

"THE WORK OF THE SANITARY INSTITUTE OF GREAT BRITAIN."

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Anniversary Meeting, July 13th, 1882.

WE have now arrived at the Sixth Annual Meeting of this Institute, and, suddenly called upon to prepare the usual address, it has seemed to me a fitting time to pass in review *the objects of the Institute, the manner in which it has sought to attain them, and what is still left to be done.* The representative character of the annual addresses may be gathered from the following list of them:—

Dr. Richardson delivered the first address, "On the future of Sanitary Science in 1877." *Frank Buckland*, in 1878, addressed you "On the Pollution of Rivers and its effects upon the Fisheries, and water supply of Towns and Villages." *G. J. Symons*, in 1879, "On Water Economy." *Captain Galton*, in 1880, on "The preventible causes of impurity in London Air." *Professor de Chaumont*, in 1881, on "Modern Sanitary Science."

It has been thought desirable that an *Architect* should address you in this year of 1882. There are several senior and more distinguished members of my profession to whose hands I could have preferred that this duty should have been entrusted, and to whom, indeed, I recommended the Council to apply; and it is only from their inability to comply with the invitation of the Council that, though a very busy man, I have consented to undertake the responsible task in question, and to occupy this prominent position in to-day's proceedings with only a fortnight's notice.

The *title* of my address has been chosen advisedly, because the very existence of the Society, as a separate organization, has been thought a questionable necessity by those who feel that in some sense it encroaches upon the domains of kindred societies. But I think I shall be able to satisfy all present that there was a very large field of usefulness left practically unoccupied until the establishment of this Institute. Every other scientific society is too much engaged with its own professional interests to take that constant oversight of the public weal in connection

with *public health* which this Institute has set itself to do. The position occupied by the Society of Arts, is, perhaps, an analogous one, but on a much broader basis. That Society looks after the interests of the public, as those interests are affected by the arts and sciences generally, by education and legislation, and whatever hastens or hinders the progress of our numerous industries and manufactures, or is concerned in the development of commercial enterprise. Its occasional conferences on sanitary questions have been most valuable and instructive, and may be said to have been indirectly the originators of this Institute, by showing the necessity of such an organization exclusively devoted to their study.

The Sanitary Institute is worthy of support and encouragement because it affords a platform upon which may meet the professors of every other scientific society whose special knowledge, as applied to the preservation of public health, may thus be brought to bear upon sanitary measures.

Upwards of 150 addresses and papers have been read at the various annual and ordinary meetings and provincial congresses since the commencement of this Society's labours only six years ago, one half of which have been written by members of the medical profession, whose special knowledge, so disseminated has led to the more perfect understanding and better classification of what may be termed preventible diseases, and localized their malevolent action by identifying the predisposing causes.

The principles thus enunciated and systematised have opened the way for the exercise of the ingenuity of others, and the remaining half of the papers read have been prepared by civil and military engineers, architects, surveyors, and members of the legal profession.

The respective scientific institutes to which these men belong are all more or less interested in sanitary questions, but it is not the *speciality* of any one of them, and therefore receives only occasional attention.

Whereas, by the establishment of this Society the earnest sanitarians may come forth from among them, and find a sympathetic audience, and a well-consolidated organisation through which such men may not simply ventilate their theories, but divulge their experiences, and propound their practical schemes for the amelioration of the insanitary physical conditions under which many of us are compelled to exist—some of us quite unconscious of the fact.

The first object of the Society is, therefore, to form into a nucleus, and enrol as members, all those whose minds have been exercised and enlightened on this subject of national health, and

whose talents and experience may be turned to good account, whatever their particular professions may be.

2ndly.—*The next* is to awaken the conscience of the country generally, and of its public men in particular, to the vast importance of preventive measures in arresting the spread of disease.

3rdly.—*And thirdly* to collect and impart information upon all matters connected with the subject of public health; and both directly and indirectly to influence the measures which may be adopted, and the laws which may be framed for the public good in connection with sanitary matters: the sanitary condition of this country being still very unsatisfactory, and further legislation being necessary, with a view to its improvement.

The *manner* in which the Society has sought to *attain* these objects is *threefold*, and appears to me to have been singularly successful.

1st. The reading of papers, their discussion and publication, with which is associated a distinguishing peculiarity of this Institute, viz.: Annual Congresses, held in different parts of the country, by means of which the whole country is awakened out of its sleep, and made to give a passing thought to the subject through the invaluable aid of the public press; while in the cities visited an excitement is produced, and an impression is made which is not soon forgotten, bringing together, as it does, the foremost men in each locality, who are interested in the subject.

Already Leamington, Stafford, Croydon and Exeter have welcomed the Institute, and held sanitary exhibitions, while the Congress lasted, at which valuable papers were read and listened to; and the earnest exhortations of veteran sanitarians of European reputation were well received.

Last year the Sanitary Exhibitions at South Kensington and at Eastbourne and Brighton made it undesirable to hold a fourth lest the public should be surfeited. This year, however, the arrangements for the usual Congress, which will be held at Newcastle, are completed. The local magnates will come forward as usual, and, under the presidency of Captain Douglas Galton, the Congress will no doubt be as remarkable a success as the previous ones have been.

This branch of the Society's work not only provides for the scientific discussion of papers in the three principal sections, but has an educational side in the shape of popular evening lectures and visits to sanitary works, complete or in progress. Some of the happiest efforts of Dr. Richardson have been prepared for these evening lectures.

2ndly. In connection with the Congresses, *Exhibitions* are held, and the Council appoint *Judges* to investigate sanitary appliances, to award medals and certificates, and to carry out detailed experiments by means of deferred practical trials, as to the value of the various forms of apparatus and appliances, which the public are invited to purchase, but the value of which they have few means of ascertaining beforehand.

The value of this branch of the Institute's work is obvious, and was ably enforced at Croydon, by Dr. Lory Marsh, who contributed a short Paper on the Technical work of the Institute.

3rdly. There is one most useful work undertaken by the Institute, of which I had long seen the necessity; and as far back as 1854, as a member of the then "Metropolitan Sanitary Association," had strongly (though unsuccessfully) recommended that Society to inaugurate. I had just published "The practical view of the Sanitary Question," which detailed the work of a Local Board in St. Pancras, to which I was hon. architect and secretary; and Sir Benjamin Hall was engaged in getting his "Public Health Bill," and "Nuisances Removal," and "Metropolitan Local Management" Bills through Parliament at the time, after submitting the Nuisances Removal Act to our revision.

But the Sanitary Institute has realised my hopes, and has organised a *Board of Examiners*, to conduct examinations, and to grant certificates in sanitary science to *Local Surveyors and Inspectors of Nuisances*, and to persons desirous of qualifying themselves for such appointments, or of obtaining the certificate of the Institute.

The value of this enterprise cannot be too highly rated when it is remembered how inferior were the officers commonly appointed for sanitary purposes, and how few first-rate men there are still. As one of the delegates of the Royal Institute of British Architects present during the last two examinations, I have had opportunities of observing the sensible manner in which these examinations are conducted, avoiding all catch questions, and fairly testing the qualifications of the candidates.

Dr. Carpenter, in an inaugural address, alluded to the opposition which this Institute had met with from kindred societies, to whom he replied—"If we were proposing in any way to educate and examine men so as to fit them for the profession of an architect, of a surveyor, or of an engineer, there would be a reason for this antagonism; but it would be quite out of our province to propose anything of the kind, or in any way to come into antagonism with those bodies in their professional work. It is true that an architect ought to know the principles of public health, so far as they are connected with house-

building, and that an engineer should be acquainted with the principles of sanitary science, so far as they are associated with sewage and water supply; and that surveyors could not be fitted for their duties if they did not know how to advise a Highway Board or sanitary authority upon the right way to prevent nuisance. But these are the very points which the bodies in question have no means of knowing except from outside help, especially that help which is forthcoming from members of the medical profession and professed hygienists."

I agree with Dr. Carpenter, and will presently exemplify his meaning by reference to a few cases where the knowledge of the correct principles on the one side has led to correct practice on the other. I am free to confess, however, that I have not met with any members of my profession who are antagonistic to this work of the Institute, consequently I am disposed to think that the suggested antagonism has been somewhat exaggerated so far as we are concerned, and I think that the appointment of myself and Professor Lewis to represent the Council of the Institute of British Architects at these examinations is evidence of their appreciation and sympathy with this most important and practically useful branch of the technical work of the Sanitary Institute. At all events, I quite agree with Dr. Carpenter that "the importance of the *sanitary* duties which surveyors and inspectors of nuisances have to perform is more patent to medical men than to any other distinct class of persons."

But with regard to original research, I will now quote a few examples illustrative of Dr. Carpenter's contention, and of that important branch of the Institute's work which embraces the record and tabulation for convenient reference of those scientific principles most recently established, which underlie all practical sanitary operations. As he infers, the architect and engineer are competent enough to work out any detail of construction required, scientifically and practically, provided always the premises of the problem are clearly stated. It is to the philosophic enquiries and experiments of pure science, and to the experience and observation of that portion of the medical profession who have made a special study of what has been termed "preventable disease," in short, to *professed hygienists*, that we look for reliable demonstrations for our guidance, and of which the archives of the Sanitary Institute form the repository.

About two years ago I read a paper at the Royal Institute of British Architects, at the request of the Council, on "The Relation of Sanitary Science to the Practice of Civil Architecture;" and in the discussion which followed, Prof. Corfield remarked:—

"Mr. Robins has said that civil architecture can never be divorced from the experience of sanitary science. I would go

further than that, and would say that if it were not for the experiments that have been made by scientific men, no alteration in principle would be carried out, not only in architecture, but in everything else.

"If it had not been for the chemist, Pasteur, for instance, all the vine-growers in the world would never have discovered the cause of the destruction of their vines; the fowl-keeper would never have discovered the reason for the loss of hundreds of thousands of their poultry by chicken cholera; and the prevention of the silkworm disease would have remained an unknown problem. And he asked, What is it that has caused us to think so much of sewer air? There is one reason, and only one, and that is, that it has been shown by scientific experiment—by the experiments of sanitary science—that enteric or typhoid fever is produced by a constituent of that air; yet the public mind was not aroused to the necessity of preventive measures until one or two members of the Royal Family suffered from that disease."

It should be a subject of gratulation to this Institute that the Society of Arts has this year voted its Albert medal to Professor Pasteur.

Again, Professor Frankland, in his paper on "The transport of solid and liquid particles in sewer gases," read at the Royal Society, in 1877, thus summarises his conclusions:—

1. "The moderate agitation of a liquid does not cause the suspension of liquid particles capable of transport by the circumambient air; and, therefore, the flow of fresh sewage through a properly-constructed sewer is not likely to be attended by the suspension of zymotic matters in the air of the sewer.

2. "The breaking of minute gas bubbles on the surface of a liquid, consequent upon the generation of gas within the body of the liquid, is a potent cause of the suspension of transportable liquid particles in the surrounding air; and, therefore, when, through the stagnation of sewage, or constructive defects which allow of the retention of excrementitious matter for several days in the sewer, putrefaction sets in and causes the generation of gasses, the suspension of zymotic matters in the air of the sewer is extremely likely to occur.

3. "It is therefore of the greatest importance to the health of towns, villages, and even isolated houses, that foul liquids should pass freely and quickly through sewers and drain pipes, so as to secure their discharge from the sewerage system before putrefaction sets in."

To point the moral:—Dr. Frankland's investigations have proved that when water contains foul matter for any length of time decomposition takes place in the water, and the surrounding

air is contaminated by the bubbles of gas generated, breaking and releasing the infectious particles along with it, and thus it is that the architect learns, what he never would have discovered for himself, the necessity of devising means for the ventilation or disconnection, by air as well as by water, of the house-drains from the main sewer, which has led to the introduction of ventilating traps, and of intercepting cross-current air-ventilated manholes to house drains, even where water traps exist, to obviate the fatal consequences likely to ensue where neither air nor water traps nor manholes exist, which, nevertheless, is still the case in the great majority of dwelling houses in the land.

Through the influence, therefore, of Sanitary Science, as we understand it, mechanical contrivances have been devised whereby, as Prof. Corfield puts it, "a house may be brought into such a condition of safety, that we can say with perfect certainty that if typhoid poison is in the main sewer it will not get into the house; and further, that if typhoid fever is taken into the house, when such preventive measures are taken, it will not spread."

But this sound principle is not only applicable to *drainage*; it is most important to remember it in *water supply*. Thus Sanitary Science, having first revealed the ready absorption by water of bad gases, mechanical means have been devised by practical sanitarians to prevent the drinking water in our cisterns and wells from becoming contaminated. It was, and still is, common to find the only supply cistern fixed over the closets for the convenience of having the ball levers and service boxes in the same for their supply, and the trumpet shaped overflow waste pipe, untrapped, was fixed in direct communication with the soil drains—through which, sewer air was laid on to the surface of the drinking water to be absorbed by it, and to poison the unconscious family drinking the same. All this is being amended now. Separate cisterns are provided for drinking water. No water can be drawn from those supplying the closets. Every cistern waste discharges into the open air over a trapped gully grating. Galvanized iron or slate cisterns being preferred to lead, and tin lined lead pipes serving the various supply taps.

