but it is ultimately—that is, after more than a year's decomposition—washed into the stream from which the inhabitants are supplied with water, and so returned to them diluted in the form of *aqua pura*, for washing, cooking, or drinking. The sole benefit accruing from the French mode of nightmanship is, that it performs a noisome operation in a comparatively cleanly manner; but surely this is a small compensation for the evils attendant upon it. The noses of those who prefer stagnant cesspools to rapid sewers cannot be so particularly sensitive, that for the sake of avoiding the smell of the nightman's cart they would rather that its contents should be discharged into the water that they use for household purposes.

The hydraulic or pump-and hose method of emptying the cesspools is now practised by the Court of Sewers, who introduced the process into London in the winter of 1847. The apparatus used in this country consists of an hydraulic pump, which is generally placed six or eight feet distant from, but sometimes close to, the cesspool—indeed, on its edge. It is worked by two men, "just up and down," as one of the labourers described it to me, "like a fire-engine." A suction-pipe, with an iron nozzle, is placed in the cesspool, into which is first introduced a deodorising fluid, in the proportion, as well as can be estimated, of a pint to a square yard of matter, and diluted with water from the fire-plugs.

The pipes are of leather, the suction-pipes being wrapped with spring-iron wire at the joints. India-rubber pipes were used, and "answered very tidy," one of the gangers told me, but they were too expensive, the material being soon worn out: they were only tried five or six months. The pipes now employed differ in no respect of size or appearance from the leathern fire-engine pipes; and as the work is always done in the daytime, and no smell arises from it, the neighbourhood is often alarmed, and people begin to ask where the fire is. One outsideman said, "Why, that's always asked. I've been asked—ay, I dare say a hundred times in a day—'Where's the fire? where's the fire?'" A cesspool, by this process, has been emptied into a sewer at 300 yards distant. The pipe is placed within the nearest gullyhole, down which the matter is washed into the sewer. When the cesspool is emptied, it is well sluiced with water; the water is pumped into the sewer, and then the work is complete.

The pumping is occasionally very hard work, making the shoulders and backache grievously; indeed, some cesspools have been found so long neglected, and so choked with rags and rubbish, that manual labour had to be resorted to, and the matter dug and tubbed out, after the old mode of the nightmen. A square yard of cesspoolage is cleared out, under ordinary circumstances, in an hour; while an average duration of time for the cleansing of a regularly-sized cesspool is from three to four hours.

A pneumatic pump, with an iron cart, drawn by two horses (similar to the French invention), was tried as an experiment, but discontinued in a fortnight.

For the hydraulic method of emptying cesspools, a gang of four men, under the direction of a ganger, who makes a fifth, is required.

The *division of labour* is as follows:—

1. The pumpmen, who, as their name implies, work the engine or pumps.

2. The holeman, who goes into the cesspool and stirs up the matter, so as to make it as fluid as possible.

3. The outsideman, whose business it is to attend to the pipe, which reaches from the cesspool, along the surface of the street, or other place, to the gullyhole.

4. The ganger, who is the superintendent of the whole, and is only sometimes present at the operation; he is not unfrequently engaged, while one cesspool is being emptied, in making an examination or any necessary arrangement for the opening of another. He also gives notice (acting under the instruction of the clerk of the works) to the water company of the district, that the pumps will be at work in this or that place, a notice generally given a day in advance, and the water is supplied gratuitously, from a street fire-plug, and used at discretion, some cesspool contents requiring three times more water than others to liquefy them sufficient for pumping.

The cesspool-pumping gangs are six in number, each consisting of five men, although the "outsideman" is sometimes a strong youth of seventeen or eighteen. The whole work is done by a contractor, who makes an agreement with the Court of Sewers, and finds the necessary apparatus, appointing his own labourers. All the present labourers, however, have been selected as trusty men from among the flushermen, the contractor concurring in the recommendation of the clerk of the works, or the inspector. The cesspool-sewermen work in six districts. Two divisions (east and west) of Westminster; Finsbury and Holborn; Surrey and Kent; Tower Hamlets (now including Poplar); and the City. The districts vary in size, but there is usually a gang devoted to each: in case of emergency, however, a gang from another district (as among the flushermen) is sent to expedite any pressing work. All the men are paid by the job, the payment being 2*s.* each per job, to the pumpmen and holeman, and 3*s.* to the ganger; but in addition to the 2*s.* per job, the holeman has 6*d.* a-day extra; and the outsideman has 6*d.* a-day *deducted* from the 4*s.* he would earn in two jobs, which is a frequent day's work. The men told me that they had four or four and a-half days' work (or eight or nine jobs) every week; but such was the case more particularly when the householders were less cognizant of the work, and did not think of resorting to it; now, I am assured, the men's average employment may be put at five days a week, or ten jobs.

The perquisites of these workmen are none, except the householder sends them some refreshment on his own accord. There may be a perquisite, but very rarely, occurring to the holeman, should he find anything in the soil; but the finding is far less common than among the nightmen, with whom the process goes through different stages. I did not hear among cesspool-sewermen of anything being found by them or by their comrades; of course, when the soil is once absorbed into the pipe, it is unseen on its course of deposit down the gullyhole.

The men have no trade societies, and no arrangements of any equivalent nature; no benefit clubs or sick clubs, for which their number, indeed, is too small; or, as my informant sometimes wound up in a climax, "No, nothing that way, sir." They are sober and industrious men, chiefly married, and with families. Into further statistics, however, of diet, rent, &c., I need not enter, concerning so small a body; they are the same as among other well-conducted labourers.

The men find their own dresses, which are of the same cost, form, and material as I have described to pertain to the flushermen; also their own "picks" and shovels, costing respectively 2*s.* 6*d.* and 2*s.* 3*d.* each.

One cesspool-sewerman told me, that when he was first a member of one of those gangs he was "awful abused" by the "regular nightmen," if he came across any of them "as was beery, poor fellows;" but that had all passed over now.

The total sum paid to the six gangs of labourers in the course of the year would, at the rate of ten cesspools emptied per week, amount to the following:—

	Yearly Total.
12 pumpmen, 10 jobs a-week each, 20*s.* per week, or 52*l.* per year, each .	£624
6 holemen, ditto, ditto, with 2*s.* 6*d.* a-week extra	351
6 outsidemen, 20*s.* a-week, less by 6*d.* a-day, or 2*s.* 6*d.* a-week, 45*l.* 10*s.* a-year	296
Carried forward . .	£1271

	Yearly Total.
Brought forward . . .	£1271
6 gangers, 30*s.* a-week each, or ~8*l.* per year	468
	£1739

Any householder, &c., who applies to the Court of Sewers, or to any officer of the court whom he may know, has his cesspool cleansed by the hydraulic method, in the same way as he might employ any tradesman to do any description of work proper to his calling. The charge (by the Court of Sewers) is 5*s.* or 6*s.* per square yard, according to pipeage, &c. required; a cesspool emptied by this system costs from 20*s.* to 30*s.* The charges of the nightmen, who have to employ horses, &c., are necessarily higher.

Estimating that throughout London 60 cesspools are emptied by the hydraulic method every week, or 3120 every year, and the charge for each to be on an average 25*s.*, we have for the gross receipts . . 3120 × 25*s.* =	£3900
And deducting from this the sum paid for labour	1739
It shows a profit of	£2161

This is upwards of 123 per cent; but out of this, interest on capital and wear and tear of machinery have to be paid.

During the year 1851, I am credibly informed that as many as 3000 sewers were emptied by the hydraulic process; and calculating each to have contained the average quantity of refuse, viz. five tons or loads, or about 180 cubic feet, we have an aggregate of 540,000 cubic feet of cesspoolage ultimately carried off by the sewers. This, however, is only a twenty-seventh of the entire quantity.

The sum paid in wages to the men engaged in emptying these 3000 cesspools by the hydraulic process would, at the rate of 2*s.* per man to the four members of the gang, and 3*s.* to the ganger, or 11*s.* in all for each cesspool, amount to 1650*l.*, which is 139*l.* and 250 cesspools less than the amount above given.

Statement of a Cesspool-Sewerman.

I give the following brief and characteristic statement, which is peculiar in showing the habitual *restlessness* of the mere labourer. My informant was a stout, hale-looking man, who had rarely known illness. All these sort of labourers (nightmen included) scout the notion of the cholera attacking *them!*

"Work, sir? Well, I think I *do* know what work is, and has known it since I was a child; and then I was set to help at the weaving. My friends were weavers at Norwich, and 26 years ago, until steam pulled working men down from being well paid and well off, it was a capital trade. Why, my father could sometimes earn 3*l.* at his work as a working weaver; there was money for ever then; now 12*s.* a-week is, I believe, the tip-top earnings of his trade. But *I didn't like the confinement or the close air in the factories*, and so, when I grew big enough, I went to ground-work in the city (so he frequently called Norwich); I call ground-work such as digging drains and the like. Then I 'listed into the Marines. *Oh, I hardly know what made me;* men does foolish things and don't know why; it's human natur. I'm sure it wasn't the bounty of 3*l.* that tempted me, for I was doing middling, and sometimes had night-work as well as ground-work to do. I was then sent to Sheerness and put on board the *Thunderer* man-of-war, carrying 84 guns, as a marine. She sailed through the Straits (of Gibraltar), and was three years and three months blockading the Dardanelles, and cruising among the islands. I never saw anything like such fortifications as at the Dardanelles; why, there was mortars there as would throw a ton weight. No, I never heard of their having been fired. Yes, we sometimes got leave for a party to go ashore on one of the islands. They called them Greek islands, but I fancy as how it was Turks near the Dardanelles. O yes, the men on the islands was civil enough to us; they never spoke to us, and we never spoke to them. The sailors sometimes, and indeed the lot of us, would have bits of larks with them, laughing at 'em and taking sights at 'em and such like. Why, I've seen a fine-dressed Turk, one of their grand gentlemen there, when a couple of sailors has each been taking a sight at him, and dancing the shuffle along with it, make each on 'em a low bow, as solemn as could be. Perhaps he thought it was a way of being civil in our country! I've seen some of the head ones stuck over with so many knives, and cutlasses, and belts, and pistols, and things, that he looked like a cutler's shop-window. We were ordered home at last, and after being some months in barracks, which I didn't relish at all, were paid off at Plymouth. Oh, a barrack life's anything but pleasant, but I've done with it. After that I was eight years and a quarter a gentleman's servant, coachman, or anything (in Norwich), and then got tired of that and came to London, and got to ground and new sewer-work, and have been on the sewers above five years. Yes, I prefer the sewers to the Greek islands. I was one of the first set as worked a pump. There was a great many spectators; I dare say as there was 40 skientific gentlemen. I've been on the sewers, flushing and pumping, ever since. The houses we clean out, all says it's far the best plan, ours is. 'Never no more nightmen,' they say. You see, sir, our plan's far less trouble to the people in the house, and there's no smell—least I never found no smell, and it's cheap, too. In time the nightmen 'll disappear; in course they must, there's so many new dodges comes up, always some one of the working classes is a being ruined. If it ain't steam, it's something else as knocks the bread out of their mouths quite as quick."