Our able Chairman of Council, Prof. de Chaumont, assures us that parallel with the progress of medicine and the collateral sciences, advances have been made in Sanitary Science which amount to important revelations, so that it has become possible to lay down certain principles which are capable of practical application to the great advantage of us all. In short, the ablest medical and sanitary authorities have decided that by good sanitary appliances and surroundings, resulting in the maintenance of the

purity of the air within and around our dwellings, typhoid fever, diphtheria, sore throat, and cholera might be rendered exceptional diseases, instead of being, as they now are, the fruitful sources of illness and death, to the alarming extent of one-third of the whole mortality of the United Kingdom.

In further illustration of the uses of sanitary science, as it has been formulated by the experimental researches of professors of physics, chemistry, and hygiene, the popularization of which researches is the special work of this Institute, let me detail to you the experiments of Dr. Pettenkofer and Dr. Renk at the Hygienic Institution at Munich. Dr. Renk, in a letter promising to send me a pamphlet in which he has laid down his opinion of sewer gases and the hygienic estimation of them, also some hints how to keep them out of our houses in a better way than has been done hitherto, proceeds to give me a description of his experiments on "the entrance of ground air into houses." By means of a differential manometer, invented by Recknagel, he discovered that, in a house at Munich, the air in the ground beneath the paving of the cellars was always under a higher pressure than the air of the cellar itself, from which result he inferred that the ground air is always in motion from the soil into the house—the pavement being bricks laid in mortar was permeable by air. This higher pressure of the air under the house he found was caused by the wind and by the difference in temperature between the inside and the outside of the house.

It happened that in and under the cellar paving a draught channel for ventilating purposes was situated, being constructed of bricks and mortar, and covered with stone slabs. The channel was connected with the chimney of the boiler which generated the steam for the heating apparatus. This draught channel had a very great influence on the ground air to a distance of six yards from its walls, and the ground air was more attracted by the current of air passing through the draught channel than by the air in the basement of the house. Moreover, the air of the cellar was in like manner, for a certain distance from it, drawn into the same draught channel current, and with increasing rapidity the nearer it approached the channel.

This experiment suggested to Dr. Renk a means of keeping ground air out of houses—that is, by permeable tubes connected with the chimney of the kitchen fire, up the flue of which a constant current is being kept up, thereby a sufficient draught is created to withdraw the ground air from the soil and carry it above the roofs.

In connection with these experiments were others illustrating its passage through walls of houses of different materials, from

which tables of data are derived, which give to the architect and engineer the means of calculating the degree of permeability for air that the materials he employs possess.

It is my practice to avoid boarded floors on basements, and the air spaces under them required to prevent dry rot. It is better to cover the whole area of the ground covered by the house with a layer of cement concrete 6 inches thick, which is practically impervious to air or moisture, and to lay thereon a wood block pavement formed of burnettized blocks $7 \times 3\frac{1}{2} \times 2$ inches thick, with wrought edges and top surface, set in pitch and jointed with cement powder brushed into the interstices, and set with water.

The architect to the Ecclesiastical Commissioners, Mr. Ewan Christian, first suggested and carried out a plan for rendering walls impervious—by simply building the enclosing wall of a house with a hollow space of about an inch, and pouring into the same liquid asphalt, thus forming a vertical damp course, rising from the horizontal asphalt damp course commonly laid in walls 3 inches above the level of the ground to prevent damp rising in the walls themselves.

So far we have been considering the helpfulness of sanitary science in relation to sewer gases, and the ventilation of drains, water supply, and the withdrawal of ground air from the basements of houses. But when we have succeeded in ventilating our drains, water, and subsoil *out* of our houses instead of *into* them, we have still to consider, as I showed in my lecture at Eastbourne, on "The Revelations of Sanitary Science," how to maintain the purity of the rooms we inhabit and defile with our own breathing, house warming, lighting, and cooking.

Here again the architect and engineer are aided by the researches of medical men. The late Dr. Parkes has shown and figured in great detail the various sources of impurity to which the air of enclosed spaces is subject, and the particular diseases to which the inspiration of such impurities give rise; and he has given a means of testing the constituent parts of the air, and formed tables for the guidance of professional men, in which work Prof. de Chaumont was associated with him.

It is usual to measure the impurity in the atmosphere by the proportion of carbonic acid gas it contains—not because it is the only, or even the chief cause of its unhealthiness, but simply because it is measurable, and is indicative of the proportional existence of other impurities, to which, in fact, it forms an index. The necessity for *change* of air having been proved, scientific and practical men have set about trying to achieve it, with varying success, but in all cases it is obvious that inlets for fresh air must be accompanied with outlets for foul air, so

rarified by heat, as to maintain an upward current in the shaft therefrom. I might go on adding example after example *ad nauseam*, but I have given sufficient instances of the great value to practical men of the researches of other men in Sanitary Science to show the valuable nature of the work which the Sanitary Institute of Great Britain has in hand.

We have now seen that the objects of the Institute are sufficiently unique to warrant its separate existence, and that the manner in which it has sought to attain those objects is sufficiently comprehensive. We may now consider briefly *what remains to be done*.

In the first place, it occurs to me that, with respect to the Examinations conducted by the Institute, it may soon be necessary to consider the extent to which some technical education should eventually be required as a condition precedent to such examination, if the standard of efficiency for the offices of Local Surveyor or Inspector of Nuisances is to be permanently raised. Of course the emoluments must correspond, and be made commensurate with the qualifications demanded, and the independence of the officers must be better secured than it now is, both by the public and its representatives, the parochial authorities. But I do not propose to enlarge upon this branch of the subject, which has been well ventilated at the ordinary meetings of the Institute, but I hope some practical legislation will follow the general opinion formed, that responsible officers ought not to be subject to irresponsible representatives of vested interests, opposed to the spirit of the public health and nuisances removal acts.

To raise the standard of efficiency, qualifications of candidates for diplomas should not simply depend on the replies written or oral to a few test questions of the examining body, but by some evidence of preparatory study, as shown by previously acquired certificates of elementary general competency.

The Conference of the Society of Arts, on Technical Education, of 1868, thus expressed itself:—

“Believing that our defects are far more due to the ignorance of those who direct works than to imperfect technical education, want of skill, or incapacity in those who execute them, we consider—That with a view to the development of a system of scientific education, it is desirable that schools be established, having for their main object the teaching of science as a mental discipline. These science schools should prepare some youths for the higher courses of a college, and other less ambitious pupils for their professional pupilage.”

Now, as I have elsewhere stated, in England all the best things are reserved for the upper ten thousand, and because a

classical education was associated with a refined culture, therefore all our public and private schools became preparatory schools for the universities, as if the whole country consisted of noblemen and county families, to the entire neglect of the scientific necessities of the period.

The thorough mastery of any one branch of higher scientific education, to the extent to which the dead languages or pure mathematics are now carried in the universities, would be found a full and sufficient means of mental expansion, but the absence of efficient teachers to an equivalent extent will long stand in the way of such a development.

But I am happy to think that contemporaneously with the spread of knowledge in sanitary matters in particular, has come a feeling of backwardness in technical education generally, and during the last five or ten years, science schools of the character suggested by the Conference of 1868 have been built, and are being erected throughout the country, by municipal authorities, as at Nottingham; by trade guilds, such as the City Companies of London and Bristol; and by private benevolence, of which Josiah Mason's College, at Birmingham, is an eminent example; so that very soon the means of obtaining technical information will be within the reach of every man worth his salt.

The proposed introduction into the ordinary curriculum of our primary schools of such elementary, scientific, and practical courses as may help towards the development of individual cleverness, by a general raising of the technical standards, and a selection of the fittest for higher training, cannot be otherwise than eminently desirable, and will leave no excuse for any candidate for examination being entirely without that preparative training which is, or should be, the aim of all test examinations to foster and encourage.

The recent establishment of compulsory examinations for admission to the Architects', Surveyors' and other Institutes, will certainly help to bring about a change in this matter, and soon it is to be hoped that, just as candidates for entry to the technical educational advantages to be hereafter obtained at the Central Institution of the City Guilds will be required to produce certificates of having passed preliminary examinations at other schools of lower grade, so admission to the examinations of our professional institutes should be ultimately given only to such students as shall be able to produce similar educational certificates of competency up to a certain point, which can only be fixed from time to time, as the means of obtaining such certificates shall have been increased.

As time rolls on, therefore, I trust that the Sanitary Institute will see its way to require some guarantee that the persons to

whom it grants its diploma are not only acquainted with the letter of the law, but are qualified to carry it out, by previous training, as well as the capacity to get through a special examination.

Concurrently with the advantages offered to young men for improving their general technical knowledge, and in due proportion to their general accessibility and extension, should the fulness of the topics for examination be increased, or the evidence of previous study be required, so that the general standard may be raised. This, of course, will be a very gradual process, but it is one that must be borne in mind if the credit of the Institute is to be maintained, and the value of its diploma permanently established.

I may here observe that a chair of Hygiene is associated with some of the foreign universities.

In my recent tour of the technical schools on the Continent, I visited a very remarkable institution in Munich, founded by the King, and entirely under the control and management of Dr. Pettenkofer, one of the Professors at the University, from whose plans it was built and fitted up in a sumptuous manner, replete with every apparatus and appliance. It is called the "Hygienische Institut," and I spent several hours with his chief assistant, Dr. Renk, by whom I was taken through the physical and chemical laboratories, and shown the various experiments on ground air, which I have already detailed to you, and which he had been two years in working out.

It is to this institution that officers of health have to repair and complete their courses before being considered properly prepared to undertake responsible official positions in relation to the public health.

And it would be a gratifying circumstance if, in the legislative enactments of this country, something besides the mere appointment of officers should be required; and that certificates of competency from an appointed tribunal should be required of all candidates for office under the Public Health and Nuisances Removal Acts.

And it may not be too much to hope that, just as no district surveyor can be appointed under the Metropolitan Buildings Act unless he shall have first passed the compulsory examination entrusted to the Royal Institute of British Architects by that Act, so the certificate of the Sanitary Institute of Great Britain shall be, by law, required of all would-be officers of health.

2ndly. This brings me to the consideration of some points in which sanitary legislation seems to need improvement. But first let me remark that it would be a very narrow view of the

work of the Institute if it were to show towards others the same jealousy which it has deprecated in its own case. The Sanitary Institute should be ready to aid to its utmost all efforts for the improvement of the sanitary condition of the masses. There are many philanthropic schemes afloat which it should be the pleasure of this Institute to assist and encourage by its sympathy and advice, and otherwise as opportunity may occur, and by the personal co-operation of its members.

The National Health Society, The Ladies' Sanitary Association, The Parkes' Museum, The Sanitary Protection Association, the Sanitary Assurance Association, etc., etc.:—these societies have collected funds and formed valuable and influential coteries of the patrons and patronesses of sanitary work, whose hearts and whose purses are open to the appeal of those whose slender means would deprive them of the advantages of good sanitation, if it were not for the co-operative principle underlying the two latter societies' labours, and enabling them for a small fixed fee to give the professional advice required.

The fact that a few rich people, who could afford to pay for more elaborate reports and supervision, may also seek to obtain these advantages ought not to influence our judgment of their general usefulness and value.

Mr. H. C. Stephens has shown, in an ably written paper, the way in which the law, as it now stands, operates as an obstruction to sewage disposal. He has shown that under the Public Health Act of 1875, owners and occupiers derive rights which prevent local sanitary authorities from carrying out systems of drainage involving the *separation of the rainfall and surface water from sewage*. The bad effects of the present system have necessitated the appointment of a Royal Commission to consider if any, and what steps can be taken to lessen the evils attendant on the present outfall arrangements of the metropolitan drainage.

The 10th clause of the abstract of Mr. Stephen's paper puts the matter clearly, thus:—"Though, under the 24th section of the Public Health Act, it is competent for local authorities, at the expense of the ratepayers, to alter or construct anew the drainage of houses, if such drainage is not adapted to the general sewage system of the district, there is, notwithstanding, no power in the Public Health Act, or elsewhere, enabling local authorities to decline to approve plans by which excreta and house waste, with the rainfall combined, are shown to be received into carriers common to all."

So long as the rainfall accompanies the waste and soil drainage, so long will the impracticability of economically converting the latter into agricultural uses remain. Consequently, a sanitary

measure of urgency and importance is rendered impracticable from rights arising under the Public Health Act.

The combined system of drainage dates from the Fire of London, after which it was first instituted. But as London grows, the difficulties will increase, and are increasing, and sewers, forming elongated cesspools in dry weather must increase in number, till the time comes when Prof. Corfield's suggestion will be the only cure remaining for great cities—that is to say, the old sewers shall be exclusively used for rainfall, and a new system of soil drainage on the latest principles of sanitary science, with complete and constant flushing arrangements, automatic in action, shall be constructed.

The provisions of the Public Health Act should be broad enough to allow of the trial of this "separate system" on a smaller scale than will eventually become necessary.

Again, so long as we hold to any water carriage system, and none is so readily adaptable to householders' uses, a good supply of water all the year round is an absolute necessity, whether it is constant or intermittent is of much less consequence than is commonly supposed. The enforced use of waste-preventers has so improved their manufacture, that a sufficient flush can be obtained in spite of their use, and the regulation of the size of the service pipe from the cistern, in proportion to the height above the closets, will effect all that is required in a house.

But the influence of the Institute may be beneficially used in favour of the public, and especially the humbler portion of it, by getting a revision of the Water Companies' Act, which has granted to them inquisitorial powers for self aggrandisement, quite inconsistent with public purposes of a sanitary nature.

I do not enter into the question of the cost of the water, which should obviously bear some relation to the quantity supplied, and not rates and taxes, that is likely to be taken up more effectively by other bodies than this Institute. But I do contend that so long as a house is supplied by cisterns filled once a day, the Water Companies have no right to interfere in the use of that water so supplied. Where there is constant service, and no intervening cistern, it may be necessary to look to every point at which water may escape; but the inconvenience of leakage from high pressure is its own punishment for indiscretion in the use of imperfect apparatus.

As the case now stands, difficulties are thrown in the way of using water, the result of which is that an insufficient quantity is used for the purposes of a healthy water carriage of the excreta of dwelling houses, rendering more than ever necessary the proper ventilation of sewers and drains.

Another, and a pressing want of the day is greater uni-

formity in the bye-laws governing the action of local authorities. This subject has been well thrashed out at the Royal Institute of British Architects in London, as well as provincial architectural societies, and has been the subject of annual conferences, and is likely to be re-opened at the next conference of the Royal Institute.

The inconsistencies at present prevailing are very perplexing, and even the model bye-laws of the Local Government Board are open to considerable improvement; but the subject is too large and technical to enter on at this time—one instance in my own practice is enough.

In Croydon I was required to make my house soil drains 4 inches diameter to enter 6 inch pipe sewers. In London we commonly use pipes 6 inches diameter. At Bristol no drain from any single closet is allowed to be less than 9 inches diameter: a difference of from 12 to 54 inches in the sectional area for the same purpose, or nearly five times.

I hope I need not apologise for having confined my attention more particularly to those points which are more especially interesting to me as an architect. The time at my disposal is too limited to allow of my entering at any greater length upon the question of the legal disabilities under which sanitarians feel restive; nor is the occasion one on which it is necessary that I should do much more than indicate the direction in which the work of this Society may be profitably employed in the remedy of existing defects and abuses, legal or otherwise.

But I am perfectly sure that in proportion to the public spirit manifested by its members, in the same proportion will they acquire (as they will deserve) the support and countenance of the whole community.

I must apologise for the superficial quality of this paper; I do not offer it as an example for imitation, but rather as the hearty contribution of one of its well-wishers, to the popularisation of the objects, action, and aspirations of the Sanitary Institute of Great Britain.

REPORT ON THE INTERNATIONAL MEDICAL AND SANITARY EXHIBITION, 1881.

At the close of the International Medical and Sanitary Exhibition, it was decided by the Council of the Sanitary Institute of Great Britain, that some record of the various Sanitary Exhibits should be perpetuated for the members' future reference. A small committee, composed of Prof. de Chaumont, Dr. A. Carpenter, Mr. H. H. Collins (who acted as Chairman), Dr. H. C. Bartlett, and Mr. E. C. Robins, was formed for the purpose of carrying out this decision. Several members of the Council undertook to aid in the preparation of the Report, and were most ably assisted by Mr. J. Wallace Peggs, who has spared neither time nor trouble in order to render the information he had acquired useful and valuable.

It became necessary in determining the enumeration of the Exhibits to adopt some rule as to the scope of the Report, inasmuch as there was necessarily a large number of Exhibits which, although of great practical value and of ingenious invention, were not in any way novel. The Committee, therefore, determined to report specially only on those which had the recommendation of being modern, or recent improvements, or else novel in arrangement: this will account for the omission of many exhibits which otherwise would naturally have found a place in the Report.

The Council do not identify themselves in any way with, nor do they hold themselves responsible for the statements of facts or expressions of opinion which may be found in the following pages; the merits of the exhibits having been fully entered into by the competent judges who were appointed by the Council of the International Exhibition to report and adjudge thereon.*

SECTION XIII.

DOMESTIC AND HOSPITAL ARCHITECTURE.

PLANNING, CONSTRUCTION, DECORATIVE MATERIALS.

THE chief feature of this section, it will be observed, consists of the large number of architectural drawings showing the construction of Hospitals, Pauper Infirmaries, and Special Hospitals for specific

* A List of the Award was published in the Catalogue.

diseases, Workhouses, Lunatic Asylums, Orphan Asylums, and Schools.

There are also exhibits of drawings for the reconstruction of University Hospital, London, and designs for constructing hospitals on Professor Marshall's system of circular wards.

Before proceeding to give any description of the various buildings, it may be interesting to remark that the isolation of sick wards by a ground floor connecting corridor running at right angles with the axis of the wards, forms what is called the "Pavilion System." This system of construction was adopted by Mr. Worthington for the Chorlton Union, near Manchester, and was, we believe, the first example in this country of the pavilion principle.

This system has been generally followed in the exhibits we are considering. The space allowed between the pavilions is a matter of much importance, and it is usually considered that this should be not less than twice the height of the pavilion.

The cubical contents of each ward varies with the nature of the disease to be treated, and is fixed for all public buildings. Voluntary Institutions commonly give more cubic space than Public Institutions. The cubic space, however, should not be obtained merely by increasing the height of the wards at the expense of the floor space. The Cubic Space Commission have recommended that six feet of wall space should be allotted to each bed, and considerably more for infectious diseases.

Single separation wards are to be provided for removing cases that for any reason may require separation.

Space should also be given at the end of the ward, or in the width of the ward, for allowing convalescents to move and sit about when no special convalescent wards are provided.

The sick ward is in every hospital design the feature of interest, and is first thought of. Its axis should be nearly north and south, and where the ward is long and lighted by opposite windows, it should have a width of 24 feet, with the beds singly or in pairs between the windows.

Mr. Saxon-Snell has, in some of his buildings, made an exception, having no windows on the same side of the ward as the beds, but lighted from the ends by opposite windows, care being taken not to make the wards too long. The cross ventilation so obtained is less likely to be injurious to the patients, while the absence of bright light immediately opposite is more agreeable to the eyes. These wards of Mr. Snell are applicable to poor law administration where less serious class of cases may be treated.

The cheerfulness of wards so constructed is scarcely the same as those lighted on both sides; and, we notice that Mr. Robins in his design for the North Staffordshire Infirmary, has felt the importance of this point, and provided bay windows, V shaped on plan, with low eills, so that patients may see out of them as they lie in bed.

The plans exhibited generally provided the usual ward nurse's bed room and scullery at one end, and the baths and water-closets at the other end. It may be well to remark here, that the recent practice

is in favour of the ward nurse's bed room not being attached to the ward, but that nurses should have their room in the administrative block. The ward nurse when on duty should be in the ward, and when off duty is better away from the ward.

The cross-ventilated lobbies dividing the water-closets and bath-room from the ward were variously designed, but those having means of heating by hot water pipes or otherwise, must be considered better than those not heated; for patients are not likely to take a chill in passing into the warmed apartment.

Various systems of heating and ventilation were shown. Open fires were generally adopted, but aided by heating apparatus independent of the fires, except in the case of some of Mr. Saxon-Snell's buildings which had his patent Thermhydric stoves, combining the open fire with hot water circulation, the heat for which is obtained by the same fire.

Admitting fresh air over heated surfaces at the lower part of the room, and extracting the vitiated air by vertical shafts in the upper part of the walls is the system most generally adopted.

The velocity is sometimes accelerated in these shafts by heat applied at the foot of the shaft over the chamber with which it communicates.

The question of ventilation for large buildings is quite in the experimental stage, and in order perfectly to control the proper and efficient supply of air to wards, special power may have to be provided.

The question of summer ventilation when cool fresh air is required, and that of winter when warm fresh air is required, have both to be considered. Mr. Robins has expressed his opinion that fans, either to withdraw the vitiated air, or to force in fresh air, or both as may be required, are the proper means for obtaining the change of air necessary in large buildings.

It may be well to note here that great care should be devoted to the selection of the intake of fresh air so that it may be pure.

A reference to the more important buildings may now be given.

No. 84. GALTON, CAPTAIN DOUGLAS, R.E., C.B., D.C.L., F.R.S.

The Herbert Hospital, Woolwich. This hospital, built on the western slope of Shooter's Hill, was designed for 650 patients. The wards range N.N.E. and S.S.W., and are in single and double pavilions, which connect by a corridor 715 feet long and 15 feet wide. The pavilions are 63 feet 9 inches apart, and are in three stories. The greatest length of the pavilion is 312 feet, and the ordinary wards are 117 feet 8 inches, 108 feet 6 inches, 73 feet 8½ inches long, 27 feet 6 inches wide, and 14 feet high. The principles embodied in this building are now well known and appreciated, so that it will be unnecessary to follow them here in detail.

No. 56. SNELL, II. SAXON, F.R.I.B.A.

This is a very complete series of drawings illustrative of *Parochial and Charitable Institutions*. The drawings include *Workhouses, Infirmarys, Schools*, and many other institutions which have been erected by Mr. Snell. The list of all the institutions of which drawings are exhibited will be found in the Official Catalogue, International Medical and Sanitary Exhibition, 1881.

In the *St. Olave's, St. George's, and St. Marylebone Infirmarys*, the usual arrangement of hospital building with narrow wards separated by wide open spaces is shewn. The beds are arranged along each side, and the nurses' room, sculleries, &c., at the end next the corridor connecting the ward with the administrative block and other wards. The lavatories, baths, and w. c.'s are placed in a tower at the extreme end of ward, and separated therefrom by a ventilating lobby.

In the *Infirm wards of St. Marylebone, and in St. Luke's Workhouse Infirmary*, a very different arrangement to the above is shewn. Here the wards are more than 40 feet wide, and the beds are placed against the end walls, and back to back against the partitions running partly across the ward from one side, and about two-thirds the height of the ward. The other side of the ward is built into a series of bay windows, around which are seats for the inmates, and this space forms the day-room. The nurses' and officers' rooms are placed at the ends as previously described.

In *St. Marylebone Infirmary* the circumscribed area of the site has made it necessary to accommodate the laundry on the upper floors. The washhouse is on the topmost floor (3rd floor), the drying ground on the 2nd floor, and the laundry on the 1st floor. The linen to be washed is sent up by a lift from the ground floor, and passes down through the various processes, and finally to the delivery room on the ground floor again.

The *Holborn Infirmary*, erected at Highgate, shews both the above systems combined in one establishment. The administrative block in this infirmary is placed somewhat differently to the usual manner.

Workhouses form a class of work corresponding to the above, and are illustrated by *St. Luke's, St. Marylebone new casual-wards*, and the alteration and additions to *St. George's Workhouse*.

The list of parochial buildings is continued with *Hendon Union Lunatic Wards*, and a comprehensive set of buildings for the *Clerkenwell Mortuary*. The part of the building over the disinfecting chamber is carried up as a tower with a flue for conveying any noxious vapour away from the disinfecting chamber to the highest part of the building.

The Dispensaries for the northern and southern districts Marylebone give the same accommodation, but are rather differently planned owing to the difference of site.

The lodgings for houseless poor, designed for a Russian Philanthropist, to be erected at Nijny Novgorod, are planned on the same principle as casual wards.

The School buildings are represented by *Industrial School* for 437 and 628 children respectively, and by the *Kensington District Schools*. The latter design shews a careful separation of the different classes of children. In addition, there are the usual buildings arranged for probationary wards for both boys and girls and infants. This design also includes an infirmary and a chapel.

The *Royal Patriotic Fund School* for boys, erected on Wandsworth Common, is designed for 180, with infirmary accommodation for 14. The area of the site is 12 acres, and includes play ground and cricket field.

The detail drawings exhibited by Mr. Snell are interesting, and shew the isolated tower building containing the w.c.'s, bath, and lavatories. The chambers are heated with hot water pipes, so that air would be rather drawn in from the wards than delivered into them.

The ward windows are designed so as to protect the occupants of the adjacent beds from draughts when open. The upper part is made as a sash to let down. The window is close up to the ceiling, and has a box space provided for the Venetian blinds.

The system of *circular wards* suggested some years ago by Professor Marshall is shewn, worked out for an infirmary, by Mr. Saxon-Snell. The unlimited supply of air to a sick ward is a cardinal consideration. The square court enclosed by the buildings is the worst form of construction. The circular ward offers many advantages, as it receives the wind from every direction, and is quite detached and well aerated. The circular ward for the amount of material used gives more wall space and greater cubic capacity. The sharp cross draughts and down draughts as in ordinary wards would not be so great in the circular construction.

The height of the tower wards in towns should be arranged for two or three stories, and the towers built on arches below might be finished at the top with a winter garden. No direct communication would be given between the towers, access being only indirect through a corridor. The cost, according to Mr. P. Gordon Smith, would be slightly greater than ordinary pavilion construction, with a corresponding number of beds and equal ward space per bed.

No. 62. ROBINS, E. C., F.S.A.

This exhibit comprised designs for the *North Staffordshire Infirmary*, the *Coventry and Warwickshire Hospital*, and the *St. Pancras Infirmary*, all illustrating various applications of the "pavilion system" of planning.

His premiated drawings for the London Orphan Asylum were exhibited to shew the application of the same principle to an orphan school. The quadrangular form of the uniting corridor connected complete homes for 25 boys in each block.

Mr. Robins also exhibited his design for the City of London School, wherein he has worked out the so-called "*Hall passage system*," which

he recommends for the planning of middle class day schools, all the class rooms being entered from the great hall.

No. 91. TOLLET.