On the Present Disposal of the Night-Soil.

It would appear, according to the previous calculations, that of the 15,000,000 cubic feet of house-refuse annually deposited in the cesspools of the metropolis, about 500,000 cubic feet are pumped by the French process into the sewers; consequently there still remains about 14,500,000 cubic feet, or about 404,000 loads, to be disposed of by other means. I shall now proceed to explain how the cesspoolage proper, that is to say, that which is removed by cartage rather than by being discharged into the sewers, is ultimately got rid of.

Until about twenty months ago, when the new sanitary regulations concerning the disposal of night-soil came into operation, the cesspool matter was "shot" in a night-yard, generally also a dust-yard. These were the yards of the parish contractors, and were situate in Maiden-lane, Paddington, &c., &c. Any sweeper-nightman, or any nightman, was permitted by the proprietor of one of these places to deposit his night-soil there. For this the depositor received no payment, the privilege of having "a shoot" being accounted sufficient.

There were, till within these six or eight years, I was informed, 60 places where cesspool manure could be shot. These included the nightmen's yards and the wharves of manure dealers (some of the small coasting vessels taking it as ballast); but as regards the cesspool filth, there are now none of these places of deposit, though some little, I was told, might be done by stealth.

Of one of these night-yard factories Dr. Gavin gave, in 1848, the following account:—

"On the western side of Spitalfields workhouse, and entering from a street called Queen-street, is a nightman's yard. A heap of dung and refuse of every description, about the size of a tolerably large house, lies piled to the left of the yard; to the right is an artificial pond, into which the contents of cesspools are thrown. The contents are allowed to desiccate in the open air; and they are frequently stirred for that purpose. The odour which was given off when the contents were raked up, to give me an assurance that there was nothing so very bad in the alleged nuisance, drove me from the place with the utmost speed.

"On two sides of this horrid collection of excremental matter was a patent manure manufactory. To the right in this yard was a large accumulation of dung, &c., but to the left there was an extensive layer of a compost of blood, ashes, and nitric acid, which gave out the most horrid, offensive, and disgusting concentration of putrescent odours it has ever been my lot to be the victim of. The whole place presented a most foul and filthy aspect, and an example of the enormous outrages which are perpetrated in London against society.

"It is a curious fact, that the parties who had charge of these two premises were each dead to the foulness of their own most pestilential nuisances. The nightman's servant accused the premises of the manure manufacturer as the source of perpetual foul smells, but thought his yard free from any particular cause of complaint; while the servant of the patent manure manufacturer diligently and earnestly asserted the perfect freedom of his master's yard from foul exhalations; but considered that the raking up of the drying night-soil on the other side of the wall was 'quite awful, and enough to kill anybody.'

"Immediately adjoining the patent manure manufactory is the establishment of a bottle merchant. He complained to me in the strongest terms of the expenses and annoyances he had been put to through the emanations which floated in the atmosphere having caused his bottles to spoil the wine which was placed in such as had not been *very* recently washed. He was compelled frequently to change his straw, and frequently to wash his bottles, and considered that unless the nuisance could be suppressed, he would be compelled to leave his present premises."

This and similar places were suppressed soon after the passing of the sanitary measures of September, 1848.

The cesspool refuse, which was disposed of for manure, was at that time first shot into recesses in the night-yard, where it was mixed with exhausted hops procured from the brewhouses, which were said to absorb the liquid portions, when stirred up with the matter, and to add not only to the consistency of the mass, but to its readier portability for land manure or for stowage in a barge. It was also mixed with littered straw from the mews, and with stable manure generally. An old man who had worked many years—he did not know how many—in one of these yards, told me that when this night-soil was "fresh shot and first mixed" (with the hops, &c.), the stench was often dreadful. "How we stood it," he said, "I don't know; but we did stand it."

In one of the night-and-dust-yards, I ascertained that as many as 50 loads, half of them waggon-loads, have been shot from the proprietor's own carts, and from the carts of the nightmen "using" the yard, in one morning, but the average "shoot" was about ten loads (half a waggon) a-day for six days in the week.

Of the mode of manufacture of this manure, a full account has been given in the details of the cesspool system of Paris, for the process was the same in London, although on a much smaller scale; and indeed the manufacture here was chiefly in the hands of Frenchmen.

The manure was, after it had been deposited for periods varying from one month to five or six, sold to farmers and gardeners at from 4*s.* to 5*s.* the cart-load, although 4*s.*, I was in-

formed, might have been the general average. The cesspool matter, considered *per se*, was not worth, of late years, I am told, above 2*s.* a ton (or a load, which is sometimes rather more and sometimes less than a ton). It was when mixed that the price was 4*s.* to 5*s.* a ton. This cesspool filth was shot on the premises of the manufacturer gratuitously, as it was in any of the night-yards. It was not until it had been kept some time, and had been mixed (generally) with other manures, and sometimes with road-sweepings, that this manure was used in gardens; for it was said that if this had not been done, its ammoniacal vapours would have been absorbed and retained by the leaves of the fruit-trees.

This night-soil manure was devoted to two purposes—to the manufacture of deodorized and portable manure for exportation (chiefly to our sugar-growing colonies), and to the fertilization of the land around London.

When manufactured into manure it was shipped—in new casks generally, the manure casks of the outward voyage being transformed into the brown sugar casks of the homeward-bound vessels. I was told by a seaman who some years ago sailed to the West Indies, that these manure casks in damp weather gave out an unpleasant odour.

It was only to the home cultivators who resided at no great distance from a night-yard, from five to six miles or a little more, that this manure was sold to be carted away; their attendance at the markets with carts, waggons, and horses, giving them facilities of conveying the manure at a cheap rate. But upwards of three-fourths of the whole was sent in barges into the more distant country parts, having a ready water communication either by the Thames or by canal.

The purchaser nearer home conveyed it away in his own cart, and with his own horses, which had perhaps come up to town laden with cabbages to Covent Garden, or hay to Cumberland-market, the cart being made watertight for the purpose. The "legal hours" to be observed in the cleansing of cesspools, and the transport of the contents upon such cleansing, not being required to be observed in this second transport of the cesspool manure, it was carted away at any hour, as stable dung now is.

It is not possible at the present time, when night-yards are no longer permitted to exist in London, and the manufacture of the night-soil manure is consequently suppressed, to ascertain the precise quantities disposed of commercially, in a former state of things.

The money returns to the master-nightman for the manure he now collects need no figures. The law requires him to refrain from shooting this soil in his own yard, or in *any* inhabited part of the metropolis, and it is shot on the nearest farm to which he has access, merely for the privilege of shooting it, the farmer paying nothing for the deposit, with which he does what he pleases. It is mixed with other refuse, I was told, at present, and kept as compost, or used on the land, but the change is too recent for the establishment of any systematic traffic in the article.

Of the Working Nightmen and the Mode of Work.

Nightwork, by the provisions of the Police Act, is not to be commenced before twelve at night, nor continued beyond five in the morning, winter and summer alike. This regulation is known among the nightmen as the "legal hours," and tends, in a measure, to account for the heterogeneous class of labourers who still seek nightwork; for strong men think little of devoting a part of the night, as well as the working hours of the day, to toil. A rubbish-carter, a very powerfully-built man, told me he was partial to nightwork, and always looked out for it, even when in daily employ, as "it was sometimes like found money." The scavengers, sweeps, dustmen, and labourers known as ground-workers, are anxious to obtain night-work when out of regular employment; and, ten years and more since, it was often an available and remunerative resource.

Night-work is, then, essentially, and perhaps necessarily, extra-work, rather than a distinct calling followed by a separate class of workers. The generality of nightmen are scavengers, or dustmen, or chimney-sweepers, or rubbish-carters, or pipe-layers, or ground-workers, or coal-porters, carmen or stablemen, or men working for the market-gardeners round London—all either in or out of employment. Perhaps there is not at the present time in the whole metropolis a working nightman who is *solely* a working nightman.

It is almost the same with the master-nightmen. They are generally master-chimney-sweepers, scavengers, rubbish-carters, and builders. Some of the contractors for the public street scavengery, and the house-dust-bin emptying, are (or have been) among the largest employers of nightmen, but only in their individual trading capacity, for they have no contracts with the parishes concerning the emptying of cesspools; indeed the parish or district corporations have nothing to do with the matter. I have already shown, that among the best-patronised master-nightmen are now the Commissioners of the Court of Sewers.

For how long a period the master and working chimney-sweepers and scavengers have been the master and labouring nightmen I am unable to discover, but it may be reasonable to assume that this connexion, as a matter of trade, existed in the metropolis at the commencement of the eighteenth century.

The police of Paris, as I have shown, have full control over cesspool cleansing, but the police of London are instructed merely to prevent night-work being carried on at a later or earlier

period than "the legal hours;" still a few minutes either way are not regarded, and the legal hours, I am told, are almost always adhered to.

Nightwork is carried on—and has been so carried on, within the memory of the oldest men in the trade, who had never heard their predecessors speak of any other system—after this method:—A gang of four men (exclusive of those who have the care of the horses, and who drive the night-carts to and from the scenes of the men's labours at the cesspools) are set to work. The labour of the gang is divided, though not with any individual or especial strictness, as follows:—

1. The *holeman*, who goes into the cesspool and fills the tub.

2. The *ropeman*, who raises the tub when filled.

3. The *tubmen* (of whom there are two), who carry away the tub when raised, and empty it into the cart.

The mode of work may be thus briefly described:—Within a foot, or even less sometimes, though often as much as three feet, below the surface of the ground (when the cesspool is away from the house) is what is called the "main hole." This is the opening of the cesspool, and is covered with flag-stones, removable, wholly or partially, by means of the pickaxe. If the cesspool be immediately under the privy, the flooring, &c., is displaced. Should the soil be near enough to the surface, the tub is dipped into it, drawn out, the filth scraped from its exterior with a shovel, or swept off with a besom, or washed off by water flung against it with sufficient force. This done, the tubmen insert the pole through the handles of the tub, and bear it on their shoulders to the cart. The mode of carriage and the form of the tub have been already shown in an illustration, which I was assured by a nightman who had seen it in a shopwindow (for he could not read), was "as natural as life, tub and all."

Thus far, the ropeman and the holeman generally aid in filling the tub, but as the soil becomes lower, the vessel is let down and drawn up full by the ropeman. When the soil becomes lower still, a ladder is usually planted inside the cesspool; the "holeman," who is generally the strongest person in the gang, descends, shovels the tub full, having stirred up the refuse to loosen it, and the contents, being drawn up by the ropeman, are carried away as before described.

The labour is sometimes severe. The tub when filled, though it is never quite filled, weighs rarely less than eight stone, and sometimes more; "but that, you see, sir," a nightman said to me, "depends on the nature of the sile."