The chief features of the system of hospital construction, now known in France by the name of the Tollet system, are the separate pavilion exposing as large a surface as possible to the purifying influence of the outer air, and as little interior surface as possible to the contaminating influence of the internal air.

The most important hospital on the Tollet system is that at Bourges, which contains 220 beds, and it may give some idea of the system by adding here a short description of this hospital.

The hospital is situated on a gentle slope, and covers about 15 acres of land, or 2,582 square feet of land per bed. The Bourges hospital consists of twelve one-storey "ogival" pavilions, with a distance of 52 feet between each. The principle adopted is to have the space of ground between each of the pavilions equal to twice the height of the pavilions. The pavilions are 120 feet long and 26 feet wide, and the floors are raised 5 feet above the ground. The roof has been the subject of special study, and the pointed arch has been adopted, it being considered that this form would harbour the least dust and dirt, and having no tie-beams or obstructions would offer least surface, and give great facility for ventilation of the ward. The framework of the hospital is of iron ribs placed 4 feet apart, and curved over to meet in the point of the arch. The spaces between the iron ribs may be filled in with boards, or for more permanent hospitals, with stone or brickwork. The walls and the floors of these buildings receive careful consideration. The interior walls are prepared with silicate cement so as to be smooth and non-porous, and they can be washed, and when desired they can be coated with petroleum and burnt off so as to destroy any germ life. The floors are of wood, but covered with a material impervious to moisture and with joints caulked, so that the hospital dust does not sink in. At the end of the pavilion facing the entrance there is a door opening into a vestibule severed from the main building by a covered passage open both sides, 9 feet long. The closets are placed here, and under the same annex there is a cart to receive soiled linen, so that it is at once removed from the building. There is a small separate room at each side on entering the pavilion, one for the nurse and the second for any patient it may be considered desirable to separate. At the other end of the ward there is a small dining room, a bath room, and small kitchen.

No. 65. BOOTH, LAWRENCE, F.R.I.B.A.

The *Salford Union Hospital*, built in 1880, has a site 310 yards long, 85 yards in breadth.

The pavilion principle was adopted, and a continuous corridor

850 feet long, 10 feet wide, connects the several pavilions with each other, and with the administrative block, which latter is placed in the centre so as to be easy of access. The corridor is enclosed on the ground level, but the two upper stories form open gangways for communication to the several blocks. In favourable weather these gangways form a pleasant resort for convalescents to enjoy fresh air, and the view of scenery which is very beautiful at this point. Additional staircases are provided for double pavilion blocks for occasional use or in case of fire. In connection with these staircases there are open air balconies for semi-convalescent patients. All water-closets, bath-rooms, and lavatories are cut off from wards and day room by intervening passages open on both sides. The pavilions are well detached by wide spaces for ventilation. The wards average 80 superficial feet floor space, and 1,000 cubic feet of air or ventilating space for each patient. Sash windows to open to fullest extent, and at the head of all ward windows there are swivel casements to form hopper for judicious admission of fresh air. At every floor level hit-and-miss ventilators and ziz-zag flues are provided. Each department has its linen shoot, coal cellar, lift, nurses' kitchen, and also special adjacent wards for occasional patients. In addition to 10 small lifts for ordinary purposes, there are two large ones from the operating rooms for men and women patients and attendants. The wards and day rooms are all warmed by open fire grates constructed somewhat on the "Galton" principle. There are two distinct systems of drains: one for conveying roof-water into a tank, for washing purposes, the other for carrying sewage matter into public sewer.

The further exhibits under this number are the *Workmen's Dwellings*. These dwellings have been designed to provide independent households for very poor people at a rent of 2s. 6d. per week. The large "flat" system has been avoided, but what may be called "semi detached cottage" system has been adopted. Blocks, three stories in height, containing two tenements on ground floor, two tenements first floor, two tenements on top floor placed seven feet apart along the street frontage. Uncovered staircases of fire-proof construction are provided between the blocks for access. It is intended to give 30 feet between the backs of houses, not walled off but left open. The internal accommodation: living room, 12 feet by 12 feet; bed room, 12 feet by 10 feet 6 inches. The warming and ventilation have been carefully considered. The waste heat from sitting room warms the bed room. Floors of living room concrete, and walls lined with glazed bricks, 5 feet high, and may be washed easily. The bed room floors are of wood, and ceiling lath and plastered. No walls are plastered, and there are no skirting boards. All the walls and ceilings are lime whitened.

No. 59. POORE, DR. G. V., AND A. WATERHOUSE, A.R.A.

These drawings shew a scheme for the reconstruction of *University*

College Hospital on its present site. The main principle insisted upon is that each pavilion should be a building complete in itself, and making it impossible to pass from one pavilion to the other, from one storey to another, or from one ward to another without going into the open corridor. The building resembles the letter E, and has the three pavilions pointing to the open space of the college. Every part of the building is thus made to have advantage of what fresh air there may be in this space. The pavilions are connected at their western extremities with open corridors.

The building is five stories high, and stands about 63 feet above the pavement. The three stories devoted to wards would be exclusively for patients, and each pavilion would contain three wards. All the wards are 25 feet wide, and the length of north pavilion 120 feet, centre pavilion 80, and south pavilion 88 feet. A floor space of 120 square feet would be available to all patients, children as well as adults, giving accommodation for 174 patients. In addition there would be 24 beds in private wards, making 198 in all. The w.c.'s and sculleries are in turrets slightly projecting at each end of the pavilion. Every thing that may give rise to offensive emanations, or for which light and air are specially required, is placed in the top stories. In the north pavilion, dead house, and post mortem room, communicating by a special lift with the back yard; the Registrar's rooms, urine laboratory, dispensary laboratory, and clinical lecture theatre. In the middle pavilion the operating theatre, and in the south pavilion the kitchen is placed. The corridors are eight feet wide, and the staircases in separate buildings six feet wide, and in the centre of each a lift going from top to bottom of the building.

No. 64. ERNEST TURNER, F.R.I.B.A.

Exhibit of drawings shewing method of *drainage for town houses*.
The *Fever Hospital*, Newton Road, for the Local Board, Torquay.
The *London and Provincial Steam Laundry*.
The *Home Hospital*, Fitzroy Square.

The drainage plans shew houses of various types where of necessity the main drain passes underneath the house, and in such cases great care is required to make the drain perfectly watertight. In the houses under consideration the drains are laid in a bed of concrete, and are carefully jointed. The ventilation and aëration of all drains is also a matter of great importance, and is accomplished by admitting fresh air in front of the house in suitable positions, and withdrawing at the back of the house by a vertical ventilating shaft. By this means a current of air is continually circulating through the drains, rendering them free from sewer air.

The *Fever Hospital*, Torquay, was designed to meet the requirements of the Local Board, the object being to provide a building complete in all its sanitary arrangements, of moderate size, and at the lowest cost. The idea was, by isolating the first cases which

appear, that it might be possible to prevent a disease from becoming epidemic.

Accommodation is provided in this hospital for twenty patients in eight wards, four wards containing four beds each, and four single-bedded wards. The drainage is not carried into the town sewers, but is dealt with in two ways, the earth closet for excrement disposal, and subsoil irrigation for the slop waters from baths, sinks, &c., which are collected into a Field's flush tank, from which they are automatically discharged into drains with open joints, which allow of percolation into the ground. The rain-water is collected for use in the laundry, which building is situated in rear of the main block, and comprises wash-house, ironing room, and disinfecting chamber.

At Fitzroy House the Home Hospitals' Association made the first effort to provide accommodation for a special class of patients whose circumstances placed them without the scope of charitable relief. The house, which was an ordinary town house of the early part of the present century, has been modified and adapted for the purposes of this hospital. The entrance is by a broad, well-lighted hall, from which the dining-room is approached, and behind this is a bed-room appropriated for an accident ward. The upper floors are entirely occupied by bed-rooms, and on the landing, between the first and second floors, is a bath-room and water closet. The range of buildings at the back of the premises, originally used for stabling, have been converted into nurses' bed-rooms. The walls, whenever possible, have been rendered washable, and all floors are stained and wax polished.

Special attention has been given to the drainage arrangements. The main house-drain runs from the back through the basement passage into the public sewer. Manholes are provided at back and front on the drain, and fresh air is admitted by two inlets in the front area, and the soil pipe is carried up as an exhaustor shaft at the back of the house well above the roof. Flushing arrangement is provided at the back manhole.

The London and Provincial Steam Laundry. These works, which have been recently opened, are the largest of the kind, and are designed for dealing with from 80,000 to 90,000 pieces per week.

The buildings are laid out to deal with the work continuously and in rotation, and consist mainly of receiving and sorting rooms, wash-houses, ironing, and collar dressing rooms. There are also separate buildings, with distinct entrance, for dealing with infected linen.

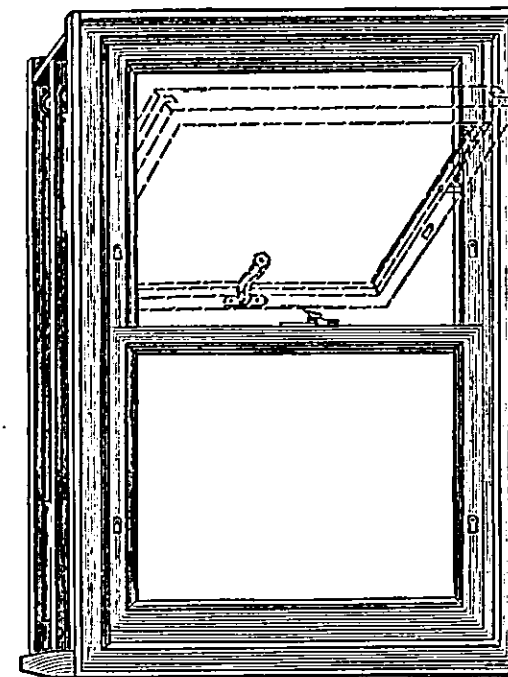
No. 81. FRANCIS E. JONES.

Drawings of Hospital in the *Circular Ward System* of Professor Marshall, and adapted to a confined site such as University College Hospital.

Circular Wards have been adopted for the Hospital at Antwerp now in course of construction.

For information respecting the advantages claimed for Circular Wards, see Professor Marshall's pamphlet, read at Social Science Congress, 1878.

No. 395. ADAMS, ROBERT.



The *Anti-Accident Reversible Window* is here shewn among a collection of other useful appliances for buildings. This kind of window would be serviceable for ventilation in many classes of public and private buildings. The general form and appearance of the window is that of the ordinary sash window, and will act as such, but has the advantage also of swinging on centres to any required angle. Both top and bottom sashes may be revolved, and thus form a louvre ventilator of large size. The further advantage that the sashes may be cleaned with ease and safety, without getting outside in the ordinary way, is to be observed.

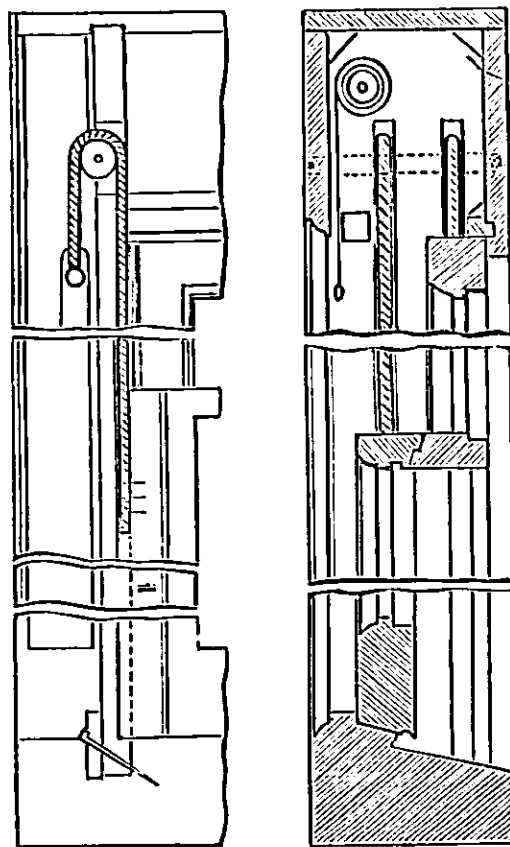
No. 300. ALBISSIMA PAINT COMPANY, LIMITED.

Sanitary paints made from *zinc*. It is claimed that this paint possesses large covering power, it is inodorous, unchanged by gases, and being free from white lead, is a desirable pigment.

No. 89. MONS. BORDIAN (Brussels).

Complete drawings of a theatre at Brussels are shewn, to which M. Bordian has applied a system of ventilation by compressed air. Engines and air compressors are fixed in the basement, from which pipes are carried all over the building, and the air distributed under pressure to any part of the buildings at will. Outlets are provided for the escape of foul air which go into a lantern in the roof of building. In summer means are employed to cool the air, and in winter to warm the air.

BULLIVANT, TAGLIAFERRO, AND CO.



The arrangement of sash window here exhibited has been somewhat largely used on account of its simplicity and the ease of removing the sashes for cleaning. The exclusion of air and dust more perfectly is a good feature in this invention. The weights, instead of being attached by lines to the sash in the ordinary way, are hung to a moveable guide bar, which travels in a groove partly in the sash and partly in the pulley stile. The guide bar has a spring packing its entire length, which keeps it firmly to the work. A screw passes through the centre of the side of the sash when in work, retaining the guide bar firmly in place. When this screw is removed the weight in falling draws the guide bar out of the sash. The sash can then be lifted out for cleaning.

No. 361. CHARLES DRAKE AND CO., LIMITED.

The *marble concrete* in various forms was exhibited here, among others may be mentioned a bath of marble concrete, polished inside, and also floors of the same material of various colours.

No. 83. WILLIAM EASSIE, C.E.

Drawings were exhibited shewing the various arrangements and furnaces used in different countries for the purposes of cremation.

No. 92. GRANTHAM, JUN., AND BAILEY DENTON, JUN.

This exhibit shews drawings for *abattoirs* and *meat market*, suitable for a large town.

Public *abattoirs* were first established in Paris, and several have been erected in England on similar principles. It is important from a sanitary point of view, that the slaughtering of cattle and the disposal of the offal should be concentrated as much as possible under

public control, and not carried on in private slaughter-houses in crowded neighbourhoods.

The drawings shew the necessary buildings for offices for housing and slaughtering the cattle, for storing, and for the sale of meat. The buildings comprise lairs or cattle sheds, slaughter-houses, and meat market.

The lairs and slaughter-houses are ranged on each side of a gangway, so that the animals are taken direct from the lairs across to the slaughter-houses.

Tramways may be laid in the streets so as to convey the meat to the market for sale.

No. 442. HOWARD AND SONS.

Patent parquet flooring in different kinds of wood—oak, walnut, mahogany, &c., made in various patterns. This flooring is laid so as to be impervious to dust and dirt and would no doubt form a valuable floor surface in hospital buildings.

No. 328. IHLEE AND HORNE.

Luminous paints were here shewn, and a cottage with the interior walls coated with the luminous paint exhibited. Various objects were also shewn for which the luminous paint is suitable.

No. 282. MAGUIRE AND CO.

The *Barff* process for coating various iron materials used in building, including corrugated iron sheets, wrought iron pipes, &c., and a variety of other useful purposes.

No. 248. G. E. PRITCHETT, F.S.A.

Building construction, shewing various methods of walling and flooring composed of red earthenware hollow pipes laid in Portland cement. It is claimed for these walls and floors that thorough aëration and ventilation are caused, and dampness rendered impossible.

No. 289. THE SANITARY PAINT COMPANY

Exhibit various paints, including *Griffiths' white* and silicate paints and petrifying liquids. *Griffiths' white* is provided as a substitute for the ordinary white lead, and has no poisonous effects, as the lead paints have.

No. 287. THE SILICATE PAINT COMPANY.

Paints and colours, and the *Charlton white zinc* preparation to take the place of ordinary lead paints.

No. 354. SPENCE'S METAL MANUFACTURING COMPANY.

Specimens of *Spence's metal*, for jointing gas and water pipes, fixing iron railings, &c. This material is used in a heated state at a comparatively low temperature, and in that condition can be easily run into any form.

No. 362. ALFRED WALKER.

Concrete made of slag or granite or breeze, with Portland cement is shewn. For floors and yards, as a finishing coat $2\frac{1}{2}$ in. thick, this material has been found useful.

No. 288. FREDERICK WALTON & Co.

"*Linerusta Walton*," a new Linoleum product (Linum, flax; Crusta, relief), introduced with a view to improve the appearance of the interior of houses, giving decoration in relief. The idea is to produce the effect of carving by stamping. This material resists the effect of damp and alteration of heat and cold, and can be scrubbed or washed.

MESSRS. WOOLLAMS & Co.

Wall papers of all colours or tints, and said to be free from arsenic. The bright tints, usually considered necessarily arsenical, are shewn prepared without arsenic.

SECTION XIV.

VENTILATING, LIGHTING, AND WARMING.

No. 410. BENHAM AND SONS.

THE *Ventilating Globe Light* here exhibited may be usefully described in this report.

The object of this contrivance is so to burn gas that the products of combustion should be carried off and not allowed to escape into the apartment, and it is also designed to assist in the ventilation.

The usual form is that of a glass globe, suspended or held from the ceiling by a tube, down the centre of which the gas piping is brought

into the globe and to the burner. At the ceiling the tube is continued for carrying off the products of combustion, and around this tube is an outer tube for removing the heated air of the apartment, and outside this again is the inlet for fresh cold air at the ceiling level. The supply of air to support combustion is drawn from the apartment in over the top of the globe, and as soon as the burner is lighted an upward current is created in the inner tube, and this tube becomes heated and rarefies the air in the outer tube, causing an upward current. The air of both the tubes is conveyed to the flue of the apartment. It is intended, by this contrivance, to produce two distinct actions, viz.: the carrying away of the products of combustion and the drawing off the vitiated and heated air of the apartment at the ceiling level.

The *Gas Fire* of Dr. Siemens is also exhibited. This heating arrangement may be very simply adapted to any existing fire-grate. The heat of the gas flames is transferred to gas coke or anthracite, which, when once heated, maintains a sufficient power for radiation. The gas is applied along the front of the grate, at the bottom bar, and is burnt without the admixture of air, as in the Bunsen burner, as by using unmixed gas yellow flame is set up between the pieces of coke near the front, presenting the appearance of an ordinary coal fire.

No. 378. BIRD, PETER HINCKES, F.R.C.S.

The well-known arrangement of inlet for fresh air through the meeting rails of the ordinary window sash. The window sash is lifted up about four inches, and the space below so opened is filled by a strip of wood about four inches deep, and running the whole width of the windows. Fresh air from without is thus free to enter at the space formed at the meeting rails, and has an upward direction towards the ceiling.

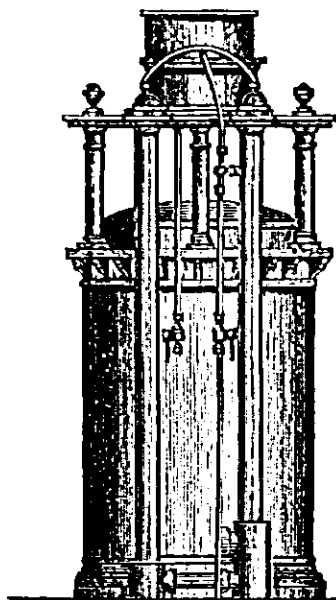
No. 268. BOSTEL, DANIEL T.

Exhibits, under this section, a Cowl for exhaust purposes, without any moving parts, and which is contrived to catch the wind in any direction it may be blowing. This cowl is the patent of Dr. Alfred Hall.

No. 411. CHORLTON AND DUGDALE.

This exhibit comprises the "Sunlight" Cooking Stove, with the newly-added hot-water supply, which is arranged so as to avoid explosion should the cold water supply cease.

No. 355. CLARK, F. W.



The *Portable Gas Machine* for making an illuminating gas of rich quality from gasoline.

The machine is self-contained, and requires merely to be placed in position, and it is automatic in action. The general appearance of the machine is that of a small gas holder. The small retort of cast iron is placed above the holder portion, and is heated by gas made in the machine itself. The gas is of rich illuminating power, and does not give off in burning any sulphur or ammoniacal impurities. The gasoline, which is kept apart from the machine, is allowed to flow into the retort as required, where it is subjected to a destructive distillation, mixes with warm air, and forms a chemical combination and a permanent gas of uniform quality.

No. 270. CLIFF, JOSEPH AND SONS.

The *Anglo-German Stove* here exhibited is formed in the same way as other well-known stoves of this class, with glazed ware of artistic design and colour.

The details of this stove vary slightly from some others in the exhibition. The fire door and damper are arranged on the narrow side of the stove, and are of German manufacture. There are tubes for the inlet of fresh air to the stove, and for the carrying off the products of combustion.

The stove may be fed with anthracite coal, and, it is said, will burn 24 hours without attention.

No. 391. COMYNS, CHING, AND CO.

The *Boyle Outlet Ventilator*, having mica flap valves, for fixing into chimney flues, and utilising the upward current therein for ventilating rooms of dwellings.

No. 374. CONSTANTINE, JOSEPH.

The *Convolute Stove*, for warming public buildings, as shown, consists of a number of castings bolted together and forming deep

square corrugations, the inner surface forming conductors of heat and flame, and the external flues warm air channels, inducing rapid circulation and diffusion. Slabs of fire-clay rest near the upper part, and equalise the heat in all parts of the stove. The sides and back are provided with fire-brick lining, protecting the metal from immediate contact with the fire.

No. 366. CONSTANTINE, T. J.

This exhibit comprises Cooking Ranges in a number of sizes, from the artizan's or cottager's, to those with double ovens and boiler, capable of cooking for 50 persons. The stove is a self-contained apparatus, and can be placed either in the ordinary opening of the kitchen fire-place, or anywhere most convenient, and requires no setting.

The stove is supported on four short legs, lifting it from the floor about 4 inches; the advantage of this being that dust and dirt can be readily removed.

The heat from the fire-box is utilised to the utmost, and chambers are formed around three sides of it, and the central fire bar is also hollow for warming air.

The door of the fire-box is specially constructed, so as to admit fresh air, and deliver the same warmed over the fuel, thereby assisting in obtaining complete combustion.

The chamber around the ovens has a series of gills, over which the heat has to pass, and the bottom has a loose plate, under which there is also a row of gills. The ovens are ventilated by an inlet and outlet.

The idea of retaining heat over the surfaces as long as possible pervades the whole construction.

Anthracite may be burned in these stoves with advantage.

No. 357. CROSSLEY BROS.

The "Otto" Silent Gas Engine, which is the exhibit under this number, is now so well known and so largely used that it requires no explanation here.

No. 307. DYER, FREDERICK.

The System of Hot-Water Circulation here shown is well known, and has been largely applied in this country. The main feature of the system, which was introduced from America, is the cylinder placed in any convenient position contiguous to the fire heating the

boiler. The usual and most advantageous way of heating this boiler in private houses is by the kitchen fire. The boiler is of small size, and made tubular, and can be fixed to either an open or close range.

The supply from the cold water cistern is laid on direct to the cylinder and boiler. The boiler is in connection with the cylinder, and has the ordinary flow and return pipes.

The hot water is caused to circulate from the top of cylinder and from the boiler throughout the house and back again to the boiler.

The cylinder can be made of any size, from 50 gallons upwards, and takes the place of the dangerous hot-water cistern, usually placed in the upper part of the house.

A safety valve is placed on the top of the cylinder, and weighted according to the head of water to be resisted: there is also the usual expansion pipe, placed at the highest part of the apparatus. It is impossible by this system to draw off the water below a certain fixed level, and the kitchen fire can thus be kept up in full action without fear of explosion in frosty weather.

No. 278. ELLISON, JAMES E.

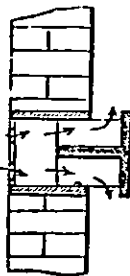
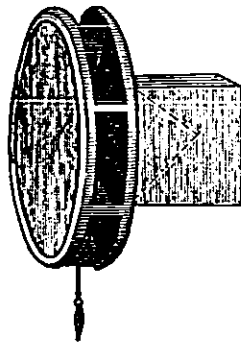


FIG. 1.

FIG. 2.

The exhibit is entirely one of Ventilation Appliances, and shows the conical perforations for bringing in fresh air without draught. The perforations are shown for bricks of various dimensions, and also for skirting boards.

The *Air Diffuser*, which is a simple appliance also for introducing fresh air without draught, consists of a square or circular plaque, with four cross divisions at the back, and is fixed into an aperture in the vertical wall. The amount of air admitted can be regulated by the distance that the plaque is drawn out, and it can never be entirely closed, as the four stops at the back prevent it being pushed fairly against the wall. The plaque may be made ornamental by inserting china painting, painted panel, or looking glass in the front.

Fig. 1 is a section of the "air diffuser," and fig. 2 a view of the back: the dotted lines show the position of the divisions.

No. 418. FARWIG, J. F.

Exhibits various forms of the George Calorigen for heating by gas, coal, and other fuel.

No. 377. FARADAY AND SON.

The exhibit shows the arrangement made by this firm for carrying off the products of combustion from gas lights. The chief feature is that of a bell glass placed over the burners, and attached to an outlet pipe taken to the outer air.

The outlet pipe is coated with asbestos and an outer zinc pipe.

No. 415. GIBBS, ROBERT RENTON.

Air Cleansing Prisms shown, forms an apparatus for cooling, cleansing, and purifying air, as it is admitted; it is formed by a series of glass V-shaped troughs, and water is laid on and made to flow from the top trough downwards through the series.

The air from the outside has to pass through the falling water and over the water contained in the troughs, by which process it is cooled and purified.

The Hot-Water Grate shown is formed by fixing a coil of iron pipe at the back of the ordinary fire-grate, and forming also the front grate bars. A hot-water circulation is thus formed, and would be available for various purposes, such as warming a bedroom from sitting-room fire.

No. 375. GRIFFIN, ROBERT H.

The arrangement of the *Ventilating, Heating, and Smoke-Consuming Stove* consists in the formation of a space at the back of the grate, where fresh air from the outside is admitted. A covering plate is placed horizontally over at the highest part of the grate, and has the flue tube cast on it.

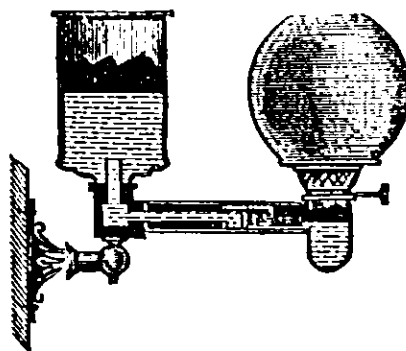
Air from without is warmed by contact with the grate, and passes upward and outward into the room at a level just above the grate. Air from the room feeds the grate from its perforated back, and the smoke passes up the tube mentioned.