Beer, and bread and cheese, are given to the nightmen, and frequently gin, while at their work; but as the bestowal of the spirit is voluntary, some householders from motives of economy, or from being real or pretended members or admirers of the total-abstinence principles, refuse to give any strong liquor, and in that case—if such a determination to withhold the drink be known beforehand—the employers sometimes supply the men with a glass or two; and the men, when "nothing better can be done," club their own money, and send to some night-house, often at a distance, to purchase a small quantity on their own account. One master-nightman said, he thought his men worked best, indeed he was sure of it, "with a drop to keep them up;" another thought it did them neither good nor harm, "in a moderate way of taking it." Both these informants were themselves temperate men, one rarely tasting spirits. It is commonly enough said, that if the nightmen have no "allowance," they will work neither as quickly nor as carefully as if accorded the customary gin "perquisite." One man, certainly a very strong active person, whose services where quickness in the work was indispensable might be valuable (and he had work as a rubbish-carter also), told me that he for one would not work for any man at nightwork if there was not a fair allowance of drink, "to keep up his strength," and he knew others of the same mind. On my asking him what he considered a "fair" allowance, he told me that at least a bottle of gin among the gang of four was "looked for, and mostly had, over a gentleman's cesspool. And little enough, too," the man said, "among four of us; what it holds if it's public-house gin is uncertain: for you must know, sir, that some bottles has great 'kicks' at their bottoms. But I should say that there's been a bottle of gin drunk at the clearing of every two, ay, and more than every two, out of three cesspools emptied in London; and now that I come to think on it, I should say that's been the case with three out of every four."

Some master-nightmen, and more especially the sweeper-nightmen, work at the cesspools themselves, although many of them are men "well to do in the world." One master I met with, who had the reputation of being "warm," spoke of his own manual labour in shovelling filth in the same self-complacent tone that we may imagine might be used by a grocer, worth his "plum," who quietly intimates that he will serve a washerwoman with her half ounce of tea, and weigh it for her himself, as politely as he would serve a duchess; for *he* wasn't above his business: neither was the nightman.

On one occasion I went to see a gang of nightmen at work. Large horn lanterns (for the night was dark, though at intervals the stars shone brilliantly) were placed at the edges of the cesspool. Two poles also were temporarily fixed in the ground, to which lanterns were hung, but this is not always the case. The work went rapidly on, with little noise and no confusion.

The scene was peculiar enough. The artificial light, shining into the dark filthy-looking cavern or cesspool, threw the adjacent houses into a deep shade. All around was perfectly still, and there was not an incident to interrupt the labour, except that at one time the window of a neighbouring house was thrown up, a night-

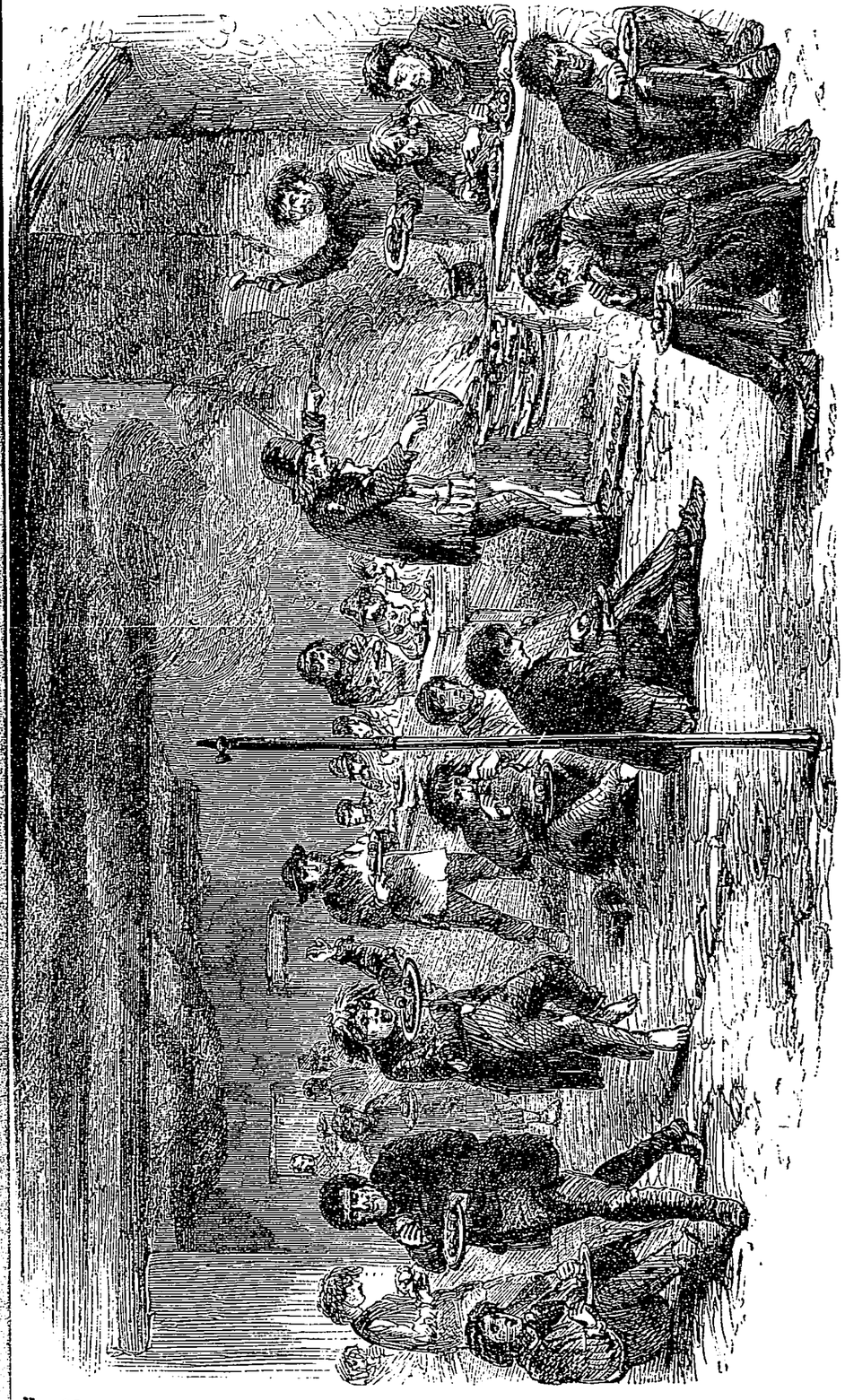
capped head was protruded, and then down was banged the sash with an impatient curse. It appeared as if a gentleman's slumbers had been disturbed, though the nightmen laughed and declared it was a lady's voice! The smell, although the air was frosty, was for some little time, perhaps ten minutes, literally sickening; after that period the chief sensation experienced was a slight headache; the unpleasantness of the odour still continuing, though without any sickening effect. The nightmen, however, pronounced the stench "nothing at all;" and one even declared it was refreshing!

The cesspool in this case was so situated that the cart or rather waggon could be placed about three yards from its edge; sometimes, however, the soil has to be carried through a garden and through the house, to the excessive annoyance of the inmates. The nightmen whom I saw evidently enjoyed a bottle of gin, which had been provided for them by the master of the house, as well as some bread and cheese, and two pots of beer. When the waggon was full, two horses were brought from a stable on the premises (an arrangement which can only be occasionally carried out) and yoked to the vehicle, which was at once driven away; a smaller cart and one horse being used to carry off the residue.

TABLE SHOWING THE NUMBER OF MASTER-SWEEPS, DUST, AND OTHER CONTRACTORS, AND MASTER-BRICKLAYERS, THROUGHOUT THE METROPOLIS, ENGAGED IN NIGHT-WORK, AS WELL AS THE NUMBER OF CESSPOOLS EMPTIED, AND QUANTITY OF SOIL COLLECTED YEARLY. ALSO THE PRICE PAID TO EACH OPERATIVE PER LOAD, OR PER NIGHT, AND THE TOTAL AMOUNT ANNUALLY PAID TO THE MASTER-NIGHTMEN.

District	SWEEPS EMPLOYED AS NIGHTMEN.	Number of Cesspools emptied during the year.	Quantity of Night-soil collected annually.	Number of operative Nightmen employed to empty each Cesspool.	Total number of times the working Nightmen are employed during the year.	Sum paid to each operative Nightman engaged in removing soil from Cesspools.	Total Amount paid to the operative Nightmen during the year.	Total Amount paid to Master-Nightmen during the year for emptying Cesspools, at 10s. per load.
			Loads.			Pence.	£ s. d.	£.
Kensington.	Hurd	8	48	3	24	6	1 4 0	24
	Francis	12	72	4	48	6	1 16 0	36
	Russell	8	48	3	24	6	1 4 0	24
	Hough	20	120	4	80	7	3 10 0	60
Chelsea.	Burns	12	72	3	36	6	1 16 0	36
	Clements	10	60	3	30	6	1 10 0	30
	Groves	18	108	3	54	6	2 14 0	54
	Clayton	20	120	3	60	6	3 0 0	60
	Sheppard	14	84	4	56	6	2 2 0	32
	Nie	16	96	3	48	6	2 8 0	48
	Haddox	20	120	3	60	6	3 0 0	60
	Albrook	30	180	4	120	7	5 5 0	90
Westminster.	Peacock	60	360	4	240	7	10 10 0	180
	Reiley	40	240	4	160	7	6 13 4	120
	White	20	120	3	60	6	3 0 0	60
	Ramsbottom	12	72	3	36	6	1 16 0	36
	Ness	12	72	3	36	6	1 16 0	36
	Porter	10	60	3	30	6	1 10 4	30
	Edwards	8	48	3	24	6	1 4 0	24
	Andrews	8	48	3	24	6	1 4 0	24
	Foreman	10	60	3	30	6	1 10 4	30
St. Martin's.	Wakefield	8	48	3	24	6	1 4 0	24
	Whateley	6	36	3	18	6	0 18 0	18
	Templeton	10	60	3	30	6	1 10 0	30
	Pearce	10	60	3	30	6	1 10 0	30
Marylebone.	Effery	12	72	3	36	6d.	£1 16 0	£36
	Brigham	10	60	3	30	6	1 10 0	30
	Ballard	8	48	3	24	6	1 4 0	24
	Pottle	25	150	4	100	7	3 15 0	75
	Shadwick	20	120	3	60	6	3 0 0	60
	Wilson	20	120	3	60	6	3 0 0	60
	Lewis	10	60	3	30	6	1 10 0	30
	Cuss	30	180	4	120	7	4 10 0	90
	Wood	20	120	3	60	6	3 0 0	60
Paddington.	Prichard	20	120	3	60	6	3 0 0	60
	Randall	25	150	3	75	6	3 15 0	75
	Brown	10	60	3	30	6	1 10 0	30
	Lamb	20	120	3	60	6	3 0 0	60
	Bolton	10	60	3	30	6	1 10 0	30
	Davis	8	48	3	24	6	1 4 0	24
	Rickwood	8	48	3	24	6	1 4 0	4
	Elkins	6	36	3	18	6	0 18 0	18
Hampstead.	Kippin	8	48	3	24	6	1 4 0	24
	Bowden	8	48	3	24	6	1 4 0	24
Islington.	Hughes	25	150	3	75	6	3 15 0	75
	Boven	20	120	3	60	6	3 0 0	60
	Chilcott	25	150	3	75	6	3 15 0	75
	Baker	12	72	3	36	6	1 16 0	36
	Burrows	20	120	3	60	6	3 0 0	60
St. Pancras.	Justo	8	48	3	24	6	1 4 0	24
	Neill	8	48	3	24	6	1 4 0	24
	Robinson	12	72	3	36	6	1 16 0	36
	Marriage	20	120	3	60	6	3 0 0	60
	Rose	12	72	3	36	6	1 16 0	36
	Hall	20	120	3	60	6	3 0 0	60
	Jenkins	12	72	3	36	6	1 16 0	36
	Steel	4	24	3	12	6	0 12 0	12
	Lake	60	360	4	240	7	10 10 0	180
	Hewlett	10	60	3	30	6	1 10 0	30
	Snell	10	60	3	30	6	1 10 0	30
	McDonald	30	180	4	120	7	5 5 0	90
Hackney.	Mason	20	120	3	60	6	3 0 0	60
	Clark	12	72	3	36	6	1 16 0	36
	Starkey	25	150	4	100	6	3 15 0	75
	Attewell	20	120	4	80	7	3 10 0	60
	Brown	12	72	3	36	6	1 16 0	36
St. Giles and St. George, Bloomsbury.	Store	20	120	3	60	6	3 0 0	60
	Richards	20	120	3	60	6	3 0 0	60
	Norris	12	72	3	36	6	3 16 0	36
	Eldridge	8	48	3	24	6	1 4 0	24
	Davis	10	60	3	30	6	1 10 0	30
	Francis	10	60	3	30	6	1 10 0	30
	Tiney	12	72	3	36	6	1 16 0	36
	Johnson	8	48	3	24	6	1 4 0	24
	Tinsey	8	48	3	24	6	1 4 0	24
	Randall	4	24	3	12	6	0 12 0	12
	Day	60	360	4	240	7	10 10 0	180
Strand.	Catlin	10	60	3	30	6	1 10 0	30
	Richards	8	48	3	24	6	1 4 0	24
	Hutchins	8	48	3	24	6	1 4 0	24
	Barker	4	24	3	12	6	0 12 0	12
Holborn.	Duck	30	180	4	120	7	5 5 0	90
	Eagle	20	120	4	80	7	3 10 0	60
	Froome	12	72	3	36	6	1 16 0	36
	Smith	12	72	3	36	6	1 16 0	36
Clerkenwell.	Davis	30	180	3	90	6	4 10 0	90
	Brown	20	120	4	80	7	3 10 0	60
	Day	12	72	3	36	6	1 16 0	36
	Hawkins	8	48	3	24	6	1 4 0	24
	Grant	8	48	3	24	6	1 4 0	24