No. 367. HELLIER, WILLIAM.

This exhibit belongs to a class of apparatus called *Instantaneous Water Heaters*. In this case the supply of water is automatic, being regulated by an ordinary ball valve. A large heating surface is provided by an arrangement of two tapered chambers and three independent coils in the centre of the inner chamber. The gas burner used is the atmospheric type, arranged on cross bars, and the products of combustion are allowed to escape into the apartment. No flue being provided.

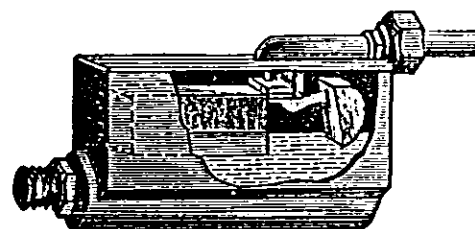
No. 241. HOPKINSON, W. W.

The "Libra" Lamp, with an independent reservoir for the oil, which allows of fresh supply to be filled in whilst the lamp is burning.



The lamps exhibited have a reservoir containing 18 hours' supply, and the oil filters from the vase, and passes along the tube and through the "Libra valve," which regulates the admission to the burner, passing just so much as the lamp is consuming. In this arrangement of lamp the oil is always maintained at a fixed level not being burnt down lower, as in lamps of the usual construction, and thus the wick does not become charred to the same extent, and requires less attention to trimming.

The large shadow which is cast by the oil vase of ordinary lamps, is obviated in this form of lamp.



The "Libra Valve" is also adapted, in a larger size, for regulating the supply of water to kitchen boilers, and from its small dimensions, $6\frac{1}{4}$ inches \times $2\frac{3}{4}$ inches \times $4\frac{1}{2}$ inches, would be very convenient, taking the place of the cistern and ball valve at present in use.

No. 376. S. LEONI AND CO

This exhibit comprises the well known Gas Cooking Stoves and the "Heating and Ventilating Calorifere." The calorifere is an arrangement of a gas stove under a china-ware cover, and has a flue-pipe conducted into a chamber, where it warms fresh air brought in from the outside. The fresh air comes into the room somewhat on the Tobin principle, but is heated on its way in the chamber mentioned. The outlet-flue runs in the centre of the inlet-tube, and thus all the heat would be utilized.

No. 412. MUSGRAVE AND CO.

The *Slow Combustion Stove* in all its varieties is shown. Fresh air is introduced and made to circulate around an outer casing, and eventually to escape into the room warmed.

The fire-box, lined with fire clay, contains sufficient fuel to last from 8 to 24 hours, according to size of stove. It is fed through the top, and air is admitted for combustion by sliding door near the bottom.

The new Smokeless Stove Grate, called the *Ulster*, is also exhibited. The *Ulster* is nearly like the ordinary register stove grate in appearance, but has a chamber for holding supply of coal which replenishes the fire as it burns away. When the grate is in operation the new fuel becomes heated, and the products are made to pass through the burning fuel and are thus consumed, adding to the brilliancy of the fire.

No. 315. PICKARD, JOHN REYNARD.

Domestic Fire Grate consuming smoke and preventing down draft.

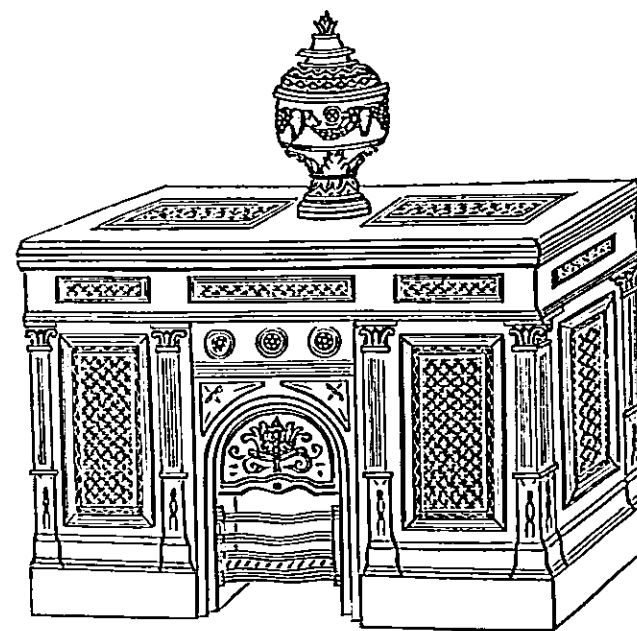
The general appearance of this grate is like the ordinary register grate, it differs essentially however in detail. The fire back is provided with openings, and under the grate an opening is made for the admission of air from the apartment. The arrangement is applicable to all existing fire places.

The smoke passes through the fire instead of over it and into a combustion chamber, where its ignition intensifies the heat. A damper is arranged in the back for regulating the draught.

No. 421. PORTWAY, CHARLES.

The *Tortoise* Slow Combustion Stove has a fire clay chamber, and is fed at top, and will burn for 7 to 10 hours, according to size of chamber. The draught is regulated by door at the bottom.

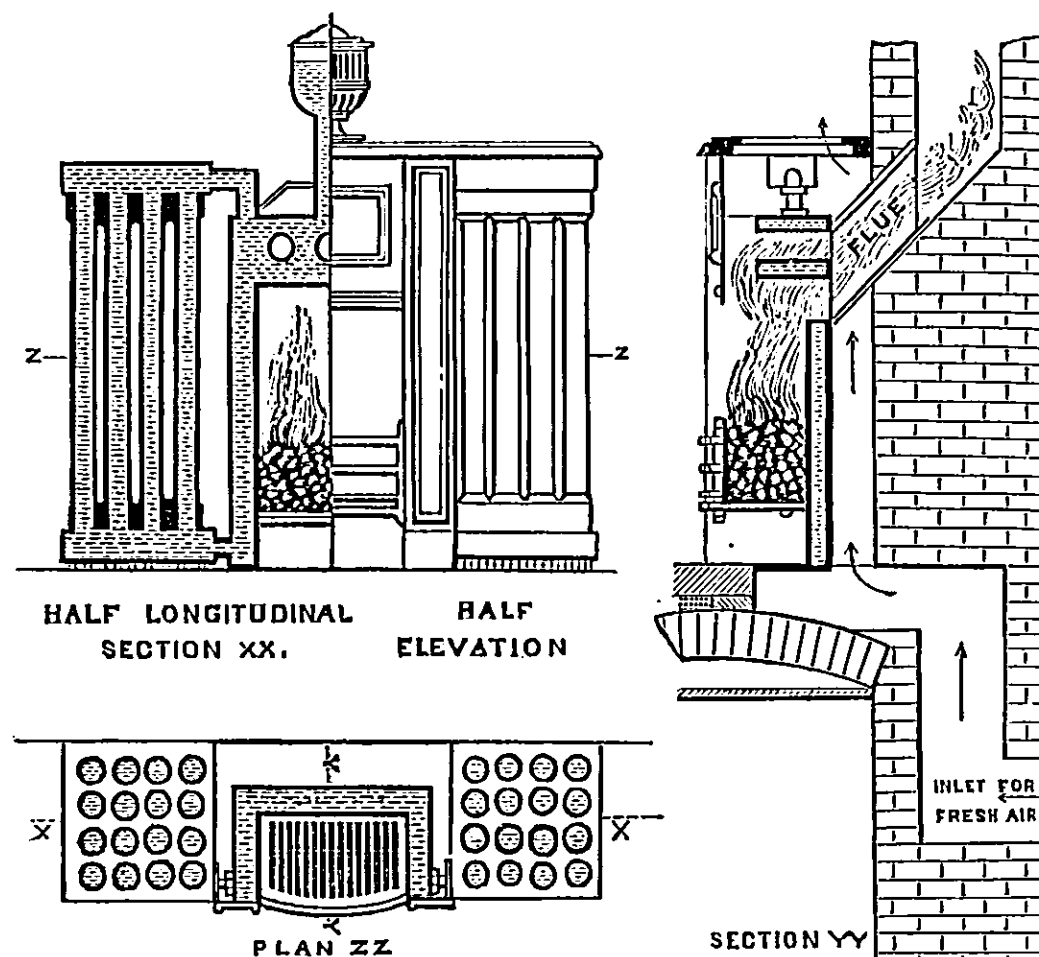
No. 420. POTTER, THOMAS AND SONS.



The *Thermhydric* Ventilating Hot-Water Open Fire Grate, the patent of Mr. Saxon Snell, F.R.I.B.A. The illustration will at once give the general outward appearance of the stove, and the construction will be seen in the sections. An ordinary fire grate is surrounded by a compartment filled with water, which is connected by tubes to a battery

of coils on either side of the stove.

From this arrangement the advantages of the open fire are obtained, and in addition all or nearly all the heat is utilized in raising the temperature of the water and circulating it: this heat is given off by



the coils. Fresh air is admitted around the back of the stove, and becomes warm before delivery into the room.

The stove may be somewhat differently arranged for the centre of wards, and, in this case, descending flues would be employed.

The revolving smoke-consuming fire grate exhibited is an arrangement by which the grate or fire basket is made to turn on pivots. The basket is closed by bars top and bottom, and can be opened for putting in fresh fuel. When fuel is added to the fire the basket is turned over, bringing the lower part uppermost, the added fuel being now below, where it becomes warmed and partly distilled; the fire goes on burning, giving off little or no smoke.

No. 248. PRITCHETT, G. E., F.S.A., F.R.I.B.A.

New patented system of Heating by Hot-Water, and also for the passage and changing of air without draught or loss of temperature. This invention is shown by a full sized section of one side of a room or hospital ward. The heating surface in this system is obtained by corrugated sheets being fixed together, leaving a small space of about $\frac{1}{8}$ th inch between them for the circulation of hot water. A heating

surface, say of 20 superficial feet, is obtained with as little water as would be required for one foot of a four inch pipe. The fuel required would be reduced correspondingly, and the flow and return pipes on this system would be much reduced in size.

The corrugated heating plates project $1\frac{1}{2}$ inches from the wall, and they may be kept open to view and decorated, or may be boxed in with panelling.

The external air is admitted at about the floor level, and passing upwards, becomes warmed against the face of the corrugated plates, and passes into the room through louvre openings at about 6 or 7 feet from the floor.

The louvres are made with Ree's patent metallic plates, enamelled to correspond with the style of decoration, and will bear the heat from a Bunsen burner being passed over them so as to destroy germs of infection when the system is used in fever wards.

The vitiated air is drawn out of the apartment by arranging corrugated heating plates near the ceiling or cornice, and can be led away into flues.

It is claimed that by this system the warming of an apartment would be equable, unlike warming from open fires by radiation.

The portable heating apparatus is made on a similar principle by corrugated plates, with the film of water circulating between; and one form is that of a pillar about one foot diameter and three feet high. The heating may be by gas or oil lamp, and the products of combustion are not led away into a flue, but an enlarged chamber is formed at the outlet, and the products are said to condense and form a fluid. There is also provided, at the end of the outlet, a bag dipping into a solution of chloride of calcium, and the products of combustion have to filter through the pores of the bag charged with the solution.

No. 353. PRIESTLEY, MRS.

The Floral Art Ventilator, designed by Mrs. Priestley, is simple and artistic, and would form an effective means of introducing fresh air without draught, except, perhaps, during cold weather.

The arrangement consists essentially of an outer window and an inner window, with a space between in which flowers may be grown. The bottom part of the outer window, and the top part of the inner window open, and can be regulated at will. The air by this arrangement has to pass over the growing plants, and travels upwards and enters the room by the top opening.

No. 382. RITCHIE AND CO.

The several varieties of the *Law-Color* Hygienic Condensing, Heating, Lighting, and Ventilating Stove are shown. The stove is usually heated by gas, but where this is not to be had, mineral oils may be used instead.

The usual form of this apparatus, which is about 3 feet 6 inches high, is that having a gas burner with a glass chimney placed midway between two side pillars. The heat and products are conveyed

by this glass chimney over the top, and travel down the side pillars into a box or receiver below. This receiver, being the coolest part of the apparatus, condenses the products of combustion, and the liquid is caught in a tray below.

There is no flue to this apparatus, nor any fresh-air inlet.

No. 380. SILBER LIGHT COMPANY.

General exhibit of the *Silber* patented lamp burners for colza and mineral oil, cooking and heating stoves, the heat being derived from two 4-inch flat burners, consuming mineral oil.

No. 346. STEEL AND GARLAND.

The *Wharfedale Grate* here shown, differs from the ordinary grate in that the fire-box, which is usually placed in a recess and far back from the flame of the grate front, is in this grate brought prominently forward into the room, and the sides are splayed off. By this arrangement a large area of heating surface is utilized and much heat saved, which usually goes up the chimney.

The grate is self-contained and requires little fixing. The ornamental canopy forms a hot air chamber, the cold air being admitted by a pipe about 4 inches in diameter, passes up the sides and back through a series of gills, and, having become heated in its passage, proceeds through a perforation at the top of the canopy distributing warm air into the apartment.

The *Noiseless Coal-box* for Sick Rooms is a simple contrivance, six small scoops containing the charges of coal are fitted into a box, so as to slide in and out.

No. 286. THE SANITARY ENGINEERING AND VENTILATION COMPANY,

Exhibit the "Imperial" Vertical Tube for bringing in fresh air to a room, at about 4 feet 6 inches from the floor. The tubes are provided with arrangements for filtering the air before entering the apartment, a very necessary arrangement in large towns.

No. 327. SHARP AND COMPANY.

The *Crown Ejector Cowl* is the chief feature of this exhibit, and its application is shown for ventilating large buildings.

No. 383. STEVENS, CHARLES RICHARD.

Exhibits models of inlets and outlets for ventilation, and having a frame wound with wool to act as a strainer to the incoming air.

A new apparatus for heating by an admixture of steam and hot air, is also shown.

The apparatus consists of a copper boiler, supplied with a small quantity of water from a hydrostatic fountain, or ball valve if more convenient. The boiler is heated by gas or lamp, or other means. The water within the boiler is converted into steam and passes, together

with the heat from the fuel, through pipe coils arranged in some convenient form for heating purposes, and eventually terminating in a small pipe which carries off the products of combustion.

The Circulating Water Heater is an apparatus for supplying hot water to baths, lavatories, and for general domestic purposes. The apparatus consists of a galvanized tank, supported upon a light frame of iron, and in the centre is placed the tube enclosing the boiler gas-burner.

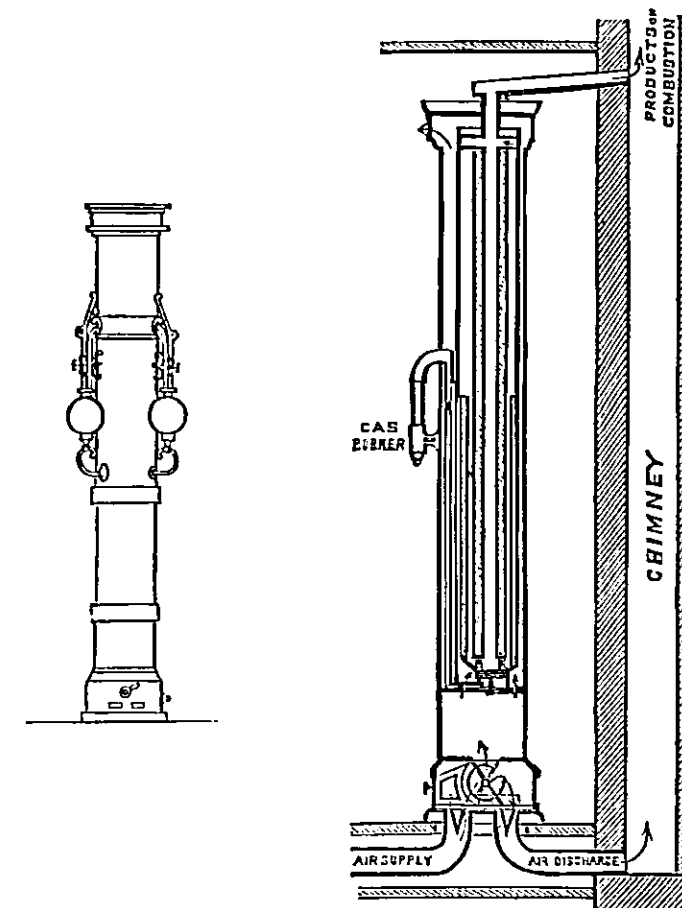
The tank is fitted with a cold water supply, and an outlet for hot water supply to any part of house desired. The gas is burnt on the atmospheric principle.

There is an escape pipe for all products of combustion.

No. 426. STRODE AND CO.

The *Schönheyder* patent Sanitary Stove for lighting, heating, and ventilating. The source from which the heat is obtained in this stove is from one or two, or more, argand gas burners, which give light, and are then utilized for heating purposes.

The outward form of this stove is that of a pillar, which can be made ornamental if thought desirable. The gas burners are arranged at any convenient height for lighting the apartment, and from



the glass chimney an iron elbow conveys the heated products of combustion downwards into a chamber, from whence they pass up into the cylinder, which acts as the heater, and thence away into the flue. To prevent the unpleasant effect of burning the air by over heating (as in some close stoves) the downward pipe from the gas-burner is surrounded by slag wool or other good non-conducting material. The fresh air supply is taken in by a separate pipe at the base of the column and ascends through an annular space, where it gradually becomes warmed and is delivered into the room at the top of the stove. Air is drawn from the room at the base through openings and delivers into the flue, thus causing a constant circulation. If it is desired to warm the room without ventilating, a door with a slide hit-and-miss valve at the base is opened, and this shuts up all inlet for fresh air and the outlet from room. In summer all products of combustion are made to pass away into the flue by a direct communication.

No. 280. THE THAMES BANK IRON COMPANY.

Among a large miscellaneous exhibit, the most noticeable feature is the improved *Gill Stove* made up in sections, and to take to pieces.

No. 242. TONKS, WILLIAM, AND SONS.

Curral's Outlet and Inlet Ventilators, made in bronze metal. The inlet ventilators are made to fix on the bottom rail of window-sashes, and on the middle rail of doors, and are in lengths of 18 inches and 24 inches, they can be arranged to admit any quantity of air by fixing a sufficient number, for large window-sashes two, or perhaps three may be necessary.

The air is admitted through perforations on the outside, and enters a long narrow opening furnished with a deflecting plate, the quantity being controlled by a regulator bar. The regulator bar in some forms of the apparatus is loose, but in others it makes a fixed valve.

A modification of the Ventilator, arranged by Mr. Mark Judge, is shown for admitting air into a room over the architrave moulding at the top of the door or windows, and is described as acting either as an inlet or outlet ventilator, according to the condition of the air in a room.

No. 416. VERITY, BROS.

The patent Ventilator or *Air Propeller*, is a contrivance for bringing in a current of fresh air by means of a revolving fan, driven by pin-hole jets of water from an upper cistern. The current is admitted generally at a height of 5 feet 6 inches from the floor, and can be regulated in quantity and direction.

Means for filtering incoming air, and in hot weather, for cooling the air, are provided.

The Patent Gas Fires made by this firm, are also shown, as well as the Patent Bath Boiler, and the Osborn Combined Boiler and Coil.

SECTION XV.

WATER CLOSETS, SINKS, BATHS, &c., SEWAGE AND DRAINAGE.

No. 304. ANGELL, A. T.

Air-tight Covers for manholes and inspection shafts on house drainage systems. The covers exhibited were of cast iron, and consisted of a frame and door, with locking apparatus and key to open. An indiarubber ring makes the joint between the frame and door air-tight, and the outer surface is chequered to give foothold.

No. 254. BEARD, DENT, AND HELLYER.

General exhibit of sanitary apparatus, including water closet apparatus, flushing cisterns, disconnecting traps, and gullies for waste and rain-water. Various examples of plumbing were also shown, and the cast lead S and P traps.

The *Artizan Water Closet* commends itself for the arrangement of improved joint and flushing-rim, and one of these, fitted with an earthenware top under the seat (which lifts), to form a slop sink, was shown. The valve closet, fitted with large overflow and ventilation to valve-box is here exhibited. The disconnecting trap for soil pipes made in stoneware, with an enlarged inlet grating for fresh air, and the disconnecting gullies, with side inlets for rain-water and sink waste, require notice here.

No. 271. THE BIRMINGHAM SANITARY ASSOCIATION.

Exhibit the *Edinboro' Air Chambered Trap* (Pott's Patent) in various sizes. This useful contrivance is made in one piece of stoneware, glazed, and consists of an open channel, with sharp fall leading into a syphon trap. There are inlet sockets arranged at the back and sides for taking soil pipes, and sink and rain-water pipes. The open channel is covered by an open iron-work grating, and special pieces of earthenware are made to bring this channel up to surface level when the trap itself is deep below the ground.

No. 247. BOLDING, JOHN, AND SONS.

The *Simplex valve closet*, with flushing rim and water supply to overflow.

The "National" wash-out closet, with flushing rim made in one piece of earthenware.

The "Champion" trap, made of lead piping and turned into a spiral form, may be considered ingenious, as giving a continuous flow.

No. 268. BOSTEL, DANIEL, T.

The exhibit in this section consisted mainly of the *Brighton Excelsior* valveless water-closet. This apparatus is made in one piece of earthenware, and is of the "wash-out" type, it consists of a basin with trap beneath, and vertical opening at the side to inspect the trap. The form of the basin admits of water remaining in it about one and a half inches deep, and the flushing rim is arranged so that the water impinges in such a manner as to entirely clear away the contents of the basin at each flush.

No. 347. BRAITHWAITE AND CO.

The patent syphon water-waste preventer is a simple arrangement for flushing water closets, and it consists of an ordinary syphon with an enlarged leg in the cistern, the other and longer leg being outside. A piston, working loosely in the enlarged leg, is set in motion by pulling a lever in the ordinary way, and causes a sudden flow over the top bend of the syphon, which sets it in action and empties the whole cistern at once. The exhibit under this section also includes the wash-out closet with flushing rim and Cloughton's lead traps. This trap has the appearance of an oval bulb outwardly on the lead pipe, and would be convenient in many cases.

No. 259. BROOKE, EDWARD, AND SONS.

General exhibit of stoneware manufacture, including pipes, gullies, invert blocks, &c.

The patent *ribbed pipes* of earthenware, exhibited for the first time. This invention consists of adding to the ordinary pipes, ribs made with the pipe, and serving to strengthen them from crushing. The weight of pipe is greatly increased, and the jointing made somewhat more difficult.

No. 261. BUCHAN, W. P.

The drain trap, with cascade action for disconnecting soil pipes and wastes generally, consists of a syphon trap with a back inlet arranged to deliver about 2 inches above level of trapping water (hence the cascade action). The trap has an inlet at top, furnished with grating to admit fresh air.

The drain pipes, with rest formed at the sockets, and long oval inspection covers are shown.

The *Carmichael* wash-down accessible closet consists of a basin with its outlet so curved as to form a syphon-trap, the deepest part of which can be seen from the basin; the whole apparatus is in one piece of glazed earthenware. There is an inspection cap, which gives access immediately to the soil pipe, which can be cleaned from this opening. The flushing water cascade and the flushing round the sides of basin, are designed to clear the trap each time of using the closet, and to keep the basin clean. A two-inch valve and supply pipe, with large flush of water, is required for this form of closet.

No. 332. CAPPER, SON AND CO.

Pearson's patent Trapless "Twin Basin" water closet, made in one piece of white glazed earthenware, is arranged with a basin and compartment at the side containing a ball-valve for admitting water. The plug has an india-rubber flange, which makes a water-tight valve. When the plug is raised the water previously contained in the basin, together with excreta, goes away to the soil pipe direct, no trap intervening, and the ball-valve allows a fresh supply to fill the basin again.

The *Brian Jones* joint is a special form for connecting the basin apparatus with the soil pipe, with a view to prevent escape of sewer gas, or the joint perishing, or being broken.

No. 270. CLIFF, JOSEPH, AND SONS.

A large general exhibit, among which may be noticed the enamelled stoneware sinks and baths.

No. 253. DOULTON AND CO.

The *Stanford* patent joint for drain pipes, now so well known, is exhibited. It consists in forming around the spigot end and inside the socket a ring of Asphaltic material, moulded to a true surface and forming, when put together, a slightly ball-and-socket joint. This arrangement of joint entirely does away with any jointing material, such as cement and the usual gasket.

The "Kenon" air chamber, floor and trap, is designed in order to simplify the construction of disconnecting manholes for house drainage. The trap is made in one piece, and the floor or open channel part in another piece of stoneware. The floor has an ordinary socket cast at one end to take the spigot end of trap. The "Kenon" floor forms the bottom of the manhole which is usually made with open channels turned in cement or separate earthenware channels. The brickwork is built around the Kenon floor and brought up to the required part. Doulton's joint for drain pipes consists in having the butt ends of the pipes ground so as fairly to fit against each other. A flange or collar is cast on the pipes about $\frac{3}{4}$ -inch from each end. The pipes on being butted against each other leave a space, say $1\frac{1}{2}$ -inch and $\frac{1}{2}$ -inch deep between the collars, this space is filled up with Portland Cement. The pipes rest on stoneware cradles.

No. 351. DURHAM, C. W., OF CHICAGO.

The construction of house drains, especially soil pipes with wrought iron tubes and screw joints as in gas or steam work. This construction renders soil pipes and drains rigid and self-supporting, and settlements of buildings would not be liable to cause failure as in lead and stoneware pipes.

No. 331. EMANUEL, A., AND SONS.

Exhibit syphon action water waste preventer with an after flush. This apparatus consists of a cistern divided into two compartments by a partition. A ball cock supplies water to the right hand compartment, the ball of which floats in the left hand compartment. In the under part of the partition is a small aperture, and when the water rises in the right hand compartment it overflows through the aperture into the left hand compartment until the rising of the ball cock shuts off the supply. A syphon $1\frac{1}{2}$ diameter opens into the right hand compartment and has the longer limb going to the supply of water closet basin. A smaller syphon opens into the left hand compartment, and the longer limb goes into the larger syphon and gives the after flush. A flat plate fits loosely into the right hand compartment like a piston, and is attached to a lever actuated by a chain in the usual manner. The action is this, that when the cistern is full pulling the chain acts on the plate or piston and pulls water over the larger syphon which is at once set into action and gives the required flush from right hand compartment into the closet basin, the smaller syphon now comes into action and delivers the contents of left hand compartment giving the after flush.