St. Luke's.	Brown	20	120	4	80	7d.	£3 0 0		£60
	Mawley	20	120	4	80	7	3 0 0		60
	Stevens	12	72	3	36	6	1 16 0		36
	Badger	8	48	3	24	6	1 4 0		24
	Lewis	8	48	3	24	6	1 4 0		24
East London.	Crozier	30	180	4	120	7	5 5 0		90
	James	20	120	4	80	7	3 10 0		60
	Dawson	8	48	3	24	6	1 4 0		24
	Newell	20	120	4	80	7	3 10 0		60
	Lumley	8	48	3	24	6	1 4 0		24
	Harvey	6	36	3	18	6	0 18 0		18
West London.	Rayment	20	120	4	80	6	3 0 0		60
	Clarke	20	120	4	80	7	3 0 0		60
	Watson	12	72	3	36	6	1 16 0		36
	Desater	12	72	3	36	6	1 16 0		36
London, City.	Tyler and Tyso	30	180	4	120	7	5 5 0		90
	Burgess	20	120	4	80	7	3 10 0		60
	Wilson	20	120	4	80	7	3 10 0		60
	Potter	10	60	3	30	6	1 10 0		30
	Wright	8	48	3	24	6	1 4 0		24
Shoreditch.	Wells	20	120	4	80	6	3 0 0		60
	Whittle	20	120	4	80	6	3 0 0		60
	Collins	15	90	3	45	6	2 5 0		45
	Crew	12	72	3	36	6	1 16 0		36
	Atwood	12	72	3	36	6	1 16 0		36
	Conroy	10	60	3	30	6	1 10 0		30
	Pusey	6	36	3	18	6	0 18 0		18
	Pedrick	8	48	3	24	6	1 4 0		24
Bethnal Green.	Crosby	8	48	3	24	6	1 4 0		24
	Mull	12	72	3	36	6	1 16 0		36
	Darby	20	120	4	80	6	3 0 0		60
	Hall	20	120	4	80	6	3 0 0		60
	Collins	12	72	3	36	6	1 16 0		36
White-chapel.	Brazier	10	60	3	30	6	1 10 0		30
	Harrison	20	120	3	60	6	3 0 0		60
	Harris	16	96	3	48	6	2 8 0		48
	Mantz	8	48	3	24	6	1 4 0		24
	Whitehead	20	120	4	80	6	3 0 0		60
St. George-in-the-East.	Rawton	20	120	4	80	6	3 0 0		60
	Wrotham	20	120	4	80	6	3 0 0		60
	Harewood	20	120	3	60	6	3 0 0		60
	Rawthorn	25	150	4	100	6	3 15 0		75
	Darling	20	120	4	80	6	3 0 0		60
	Jones	15	90	3	45	6	2 5 0		45
	Johnson	12	72	3	36	6	1 16 0		36
Bermondsey.	Simpson	15	90	3	45	6	2 5 0		45
	Wilkinson	12	72	3	36	6	1 16 0		36
	Goring	10	60	3	30	6	1 10 0		30
	Lively	8	48	3	24	6	2 4 0		24
	Stone	9	54	3	27	6	1 7 0		24
	Ward	6	36	3	18	6	0 18 0		27
Walworth and Newington.	Kingsbury	6	36	3	18	6	0 18 0		18
	Goodge	4	24	3	12	6	0 12 0		18
	Wells	15	90	3	45	6	2 5 0		12
	Wilks	12	72	3	36	6	1 16 0		45
	James	10	60	3	30	6	1 10 0		36
	Morgan	8	48	3	24	6	1 4 0		30
	Croney	8	48	3	24	6	1 4 0		24
	Holmes	8	48	3	24	6	1 4 0		30
Stepney.	Newell	10	60	3	30	6	1 10 0		30
	Fleming	20	120	3	60	6	3 0 0		60
	Tuff	20	120	3	60	6	3 0 0		60
	Hillingsworth	12	72	3	36	6	1 16 0		36
	Smith	10	60	3	30	6	1 10 0		30
	Field	8	48	3	24	6	1 4 0		24



A DINNER AT A CHEAP LODGING-HOUSE.

No. 68.

Poplar	Weaver	18	108	3	54	6*d.*	£2 14 0	£54
	Strawson	12	72	3	36	6	1 16 0	36
	Culloder	8	48	3	24	6	1 4 0	24
	Ward	10	60	3	30	6	1 10 0	30
[illegible]	Vines	12	72	3	36	6	1 16 0	36
	Humfry	15	90	3	45	6	2 5 0	45
	Young	10	60	3	30	6	1 10 0	30
	James	12	72	3	36	6	1 16 0	36
	Penn	10	60	3	30	6	1 10 0	30
	Holliday	8	48	3	24	6	1 4 0	24
	Muggeridge	15	90	3	45	6	2 5 0	45
	Alcorn	12	72	3	36	6	1 16 0	36
	Fisher	12	72	3	36	6	1 16 0	36
	Goode	10	60	3	30	6	1 10 0	30
	Smith	8	48	3	24	6	1 4 0	24
	Roberts	8	48	3	24	6	1 4 0	24
	Pilkington	9	54	3	27	6	1 7 0	27
	Lindsey	6	36	3	18	6	0 18 0	18
	Daycock	6	36	3	18	6	0 18 0	18
	Moulton	4	24	3	12	6	0 12 0	12
Lambeth	Roberts	25	150	4	100	7	4 7 6	75
	Holland	12	72	3	36	6	1 16 0	36
	Ballard	12	72	3	36	6	1 16 0	36
	Brown	8	48	3	24	6	1 4 0	24
	Mills	10	60	3	30	6	1 10 0	30
	Giles	6	36	3	18	6	0 18 0	18
	Spooner	6	36	3	18	6	0 18 0	18
	Green	4	24	3	12	6	0 12 0	12
	Barnham	4	24	3	12	6	0 12 0	12
	Price	4	24	3	12	6	0 12 0	12
[illegible]	Plummer	18	108	3	54	6	2 14 0	54
	Steers	12	72	3	36	6	1 16 0	36
	Clare	10	60	3	30	6	1 10 0	30
	Garlick	8	48	3	24	6	1 4 0	24
	Hudson	6	36	3	18	6	0 18 0	18
	Jones	4	24	3	12	6	0 12 0	12
[illegible]	Foreman	15	90	3	45	6	2 5 0	45
	Smith	10	60	3	30	6	1 10 0	38
	Giles	8	48	3	24	6	1 4 0	24
	Davis	6	36	3	18	6	0 18 0	18
	Flushman	4	24	3	12	6	0 12 0	12
[illegible]	Shelley	6	36	3	18	6	0 18 0	18
	Richardson	20	120	4	80	6	3 0 0	60
	Norris	8	48	3	24	6	1 4 0	24
	Smith	12	72	3	36	6	1 16 0	36
	Dyer	8	48	3	24	6	1 4 0	24
[illegible]	Manning	30	180	4	120	6	4 10 0	90
	Vines	20	120	4	80	6	3 0 0	60
	Roseworthy	20	120	4	80	6	3 0 0	60
	Tyler	12	72	3	36	6	1 16 0	36
	Munshin	12	72	3	36	6	1 16 0	36
Woolwich	Pearce	30	180	4	120	6	4 10 0	99
	Fiddeman	12	72	3	36	6	1 16 0	36
	Sims	12	72	3	36	6	1 16 0	36
	Smithers	12	72	3	36	6	1 16 0	36
	Rooke	8	48	3	24	6	1 4 0	24
	James	8	48	3	24	6	1 4 0	24
[illegible]	Ridgeway	20	120	4	80	6	3 0 0	60
	Binney	10	60	3	30	6	1 10 0	30
	Total for Sweep-nightmen	2992	14960	3 & 4	10,062	6&7*d.*	455 15 0	£7480

DUST AND OTHER CONTRACTORS ENGAGED AS NIGHTMEN.

		Loads.			Pence.	£	s.	d.	£	s.
Darke	50	300	4	200	8	10	0	0	157	10
Cooper	300	1800	4	1200	8	60	0	0	945	0
Dodd	300	1800	4	1200	8	60	0	0	945	0
Starkey	250	1500	4	1000	8	50	0	0	787	10
Williams	200	1200	4	800	8	40	0	0	630	0
Boyer	150	900	4	600	8	30	0	0	472	10
Gore	200	1200	4	800	8	40	0	0	630	0
Limpus	200	1200	4	800	8	40	0	0	630	0
Emmerson	150	900	4	600	8	30	0	0	472	10
Duggins	360	2160	4	1440	8	72	0	0	1134	0
Bugbee	250	1500	4	1000	8	50	0	0	787	10
Gould	200	1200	4	800	8	40	0	0	630	0
Reddin	200	1200	4	800	8	40	0	0	630	0
Newman	200	1200	4	800	8	40	0	0	630	0
Tame	300	1800	4	1200	8	60	0	0	945	0
Sinnot	200	1200	4	800	8	40	0	0	630	0
Tomkins	200	1200	4	800	8	40	0	0	630	0
Cordroy	150	900	4	600	8	30	0	0	472	10
Samuels	150	900	4	600	8	30	0	0	472	10
Robinson	100	600	4	400	8	20	0	0	315	0
Bird	100	600	4	400	8	20	0	0	315	0
Clarke	100	600	4	400	8	20	0	0	315	0
Brown	100	600	4	400	8	20	0	0	315	0
Bonner	150	900	4	600	8	30	0	0	472	10
Guess	100	600	4	400	8	20	0	0	315	0
Jeffries	200	1200	4	800	8	40	0	0	630	0
Ryan	60	360	4	240	8	12	0	0	189	0
Hewitt	100	600	4	400	8	20	0	0	315	0
Leimming	50	300	4	200	8	10	0	0	157	10
Ellis	100	600	4	400	8	20	0	0	315	0
Monk	150	900	4	600	8	30	0	0	472	10
Phillips	250	1000	4	1000	8	33	6	8	525	0
Porter	200	1200	4	800	8	40	0	0	630	0
Dubbins	150	900	4	600	8	30	0	0	472	10
Taylor	100	600	4	400	8	20	0	0	315	0
Nicholls	250	1000	4	1000	8	33	6	8	525	0
Freeman	100	600	4	400	8	20	0	0	315	0
Pattison	200	1200	4	800	8	40	0	0	630	0
Rawlins	150	900	4	600	8	30	0	0	472	10
Watkins	200	1200	4	800	8	40	0	0	630	0
Liddiard	100	600	4	400	8	20	0	0	315	0
Farmer	250	1500	4	1000	8	50	0	0	787	10
Francis	150	900	4	600	8	30	0	0	472	10
Chadwick	200	1200	4	800	8	40	0	0	630	0
Perkins	80	480	4	320	8	16	0	0	252	0
Culverwell	100	600	4	400	8	20	0	0	315	0
Rutty	150	900	4	600	8	30	0	0	472	10
Crook	100	600	4	400	8	20	0	0	315	0
M'Carthy	50	300	4	200	8	10	0	0	157	10
Bateman	100	600	4	400	8	20	0	0	315	0
Boothe	250	1500	4	1000	8	50	0	0	787	10
Wood	100	600	4	400	8	20	0	0	315	0
Calvert	150	900	4	600	8	30	0	0	472	10
Tilley	200	1200	4	800	8	40	0	0	630	0
Abbott	100	600	4	400	8	20	0	0	315	0
Potter	250	1500	4	1000	8	50	0	0	787	10
Church	100	600	4	400	8	20	0	0	315	0
Humphries	200	1200	4	800	8	40	0	0	630	0
Jackson	100	600	4	400	8	20	0	0	315	0
Batterbury	50	300	4	200	8	10	0	0	157	10

Smith	50	300	4	200	8d.	£10	0	0	£157	10
Perkins	200	1200	4	800	8	40	0	0	630	0
Rose	50	300	4	200	8	10	0	0	157	10
Croot	150	900	4	600	8	30	0	0	472	10
Speller	50	300	4	200	8	10	0	0	157	10
Piper	50	300	4	200	8	10	0	0	157	10
North	100	600	4	400	8	20	0	0	315	0
Crooker	150	900	4	600	8	30	0	0	472	10
Tingey	100	600	4	400	8	20	0	0	315	0
Jones	200	1200	4	800	8	40	0	0	630	0
Whitten	300	1800	4	1200	8	60	0	0	945	0
Webbon	150	900	4	600	8	30	0	0	472	10
Ryder	100	600	4	400	8	30	0	0	315	0
Wright	150	900	4	600	8	30	0	0	472	10
Duckett	300	1800	4	1200	8	60	0	0	945	0
Elworthy	200	1200	4	800	8	40	0	0	630	0
Slee	200	1200	4	800	8	40	0	0	630	0
Adams	150	900	4	600	8	30	0	0	472	10
Gutteris	50	300	4	200	8	10	0	0	157	10
Martainbody	200	1200	4	800	8	40	0	0	630	0
Nicholson	100	600	4	400	8	20	0	0	315	0
Mears	100	600	4	400	8	20	0	0	315	0
Parsons	150	900	4	600	8	30	0	0	472	10
Kenning	200	1200	4	800	8	40	0	0	630	0
Hooke	250	1500	4	1000	8	50	0	0	787	10
Michell	100	600	4	400	8	20	0	0	315	0
Walton	200	1200	4	800	8	40	0	0	630	0
Evans	50	300	4	200	8	10	0	6	157	10
Walker	90	540	4	360	8	18	0	0	283	10
Hobman	200	1200	4	800	8	40	0	0	630	0
Stevens	250	1500	4	1000	8	50	0	0	787	10
Jeffry	150	900	4	600	8	30	0	0	472	10
Hiscock	200	1200	4	800	8	40	0	0	630	0
Allen	100	600	4	400	8	20	0	0	315	0
Connall	100	600	4	400	8	20	0	0	315	0
Waller	50	300	4	200	8	10	0	0	157	10
Mullard	50	300	4	200	8	10	0	0	157	10
Miller	100	600	4	400	8	20	0	0	315	0
Barnes	150	900	4	600	8	30	0	0	472	10
Sharpe	100	600	4	400	8	20	0	0	315	0
Graham	150	900	4	600	8	30	0	0	472	10
Wellard	100	600	4	400	8	20	0	0	315	0
Hollis	50	300	4	200	8	10	0	0	157	10
Fletcher	150	900	4	600	8	30	0	0	472	10
Hearne	100	600	4	400	8	20	0	0	315	0
Stapleton	50	300	4	200	8	10	0	0	157	10
Martin	200	1200	4	800	8	40	0	0	630	0
Prett and Sewell	300	1800	4	1200	8	60	0	0	945	0
Jenkins	200	1200	4	800	8	40	0	0	630	0
Westley	150	900	4	600	8	30	0	0	472	10
Bird	100	600	4	400	8	20	0	0	315	0
Gale	200	1200	4	800	8	40	0	0	630	0
Porter	100	600	4	400	8	20	0	0	315	0
Wells	200	1200	4	800	8	40	0	0	630	0
Hall	250	1500	4	1000	8	50	0	0	787	10
Kitchener	150	900	4	600	8	30	0	0	472	10
Wickham	100	600	4	400	8	20	0	0	315	0
Walker	200	1200	4	800	8	40	0	0	630	0
Bindy	100	600	4	400	8	20	0	0	315	0
Styles	250	1500	4	1000	8	50	0	0	787	10
Kirtland	100	600	4	400	8	20	0	0	315	0
Kingston	100	600	4	400	8	20	0	0	315	0
Eldred	150	900	4	600	8	30	0	0	472	10
Rumball	250	1500	4	1000	8	50	0	0	787	10
Mildwater	60	360	4	240	8	12	0	0	189	0
Lovell	100	600	4	400	8	20	0	0	315	0

Clarkson	150	900	4	600	8d.	£30	0	0	£472 10
Rhodes	100	600	4	400	8	20	0	0	315 0
Pine	200	1200	4	800	8	40	0	0	630 0
Monk	250	1500	4	1000	8	50	0	0	787 10
Gabriel	100	600	4	400	8	20	0	0	315 0
Packer	200	1200	4	800	8	40	0	0	630 0
Crawley	250	1500	4	1000	8	50	0	0	787 10
Easton	150	900	4	600	8	30	0	0	472 10
Marsland	150	900	4	600	8	30	0	0	472 10
East	100	600	4	400	8	20	0	0	315 0
Turtle	200	1200	4	800	8	40	0	0	630 0
Fuller	200	1200	4	800	8	40	0	0	630 0
Taylor	100	600	4	400	8	20	0	0	315 0
Ginnow	150	900	4	600	8	30	0	0	472 10
Peakes	150	900	4	600	8	30	0	0	472 10
Fleckell	50	300	4	200	8	60	0	0	157 10
Cook	50	300	4	200	8	10	0	0	157 10
Stewart	100	600	4	400	8	20	0	0	315 0
Cooper	100	600	4	400	8	20	0	0	315 0
Bentley	200	1200	4	800	8	40	0	0	630 0
Harford	200	1200	4	800	8	40	0	0	630 0
Litten	100	600	4	400	8	20	0	0	315 0
Mills	150	900	4	600	8	30	0	0	472 10
Voy	100	600	4	400	8	20	0	0	315 0
Cortman	50	300	4	200	8	10	0	0	157 10
Forster	100	600	4	400	8	20	0	0	315 0
Davison	150	900	4	600	8	30	0	0	472 10
Williams	250	1500	4	1000	8	50	0	0	787 10
Draper	200	1200	4	800	8	40	0	0	630 0
Claxton	100	600	4	400	8	20	0	0	315 0
Robertson	50	300	4	200	8	10	0	0	157 10
Cornwall	100	600	4	400	8	20	0	0	315 0
Price	150	900	4	600	8	30	0	0	472 10
Milligan	200	1200	4	800	8	40	0	0	630 0
West	250	1500	4	1000	8	50	0	0	787 10
Wilson	100	600	4	400	8	20	0	0	315 0
Lawn	100	600	4	400	8	20	0	0	315 0
Oakes	50	300	4	200	8	10	0	0	157 10
Joliffe	150	900	4	600	8	30	0	0	472 10
Liley	100	600	4	400	8	20	0	0	315 0
Treagle	120	720	4	480	8	24	0	0	378 0
Coleman	50	300	4	200	8	10	0	0	157 10
Brooker	200	1200	4	800	8	40	0	0	630 0
Dignam	200	1200	4	800	8	40	0	0	630 0
Hillier	150	900	4	600	8	30	0	0	472 10
Simmonds	150	900	4	600	8	30	0	0	472 10
Penrose	100	600	4	400	8	20	0	0	315 0
Jordan	200	1200	4	800	8	40	0	0	630 0
Macey	100	600	4	400	8	20	0	0	315 0
Williams	150	900	4	600	8	30	0	0	472 10
Palmer	200	1200	4	800	8	40	0	0	630 0
Anderson	100	600	4	400	8	20	0	0	315 0
George	200	1200	4	800	8	40	0	0	630 0
Hasleton	50	300	4	200	8	10	0	0	157 10
Willis	250	1500	4	1000	8	50	0	0	787 10
Farringdon	50	300	4	200	8	10	0	0	157 10
Doyle	100	600	4	400	8	20	0	0	315 0
Lamb	100	600	4	400	8	20	0	0	315 0
Bolton	200	1200	4	800	8	40	0	0	630 0
Lovelock	250	1500	4	1000	8	50	0	0	787 10
Ashfield	50	300	4	200	8	10	0	0	157 10
Braithwaite	100	600	4	400	8	20	0	0	315 0
Total for Dust and other Contractors engaged as Nightmen	27,820	139,100	4	101,240	8d.	£5596	13	4	£78,027 10

MASTER-BRICKLAYERS ENGAGED AS NIGHTMEN.

		Loads.			Averages Cesspools a Night.	£	s.	d.	£	s.
Albon	100	600	4	400	5s. ea.	12	10	0	315	0
Danver	150	900	4	600	„	18	15	0	472	10
Buck	90	540	4	360	„	11	5	0	283	10
Aldred	150	900	4	600	„	18	15	0	472	10
Bowler	150	900	4	600	„	18	15	0	472	10
Deacon	250	1500	4	1000	„	31	5	0	787	10
Barrett	200	1200	4	800	„	25	0	0	630	0
Elmes	90	540	4	360	„	11	5	0	283	10
Gray	100	600	4	400	„	12	10	0	315	0
Emmerton	150	900	4	600	„	18	15	0	472	10
Coleman	100	600	4	400	„	12	10	0	315	0
Belchier	250	1500	4	1000	„	31	5	0	787	0
Wade	200	1200	4	800	„	25	0	0	630	0
Turner	100	600	4	400	„	12	10	0	315	0
Suiton	150	900	4	600	„	18	15	0	472	10
Cutmore	200	1200	4	800	„	25	0	0	630	0
Plowman	150	900	4	600	„	18	15	0	472	10
Brockwell	200	1200	4	800	„	25	0	0	630	0
Bellamy	200	1200	4	800	„	25	0	0	630	0
Janes	50	300	4	200	„	6	5	0	157	10
Higgs	50	300	4	200	„	6	5	0	157	10
Avery	100	600	4	400	„	12	10	0	315	0
Bailey	150	900	4	600	„	18	15	0	472	10
Pitman	200	1200	4	800	„	25	0	0	630	0
Hosier	150	900	4	600	„	18	15	0	472	10
Chambers	150	900	4	600	„	18	15	0	472	10
Turner	100	600	4	400	„	12	10	0	315	0
Sutton	150	900	4	600	„	18	15	0	472	10
Phenix	80	480	4	320	„	10	0	0	252	0
Elsden	50	300	4	200	„	6	5	0	157	10
Fuller	200	1200	4	800	„	25	0	0	630	0
Heath	200	1200	4	800	„	25	0	0	630	0
Beach	80	480	4	320	„	10	0	0	252	0
Jones	100	600	4	400	„	12	10	0	315	0
Gilbert	250	1500	4	1000	„	31	5	0	787	10
Green	100	600	4	400	„	12	10	0	315	0
King	250	1500	4	1000	„	31	5	0	787	10
Parker	150	900	4	600	„	18	15	0	472	10
Kelsey	200	1200	4	800	„	25	0	0	630	0
Palmer	250	1500	4	1000	„	31	5	0	787	10
Sinclair	100	600	4	400	„	12	10	0	315	0
Peck	200	1200	4	800	„	25	0	0	630	0
Young	50	300	4	200	„	6	5	0	157	10
Winter	100	600	4	400	„	12	10	0	315	0
Wolfe	90	540	4	360	„	11	5	0	283	10
Taber	50	300	4	200	„	6	5	0	157	10
Kellow	100	600	4	400	„	12	10	0	315	0
Mercer	150	900	4	600	„	18	15	0	472	10
Oswell	250	1500	4	1000	„	31	5	0	787	10
Mallett	90	540	4	360	„	11	5	0	283	10
Handley	180	1080	4	720	„	22	10	0	567	0
Bull	150	900	4	600	„	18	15	0	472	10
Atkinson	200	1200	4	800	„	25	0	0	630	0
Dennis	250	1500	4	1000	„	31	5	0	787	10
Fordham	100	600	4	400	„	12	10	0	315	0
Wigmore	150	900	4	600	„	18	15	0	472	10

Ricketts	300	1800	4	1200	5s. ea.	£37 10 0	£945 0
Linnegar	250	1500	4	1000	„	31 5 0	787 10
Price	100	600	4	400	„	12 10 0	315 0
James	300	1800	4	1200	„	37 10 0	945 0
Wills	180	1080	4	720	„	22 10 0	567 0
Templar	100	600	4	400	„	12 10 0	315 0
Tolley	50	300	4	200	„	6 5 0	157 10
Smallman	100	600	4	400	„	12 10 0	315 0
Macey	150	900	4	600	„	18 15 0	472 10
Livermore	250	1500	4	1000	„	31 5 0	787 10
Oakham	250	1500	4	1000	„	31 5 0	787 10
Rudd	100	600	4	400	„	12 10 0	315 0
Kerridge	150	900	4	600	„	18 15 0	472 10
Perrin	150	900	4	600	„	18 15 0	472 10
Thomas	300	1800	4	1200	„	37 10 0	945 0
Moore	150	900	4	600	„	18 15 0	472 10
Reeves	200	1200	4	800	„	25 0 0	630 0
Pearson	100	600	4	400	„	12 10 0	315 0
Stollery	50	300	4	200	„	6 5 0	157 10
Connew	250	1500	4	1000	„	31 5 0	787 10
Floyd	100	600	4	400	„	12 10 0	315 0
Girling	300	1800	4	1200	„	37 10 0	945 0
Gilbert	150	900	4	600	„	18 15 0	742 10
Carter	250	1500	4	1000	„	31 5 0	787 10
Clayden	200	1200	4	800	„	25 0 0	630 0
Bibbing	50	300	4	200	„	6 5 0	157 10
Dunn	100	600	4	400	„	12 10 0	315 0
Howell	100	600	4	400	„	12 10 0	315 0
Fursey	100	600	4	400	„	12 10 0	315 0
Archer	250	1500	4	1000	„	31 5 0	787 10
Hart	300	1800	4	1200	„	37 10 0	945 0
Cole	100	600	4	400	„	12 10 0	315 0
Essex	250	1500	4	1000	„	31 5 0	787 10
Hinton	100	600	4	400	„	12 10 0	315 0
Wiseman	150	900	4	600	„	18 15 0	472 10
Tepner	200	1200	4	800	„	25 0 0	630 0
Unwin	250	1500	4	1000	„	31 5 0	787 10
Treharne	300	1800	4	1200	„	37 10 0	945 0
Havenny	50	300	4	200	„	6 5 0	157 10
Williams	100	600	4	400	„	12 10 0	315 0
Plant	200	1200	4	800	„	25 0 0	630 0
Linfield	250	1500	4	1000	„	31 5 0	787 10
Morris	150	900	4	600	„	18 15 0	472 10
Jenkins	300	1800	4	1200	„	37 10 0	945 0
Buck	200	1200	4	800	„	25 0 0	630 0
Hadnutt	150	900	4	600	„	18 15 0	472 10
Cuming	200	1200	4	800	„	25 0 0	630 0
Douglas	100	600	4	400	„	12 10 0	315 0
Hogden	300	1800	4	1200	„	37 10 0	945 0
M'Currey	300	1800	4	1200	„	37 10 0	945 0
Warne	50	300	4	200	„	6 5 0	157 10
Whitechurch	200	1200	4	800	„	25 0 0	630 0
Stevenson	150	900	4	600	„	18 15 0	472 10
Izard	300	1800	4	1200	„	37 10 0	945 0
Jones	250	1500	4	1000	„	31 5 0	787 10
Rutley	100	600	4	400	„	12 10 0	315 0
Prichard	200	1200	4	800	„	25 0 0	630 0
Watts	250	1500	4	1000	„	31 5 0	787 10
Woodcock	150	900	4	600	„	18 15 0	472 10
Osborn	300	1800	4	1200	„	37 10 0	945 0
Morland	250	1500	4	1000	„	31 5 0	787 10
Brown	300	1800	4	1200	„	37 10 0	945 0
Hughes	150	900	4	600	„	18 15 0	472 10
Total for Master-Bricklayers engaged as Nightmen	19,880	99,400	4	59,520	5s.	£2,485 0	£52,185 0

SUMMARY OF THE ABOVE TABLE.

MASTER-SWEEPS EMPLOYED AS NIGHTMEN IN	Number of Masters employed as Nightmen.	Number of Cesspools emptied during the year.	Quantity of Night-soil collected annually.	Number of working Nightmen employed to each Cesspool.	Sum per load paid to each operative Nightman engaged in removing soil from Cesspools.	Total Amount paid to Master-Nightmen during the Year for emptying Cesspools.
			Loads.		Pence.	£ s. d.
Kensington	4	48	240	3 & 4	6 & 7	120 0 0
Chelsea	8	140	700	3 & 4	6 & 7	350 0 0
Westminster	9	180	900	3	6	450 0 0
St. Martin's	4	34	170	3	6	85 0 0
Marylebone	9	155	775	3 & 4	6 & 7	387 10 0
Paddington	8	107	535	3	6	267 10 0
Hampstead	2	16	80	3	6	40 0 0
Islington	4	82	410	3	6	205 0 0
St. Pancras	13	226	1,130	3 & 4	6 & 7	565 0 0
Hackney	5	89	445	3 & 4	6 & 7	222 10 0
St. Giles's and St. George's, Bloomsbury	11	172	860	3 & 4	6 & 7	430 0 0
Strand	4	30	150	3	6	75 0 0
Holborn	4	74	370	3 & 4	6 & 7	185 0 0
Clerkenwell	5	78	390	3 & 4	6 & 7	195 0 0
St. Luke's	5	68	340	3 & 4	6 & 7	170 0 0
East London	6	92	460	3 & 4	6 & 7	230 0 0
West London	4	64	320	3 & 4	6 & 7	160 0 0
London, City	5	88	440	3 & 4	6 & 7	220 0 0
Shoreditch	7	95	475	3 & 4	6	237 10 0
Bethnal-green	5	68	340	3 & 4	6	170 0 0
Whitechapel	5	66	330	3	6	165 0 0
St. George's-in-the-East	8	152	760	3 & 4	6	380 0 0
Stepney	6	80	400	3	6	200 0 0
Poplar	4	48	240	3	6	120 0 0
St. Olave's, St. Saviour's, and St. George's, Southwark	16	157	785	3	6	392 10 0
Bermondsey	6	60	300	3	6	150 0 0
Walworth and Newington	8	71	355	3	6	177 10 0
Lambeth	10	91	455	3 & 4	6 & 7	227 10 0
Christchurch, Lambeth	6	58	290	3	6	145 0 0
Wandsworth and Battersea	5	43	215	3	6	107 10 0
Rotherhithe	5	54	270	3 & 4	6	135 0 0
Greenwich and Deptford	5	94	470	3 & 4	6 & 7	235 0 0
Woolwich	6	82	410	3 & 4	6	205 0 0
Lewisham	2	30	150	3 & 4	6	75 0 0
Total for Sweeps employed as Nightmen	214	2,992	14,960	3 & 4	6 & 7	7,480 0 0
Total for Dust and other Contractors employed as Nightmen	188	27,820	139,600	4	8	72,027 0 0
Total for Bricklayers employed as Nightmen	119	19,880	99,400	4	5s. a night	52,185 0 0
Gross Total	521	50,692	253,960	3 & 4	6d. 7d. & 8d. per ld. & 5s. per night.	131,692 10 0

A TABLE SHOWING THE QUANTITY OF REFUSE BOUGHT, COLLECTED, OR FOUND, IN THE STREETS OF LONDON.

Articles bought, collected, or found.	Annual gross quantity.	Average Number of Buyers, and quantity sold Daily or Weekly.	Obtained of the Street Buyers.	Price per pound weight, &c.	Average Yearly Money Value. £ s. d.	Parties to whom sold.
REFUSE METAL.						
Copper	291,600 lbs.	200 buyers ¼ cwt. each weekly	1-500th	6*d.* per lb.	7,290 0 0	Sold to brass-founders and pewterers.
Brass	291,600 „	200 do. ¼ „ do.	„	4*d.* „	4,860 6 8	Do. do.
Iron	2,329,600 „	200 do. 2 „ do.	1-200th	½*d.* „	2,426 13 4	Do. to iron-founders and manufacturers.
Steel	62,400 „	200 do. 6 lbs. do.	none	1*d.* „	260 0 0	Do. to manufacturers.
Lead	1,164,800 „	200 do. 1 cwt. do.	1-500th	1½*d.* „	7,280 0 0	Do. to brass-founders and pewterers.
Pewter	291,600 „	200 do. ¼ „ do.	„	5*d.* „	6,075 13 4	Do. do.
					28,192 13 4	
HORSE & CARRIAGE FURNITURE.						
Carriages	120 „	4 do. 30 sets yearly	none	11*l.* each	1,320 0 0	Sold to Jew dealers.
Wheels (4, from coach-builders)	600 sets	100 do. 8 do.	„	25*s.* a set	750 0 0	Do. to costers and small tradesmen.
Wheels, in pairs for carts & trucks	600 pairs	50 do. 12 pairs yearly	„	7*s.* a pair	210 0 0	Do. do.
Springs for trucks and small carts	780 „	5 do. 3 „ weekly	„	6*s.* per pair	234 0 0	Do. to costers and others.
Lace, from coach-builders	1,344 lbs.	12 do. 112 lbs. yearly	„	1*d.* per lb.	5 12 0	Do. to cab-masters and to Jews.
Fringe and tassels, from ditto	2,688 „	12 do. 224 „ do.	„	½*d.* „	5 12 0	Do. to Jews.
Coach & carriage linings, singly	156	12 do. 13 yearly	„	25*s.* each	195 0 0	Do. to cab-masters.
Harness (carriage pairs)	60 pairs	10 do. 6 pairs do.	„	3*l.* per pair	180 0 0	Do. to omnibus proprietors.
Ditto (single sets)	144 sets	12 do. 12 sets do.	„	30*s.* per set	216 0 0	Do, to cab-masters.
Ditto (sets of donkey and pony)	41,600 „	100 do. 8 sets weekly	harness makers	4*s.* a set	8,320 0 0	Do. to little master harness-makers.
Saddles	1,040 „	10 do. 2 „ do.	none	4*s.* „	203 0 0	Do. do.
Collars	2,080 „	10 do. 4 „ do.	„	9*d.* „	78 0 0	Do. do. and marine stores.
Bridles	4,160 „	10 do. 6 „ do.	„	8*d.* „	138 13 4	Do. do. do.
Pads	2,080 „	10 do. 4 „ do.	„	6*d.* „	52 0 0	Do. do.
Bits	4,160 „	10 do. 3 „ do.	„	2*d.* „	34 13 4	Do. do. do.
Leather (new cuttings from coach-builders)	58,136 lbs.	24 do. 22 cwt. yearly	„	4*d.* „	985 12 0	Do. to Jews and also to gunsmiths.
Ditto (morocco cuttings from do.)	960 „	20 do. 48 „ do.	„	1*s.* 6*d.* „	72 0 0	Do. to tailors' trimming-sellers.
Old leather (waste from ditto)	53,760 „	12 do. 20 „ do.	„	2½*d.* „	560 0 0	Do. to Jews.
					13,560 2 8	
REFUSE LINEN, COTTON, &c.						
Rags (woollen, consisting of tailors' shreds, old flannel drugget, carpet, and moreen)	4,659,200 lbs.	200 do. 4 „ weekly	1-1000th	⅓*d.* per lb.	9,706 13 4	Sold for manure and to nail up fruit-trees.
Ditto (coloured cotton)	2,912,000 „	200 do. 2½ „ do.	1-500th	½*d.* „	6,066 13 4	Do. to paper-makers and for quilts.
Ditto (white)	1,164,800 „	200 do. 1 „ do.	1-1000th	2*d.* „	9,706 13 4	Do. to paper-makers.
Canvas	44,800 „	200 do. 2 „ yearly	none	1*d.* „	186 13 4	Do. to chance customers.
Rope and sacking	291,200 „	200 do. ¼ „ weekly	1-500th	½*d.* „	606 13 4	Do. for oakum and sacking to mend old sacks.
					36,898 13 4	
PAPER.						
Waste paper	1,397,760 „	60 colls. each disposing of 4 cwt. weekly	all	18*s.* per cwt.	11,232 0 0	Do. to shopkeepers.
GLASS AND CROCKERYWARE.						
Bottles (common and doctors')	62,400 doz.	200 buyers, 24 weekly	1-100th	2*d.* per doz.	520 0 0	Do. to doctors and chemists.
Ditto (wine)	31,200 „	200 do. 12 do.	1-200th	6*d.* „	780 0 0	Do. to Brit. wine merchants & ale stores.
Ditto (porter and stout)	4,800 „	200 do. 24 dozen yearly	none	6*d.* „	120 0 0	Do. to ale and porter stores.
Flint glass	15,600 lbs.	200 do. 1¼ lbs. weekly	1-1000th	¾*d.* per lb.	16 5 0	Do. to glass manufacturers.
Pickling jars	7,200 „	200 do. 36 yearly	none	¾*d.* each	22 10 0	Do. to Italian warehouses, &c.
Gallipots	20,800 doz.	200 do. 24 weekly	„	2*d.* per doz.	173 6 8	Do. do.
					1,632 1 8	
REFUSE APPAREL.						
Coats	624,000	300 colls each, purchasing 8 coats daily	bt. of old clo'men	6*s.* each	187,200 0 0	Sold to old clo'men and wholesale dealers.
Trousers	312,000 pairs	300 do. do. 4 pr. trousers do.	„	3*s.* 3*d.* per pr.	50,700 0 0	Do. do.
Waistcoats	312,000	300 do. do. 3 waistcoats do.	„	7*d.* each	9,100 0 0	Do. do.
Under-waistcoats	46,800	300 do. do. 3 weekly	„	2*d.* „	390 0 0	Do. to wholesale and wardrobe dealers.
Breeches and gaiters	15,600 pairs	300 do. do. 1 pair weekly	„	2*s.* per pair	1,560 0 0	Do. to old clo'men and wholesale dealers.
Dressing-gowns	3,000	100 do. do. 30 yearly	„	4*s.* 2*d.* each	625 0 0	Do. to wholesale and wardrobe dealers.
Cloaks (men's)	1,000	100 do. do. 10 cloaks yearly	„	10*s.* „	500 0 0	Do. to wholesale dealers.
Boots and shoes	1,560,000 pairs	100 do. do. 60 pairs daily	„	7*d.* per pair	45,500 0 0	Do. to wardrobe dealers and second-hand boot and shoe makers.
Boot and shoe soles	648,000 dz. pr	100 do. each collecting 30 dz. pr. daily	none	1*s.* per dz. pr.	32,400 0 0	Do. to Jews and gunsmiths to temper gun-barrels.
Boot legs	520,000 „ „	200 do. do. 50 „ weekly	„	5*s.* „	130,000 0 0	Do. to translators.
Hats	1,879,000	300 colls. each purchasing 24 hats daily	bt. of old clo'men	4*d.* each	31,200 0 0	Do. to dealers and master hatters.
Boys' suits	3,600	300 do. do. 12 suits yearly	„	3*s.* a suit	540 0 0	Do. Jew dealers.
Shirts and chemises	626,400	300 do. do. 8 daily	„	4*d.* each	10,400 0 0	Do. to old clo'men and wholesale dealers.
Stockings of all kinds	783,000 pairs	100 do. do. 30 pair daily	„	1*d.* per pair	3,272 10 0	Do. to wholesale and wardrobe dealers.
Drawers (men's and women's)	93,600 „	300 do. do. 6 „ weekly	„	3*d.* „	1,170 0 0	Do. do.
Women's dresses of all kinds	496,800	300 do. do. 6 dresses daily	„	1*s.* 9*d.* each	41,107 10 0	Do. do.
Petticoats	939,600	300 do. do. 12 daily	„	7*d.* „	27,405 0 0	Do. do.
Women's stays	261,000 pairs	100 do. do. 10 pair do.	„	5*d.* per pair	5,437 10 0	Do. do.
Children's shirts	187,920	60 do. do. 12 daily	„	3*d.* a doz.	195 15 0	Do. do.
Ditto petticoats	261,000	200 do. do. 5 do.	„	1½*d.* each	1,639 11 8	Do. do.
Ditto frocks	522,000	200 do. do. 10 do.	„	4*d.* „	8,700 0 0	Do. do.
Cloaks (women's), capes, visites, &c	5,200	20 do. do. 5 cloaks weekly	„	4*s.* „	1,040 0 0	Do. to wholesale dealers.
Bonnets	1,409,400	150 do. do. 3 doz. daily	„	6*d.* „	35,235 0 0	Do. do.
Shawls of all kinds	469,800	300 do. do. 6 daily	„	1*s.* 2*d.* „	27,405 0 0	Do. to wholesale and wardrobe dealers.
Fur boas and victorines	261,000	100 do. do. 10 do.	„	1*s.* 2*d.* „	15,220 0 0	Do. do.
Fur tippets and muffs	130,500	100 do. do. 5 do.	„	1*s.* 2*d.* „	7,612 10 0	Do. do.
Umbrella and parasol frames	518,400	200 do., each collecting 12 daily	all	5*d.* „	10,300 0 0	Do. to Jews and old umbrella menders.
					675,555 6 8	
HOUSEHOLD REFUSE.						
Tea-leaves	78,000 lbs.	... ...	„	2½*d.* per lb.	812 10 0	Do. to merchants to re-make into tea.
Fish-skins	3,900 „	25 do. do. 2 lbs. weekly for 6 months.	costers and fishmongers	1*d.* „	16 5 0	Do. to brewers to fine their ale.
Hare-skins	80,000	50 do. do. 50 weekly	all	1*s.* a doz.	333 6 8	Do. to Jews, hatters, and furriers.
Kitchen-stuff	62,400 lbs.	200 do. do. 6 lbs. weekly	none	1½*d.* per lb.	390 0 0	Do at marine stores.
Dripping	52,000 „	200 do. do. 5 „ do.	„	3*d.* „	650 0 0	Do. do.
Bones	3,494,400 „	200 buyers 3 cwt. weekly	1-1000th	¾*d.* „	105,625 0 0	Do. for manure, knife-handles, &c.
Hogwash	2,504,000 gals.	200 do., each purchasing 40 gal. daily	all	1*d.* per gallon	10,433 6 8	Do. to pig-dealers.
Dust (from houses)	900,000 loads	... ...	none	2*s.* 6*d.* per ld.	112,500 0 0	Do. for manure and to brickmakers.
Soot	800,000 bush.	800 colls. each collecting 19 bush. weekly	„	5*d.* per bushel	16,666 13 4	Do. to farmers, graziers, and gardeners.
Soil (from cesspools)	750,000 loads	... .	„	10*s.* per load	375,000 0 0	Do. for manure.
					622,427 1 8	
STREET REFUSE.						
Street sweepings (scavengers')	140,983 „	444 do. the whole „ 452 lds. daily	„	3*s.* „	21,147 9 0	Do. do.
Ditto (street orderlies')	2,817 „	546 do. do. „ 9 „ do.	„	2*s.* 6*d.* „	2,352 2 6	Do. do.
Coal and coke (mudlarks')	64,656 cwt.	550 do., each collecting 42 lbs. do.	„	8*d* per cwt.	2,151 17 4	Do. to the poor.
"Puro"	52,000 pails	200 do. do. 5 pails weekly	„	1*s.* per pail	2,600 0 0	Do. to tanners and leather-dressers.
Cigar ends	2,240 lbs.	50 do. do. 8½ lbs. do.	street-finders	8*d.* per lb.	74 13 4	Do. to Jews in Rosemary-lane.
					28,326 2 2	
				Gross Total	1,406,592 1 6	

Curious and ample as this Table of Refuse is—one, moreover, perfectly original—it is not sufficient, by the mere range of figures, to convey to the mind of the reader a full comprehension of the ramified vastness of the Second-Hand trade of the metropolis. Indeed tables are for reference more than for the current information to be yielded by a history or a narrative.

I will, therefore, offer a few explanations in elucidation, as it were, of the tabular return.

I must, as indeed I have done in the accompanying remarks, depart from the order of the details of the table to point out, in the first instance, the particulars of the greatest of the Second-Hand trades—that in Clothing. In this table the reader will find included every indispensable article of man's, woman's, and child's apparel, as well as those articles which add to the ornament or comfort of the person of the wearer; such as boas and victorines for the use of one sex, and dressing-gowns for the use of the other. The articles used to protect us from the rain, or the too-powerful rays of the sun, are also included—umbrellas and parasols. The whole of these articles exceed, when taken in round numbers, twelve millions and a quarter, and that reckoning the "pairs," as in boots and shoes, &c., as but one article. This, still pursuing the round-number system. would supply nearly *five* articles of refuse apparel to every man, woman, and child in this, the greatest metropolis of the world.

I will put this matter in another light. There are about 35,000 Jews in England, nearly half of whom reside in the metropolis. 12,000, it is further stated on good authority, reside within the City of London. Now at one time the trade in old clothes was almost entirely in the hands of the City Jews, the others prosecuting the same calling in different parts of London having been "Wardrobe Dealers," chiefly women, (who had not unfrequently been the servants of the aristocracy); and even these wardrobe dealers sold much that was worn, and (as one old clothes-dealer told me) much that was "not, for their fine customers, because the fashion had gone by," to the "Old Clo" Jews, or to those to whom the street-buyers carried their stock, and who were able to purchase on a larger scale than the general itinerants. Now, supposing that even one twelfth of these 12,000 Israelites were engaged in the old-clothes trade (which is far beyond the mark), each man would have *twelve hundred and twenty-five* articles to dispose of yearly, all second-hand!

Perhaps the most curious trade is that in waste paper, or as it is called by the street collectors, in "waste," comprising every kind of used or useless periodical, and books in all tongues. I may call the attention of my readers, by way of illustrating the extent of this business in what is proverbially refuse "waste paper," to their experience of the penny postage. Three or four sheets of note paper, according to the stouter or thinner texture, and an envelope with a seal or a glutinous and stamped fastening, will not exceed half-an-ounce, and is conveyed to the Orkneys and the further isles of Shetland, the Hebrides, the Scilly and Channel Islands, the isles of Achill and Cape Clear, off the western and southern coasts of Ireland, or indeed to and from the most extreme points of the United Kingdom, and no matter what distance, provided the letter be posted within the United Kingdom, for a penny. The weight of waste or refuse paper annually disposed of to the street collectors, or rather buyers, is 1,397,760 lbs. Were this tonnage, as I may call it, for it comprises 12,480 tons yearly, to be distributed in half-ounce letters, it would supply material, as respects weight, for *forty-four millions, seven hundred and twenty-eight thousand, four hundred and thirty* letters on business, love, or friendship.

I will next direct attention to what may be, by perhaps not over-straining a figure of speech, called "the crumbs which fall from the rich man's table;" or, according to the quality of the commodity of refuse, of the tables of the *comparatively* rich, and that down to a low degree of the scale. These are not, however, unappropriated crumbs, to be swept away uncared for; but are objects of keen traffic and bargains between the possessors or their servants and the indefatigable street-folk. Among them are such things as champagne and other wine bottles, porter and ale bottles, and, including the establishments of all the rich and the comparative rich, kitchen-stuff, dripping, hog-wash, hare-skins, and tea-leaves. Lastly come the very lowest grades of the street-folk—the *finders;* men who will quarrel, and have been seen to quarrel, with a hungry cur for a street-found bone; not to pick or gnaw, although Eugène Sue has seen that done in Paris; and I once, very early on a summer's morning, saw some apparently houseless Irish children contend with a dog and with each other for bones thrown out of a house in King William-street, City—as if after a very late supper—not to pick or gnaw, I was saying, but to *sell* for manure. Some of these finders have "seen better days;" others, in intellect, are little elevated above the animals whose bones they gather, or whose ordure ("pure"), they scrape into their baskets.

I do not know that the other articles in the arrangement of the table of street refuse, &c., require any further comment. Broken metal, &c., can only be disposed of according to its quality or weight, and I have lately shown the extent of the trade in such refuse as street-sweepings, soot, and night-soil.

The gross total, or average yearly money value, is 1,406,592*l.* for the second-hand commodities I have described in the foregoing pages; or as something like a minimum is given, both as to the number of the goods and the price, we may fairly put this total at a million and a half of pounds sterling!

CROSSING-SWEEPERS.

That portion of the London street-folk who earn a scanty living by sweeping crossings constitute a large class of the Metropolitan poor. We can scarcely walk along a street of any extent, or pass through a square of the least pretensions to "gentility," without meeting one or more of these private scavengers. Crossing-sweeping seems to be one of those occupations which are resorted to as an excuse for begging; and, indeed, as many expressed it to me, "it was the last chance left of obtaining an honest crust."

The advantages of crossing-sweeping as a means of livelihood seem to be:

1st, the smallness of the capital required in order to commence the business;

2ndly, the excuse the apparent occupation it affords for soliciting gratuities without being considered in the light of a street-beggar;

And 3rdly, the benefits arising from being constantly seen in the same place, and thus exciting the sympathy of the neighbouring householders, till small weekly allowances or "pensions" are obtained.

The first curious point in connexion with this subject is what constitutes the "*property*," so to speak, in a crossing, or the *right* to sweep a pathway across a certain thoroughfare. A nobleman, who has been one of her Majesty's Ministers, whilst conversing with me on the subject of crossing-sweepers, expressed to me the curiosity he felt on the subject, saying that he had noticed some of the sweepers in the same place for years. "What were the rights of property," he asked, "in such cases, and what constituted the title that such a man had to a particular crossing? Why did not the stronger sweeper supplant the weaker? Could a man bequeath a crossing to a son, or present it to a friend? How did he first obtain the spot?"

The answer is, that crossing-sweepers are, in a measure, under the protection of the police. If the accommodation afforded by a well-swept pathway is evident, the policeman on that district will protect the original sweeper of the crossing from the intrusion of a rival. I have, indeed, met with instances of men who, before taking to a crossing, have asked for and obtained permission of the police; and one sweeper, who gave me his statement, had even solicited the authority of the inhabitants before he applied to the inspector at the station-house.

If a crossing have been vacant for some time, another sweeper may take to it; but should the original proprietor again make his appearance, the officer on duty will generally re-establish him. One man to whom I spoke, had fixed himself on a crossing which for years another sweeper had kept clean on the Sunday morning only. A dispute ensued; the one claimant pleading his long Sabbath possession, and the other his continuous every-day service. The quarrel was referred to the police, who decided that he who was oftener on the ground was the rightful owner; and the option was given to the former possessor, that if he would sweep there every day the crossing should be his.

I believe there is only one crossing in London which is in the gift of a householder, and this proprietorship originated in a tradesman having, at his own expense, caused a paved footway to be laid down over the Macadamized road in front of his shop, so that his customers might run less chance of dirtying their boots when they crossed over to give their orders.

Some bankers, however, keep a crossing-sweeper, not only to sweep a clean path for the "clients" visiting their house, but to open and shut the doors of the carriages calling at the house.

Concerning the *causes which lead or drive* people to this occupation, they are various. People take to crossing-sweeping either on account of their bodily afflictions, depriving them of the power of performing ruder work, or because the occupation is the last resource left open to them of earning a living, and they considered even the scanty subsistence it yields preferable to that of the workhouse. The greater proportion of crossing-sweepers are those who, from some bodily infirmity or injury, are prevented from a more laborious mode of obtaining their living. Among the bodily infirmities the chief are old age, asthma, and rheumatism; and the injuries mostly consist of loss of limbs. Many of the rheumatic sweepers have been bricklayers' labourers.

The classification of crossing-sweepers is not very complex. They may be divided into the *casual* and the *regular*.

By the casual I mean such as pursue the occupation only on certain days in the week, as, for instance, those who make their appearance on the Sunday morning, as well as the boys who, broom in hand, travel about the streets, sweeping before the foot-passengers or stopping an hour at one place, and then, if not fortunate, moving on to another.

The regular crossing-sweepers are those who have taken up their posts at the corners of