No. 381. GILLOW AND Co.

The lavatory made for limited space consists of a case made of any suitable wood, standing about 10 or 12 inches from the wall.

The lavatory basin and receptacle for holding waste is within this case. The act of shutting the door turns the basin parallel to the door and thus occupies the least space.

No. 329. HAYWARD, TYLER, AND Co.

Exhibit a new hopper closet of good design with flushing rim and trap. *Chandler's* waste preventing cistern (giving the two gallon flush) for using in connection with this apparatus is also shown. The basin trap and flushing cistern are always sent out together and form one complete apparatus.

No. 306. HOWARD, EDWARD.

Here we have the arrangement designed by Mr. H. Saxon Snell for automatically flushing and ventilating water-closets.

The arrangement consists of a special shut-down flap, being fitted at a slight angle, and working on centres situate about 9 inches from back of flap.

When the closet is not in use the flap is always down, and communication with the outer air or flue, built especially at back, gives the ventilation. The action of the flap shutting itself after using the closet causes water flush.

No. 266. INGHAM, W., AND SONS.

The *Stanford* patent joint is here exhibited, and was described under Doulton and Co.

Brown's patent accessible Disconnecting trap is a useful arrangement for disconnecting soil pipes and wastes generally. It has an access cover on the sewer side of trap. The inlet is set up at an angle which would be convenient in some cases.

The balanced "flap valves" shown have an adjusting ball to screw backwards and forwards so as to adjust the flap exactly right after fixing.

No. 257. JENNINGS, GEORGE.

Among the interesting exhibits of this firm, the most noticeable in point of novelty is the "Flushing Jar," arranged to automatically flush urinals, etc., at regular and stated intervals. It consists of a glass cylinder or jar holding about one gallon supplied continuously with a small run of water regulated by an ordinary stop-cock according to the time at which the flushing is required. A spiral syphon, like a horizontal "Archimedean" screw, is fixed in the glass cylinder, and terminates at one end in the supply pipe for flushing the urinal, the other end, slightly bell-mouthed, opens into the jar or cylinder.

When the water has gradually filled the jar or cylinder to a certain height, the spiral syphon comes into action automatically and empties the contents into the basin of urinal, causing it to be properly flushed.

The "Dubois" drawn lead traps of various shapes and sizes are exhibited.

The lavatories fitted up with the shampooing apparatus. The apparatus is made entirely in metal, with universal joints enabling it to be turned into any position in the same manner as in india-rubber tube.

The lead traps provided with india-rubber bulbs, which fall in their seating and close the passage against sewer air, even should the water become evaporated from the trap, are worth notice.

No. 344. JOURNEYMEN PLUMBERS' EXHIBIT.

These exhibits were sent in competition for prizes offered by the National Health Society. (See Mr. George Shaw's report).

No. 282. MAGUIRE AND Co.

The *patent safety joint drain* is made with stoneware pipes of ordinary form with the addition at each joint of a rest or cradle, also of stoneware made hollow to receive the sockets. The joint is made in the usual manner, and afterwards the cradle is filled up with liquid cement. The cradle comes up the pipe about half-way; the top part of joint being easily made. The advantage of the cradle is that it enables the pipes to be laid concentric.

The *patent self-acting flushing tank* is an apparatus for automatically flushing drains and sewers at regular intervals.

The apparatus consists of a tank divided into two compartments by a vertical plate having a small pipe near the top. A lever has its fulcrum on the division plate, and one end actuates a valve at the outlet of larger compartment connecting with drain to be flushed. The other and shorter end of the lever carries a small cylindrical cistern. The action is, that as soon as the larger compartment fills with water up to the level of the small pipe in vertical plate, it overflows by this pipe and fills the cylindrical cistern, and when the weight of water in this cistern becomes sufficient, it lifts the larger end of the lever and opens the valve, allowing the water in the larger compartment to escape suddenly into the drain and so flushing it. There is a small hole in the cylindrical cistern which allows the water in it to empty away, which causes the valve to shut again ready for the next filling of compartment.

Dr. Scott's hospital disinfecting apparatus made for using either gas or coal as means of heating.

The chamber is made with walls and door of an improved composite non-conducting material. There is also an improved safety valve to prevent heat exceeding 300° Fahr. The apparatus is furnished with an inlet valve and ventilating shaft with outlet valve.

No. 317. MOULE'S PATENT EARTH CLOSET COMPANY.

The Moule earth closet, now so well known and largely used, is here exhibited in various forms. The No. 9 Pattern having pull-up arrangement for passing and spreading a quantity of earth each time closet is used, is a convenient form.

No. 313. PARKER, JOHN.

The dry earth closets, self-acting, works with earth or ashes, and has a pull-up handle and pail receptacle. In some forms of this apparatus there is a trough under the seat for separating liquid. This would necessitate the laying of a drain to convey the liquid away.

No. 342. PURNELL, J., AND SON.

The *Purnell patent syphon water waste preventer* is a simple contrivance for giving the two gallon flush and no more. The apparatus consists of a cast-iron cistern containing two gallons, within which is placed an ordinary syphon, the short limb opening into cistern and longer limb into the supply pipe for flushing water-closet basin. A valve of the spindle type is arranged to be actuated by a lever and chain with handle in the usual manner, and the valve connects with a short branch piece with the longer limb of syphon. When the chain is pulled down it opens the spindle valve and allows water to flow down the longer limb and sets the syphon in action, which continues until the whole contents of the cistern has been delivered into the closet basin.

The white glazed stoneware channels exhibited are of various forms suitable for forming inverts in manholes, and would be found useful in many cases instead of the usual cement channels.

The *Hopper Closet*, with flushing rim, is a simple form of closet and with a good flush, such as from the syphon water waste preventer would form a clean, efficient, and cheap closet apparatus.

No. 340. SCOTT, B. AND READ.

This exhibit comprises various adaptations of *Field's patent annular syphons* for flushing tanks.

The principle is suitable for the automatic flushing of town sewers, house drains, water-closets and urinals, or for trough closets. The distinguishing feature is that it has no working parts, and a very small dribble of water will start the syphon into action.

The syphon consists of an inner tube forming the longer limb, and an outer tube closed at the top forming the shorter limb. Into a tank of the proper size, the longer limb is fixed in a vertical position, the lower end projecting through the bottom and dipping into water which is kept at a proper level by a weir.

The action is as follows:—When the water or sewage has gradually risen in the tank to the level of the top of the longer limb, instead of running down the sides of the pipe, it is caused to descend over a lip, and by this means a quantity of air is displaced which forms a partial vacuum and thereby starts the syphon, which then empties the tank with rapidity.

For flushing house drains the galvanized iron tanks are suitable. They are self-contained, and afford an economical means of flushing periodically and preventing dangerous deposits. For flushing sewers large annular syphons are built into a tank of suitable dimensions.

No. 281. SHANKS AND CO.

This exhibit comprises bath and lavatory apparatus, and water-closet and sink apparatus.

The "Wash out" closet is arranged with outlet at the front which is not visible. There is a flushing rim, and it is designed to leave a small quantity of water in the basin each time about $\frac{3}{4}$ -inch deep. The flush comes from the back and from the rim all round. The combined effect is to clear out the basin and trap of any deposit at each flush.

The valve closet is of good pattern and well made, and has the valve box ventilating.

No. 327. SHARP, C. H., AND CO.

The water-closet designed for *ship's use* above the water line is of the valve type, and has a double action to prevent heavy seas from washing back into the apparatus.

No. 341. SHARP, HENRY, JONES AND CO.

The glazed stoneware pipes, with the Stanford patent joints, here exhibited, were described above under Doulton and Co., No. 253. The joint composition is described as being of tar, sand, and sulphur.

The *Rock concrete* tubes exhibited composed of Portland cement, made of true form with smooth surface. The experience gained with this kind of construction for sewers goes to show that as at present manufactured they require caution in using.

No. 284. THE SHONE DRAINAGE SEWERAGE AND WATER SUPPLY COMPANY LIMITED.

This Exhibit consists of the *pneumatic ejector*.

The *Hydraulic Ejector* for home drainage.

The *Hydraulic Ejector* for town sewers.

The Pneumatic Sewage Ejector was tried on the Havod-y-Wern Farm at Wrexham on an experimental length of sewer and worked during some months. The model exhibited is on the same principle and consists of an ejector worked by compressed air. The ejector can be fixed in any manhole on a town sewerage system, and the compressed air may be sent along cast-iron mains from a central station. When the sewage has gravitated into the manhole and filled it to a certain height, the ejector comes into operation automatically and drives the sewage away into a sewer at a higher level which gravitates to the outfall into the sea or on to the land. The value of such a system would be best seen where the available fall for sewers was very limited.

The Hydraulic Ejector for house drainage here exhibited, full size, consists mainly of a stoneware flush tank fitted with a syphon piece also of stoneware, the longer limb going into the drain which passes to the sewer. A tumbler box, working on centres, and holding about $1\frac{1}{2}$ gallons, discharges into a funnel-shaped pipe passing through the top and ending near the bottom of the tank. A soil pipe and wastes of any kind enter at the top and discharge into the tank. The tank having become full, the tumbler-box suddenly discharges the $1\frac{1}{2}$ gallons through the funnel-pipe and sets the syphon in action which clears the tank entirely of its contents. The tumbler-box may receive its supply from a waste, from sink or bath, and is stated to act as a grease trap in the case of sinks. There is a ventilating shaft from the tank carried up to a convenient height.

No. 255. STIFF, JAMES, AND SONS.

Among a large exhibit of general stoneware, we may mention the *Weaver* soil pipe disconnecting trap. It consists of a stoneware syphon bend having a back inlet with a drop of about 2 inches to the trapping water, and has an open top covered with a grid of stoneware for admitting fresh air. There is also provided a socket for ventilation pipe on sewer side of trap.

The "Weatherly" disconnecting and ventilating sewer air trap is a double syphon trap. There is a square chamber between the two syphons, on the top of which there is an opening for a ventilating

pipe and a lid for inspection. The inlet for the wastes into first or upper trap is placed at an angle upwards, and there is also a small grating for admission of fresh air.

No. 256. TYLOR, J., AND SONS.

This exhibit shows an extensive range of sanitary apparatus, including valve closets, urinals, lavatories, water waste preventers, waste not valves, sinks for various purposes, baths and bath fittings. The valve closet, with flushing rim, has no overflow to basin connected with the valve box. The Basin is intended to overflow into the safe below. The valve closet is also fitted with moveable valve seating, enabling a new valve to be put in without taking down the basin in the usual way.

The "Waste not" cistern valve automatically closes after allowing the intended quantity of water to pass. The urinal, with lip trap, so as to facilitate inspection, is also self-flushing, the form of trap giving a syphoning action at intervals.

No. 326. UNDERHAY, F. G.

The *patent regulator* of Underhay is to allow the passage of a certain quantity of water through the basin of the closet each time the handle is raised even should it be dropped again instantaneously.

No. 333. WARNER, JOHN, AND SONS.

The noticeable exhibit under this number is the *valve closet*, with flushing rim and moveable valve seating, enabling new one to be put in without the taking down of basin in the usual way.

No. 311. WEARE, ROBERT.

Inodorous carbon closet commode.

No. 262. WHITE, WILLIAM, F.S.A.

This exhibit of water-closet is known as the "Shrewsbury."

The main feature consists in a special form of flushing cistern whereby the whole flush of water is tipped suddenly down the supply pipe to closet. The supply pipe is of larger diameter than usual and thereby gives good flush to closet pan.

No. 279. WILCOCK AND CO.

The disconnecting traps exhibited here are similar to many already described, and form useful syphons for disconnecting soil pipes and other wastes.

The sanitary trough closet (Holroyd's Patent) is made of strong stoneware, salt-glazed inside and outside. The shape on cross section is that of an egg-shaped sewer with crown removed. The only part of these closets not stoneware is the seat of pitch pine wood.

The division walls for separating such closet are lined with white glazed bricks giving great cleanliness.

The arrangement for charging and emptying the closets is such as to prevent waste of water. The valve chest, which may be fixed at one end or in the middle, and is under lock and key, is provided with a valve and seat with an overflow arrangement in case of neglect on the part of the attendant. The water is supplied through a brass tap, on which is screwed a hose for washing out each closet.

There is also an arrangement of flushing by a fixed perforated pipe running along each side of the trough at top, and by turning on a tap the trough is flushed throughout.

No. 323. WOODWARD, JAMES.

The "Wash out" closet basin, with flushing rim and trap, made of white glazed earthenware.

The Hopper closet basin with flush rim and trap.

Porcelain sinks for refreshment bars.

SECTION XVI.

WATER SUPPLY AND FILTRATION.

A.—WATER SUPPLY.

No. 243. TONKS, J. T.

Glass Ball Valves. Frictionless balanced supply valves. Cleanliness is promoted. The balls are always tight. The spindle or the lever of one of those shown is probably imperfectly guided, but the exhibit has merit and may be advantageously used.

No. 253. DOULTON AND CO.*

Self-closing non-concussion Valves. These are liable to remain open with water containing small impurities, and they will not open with low pressures. Neat application of the same to cisterns of closets, made of metal and india-rubber.

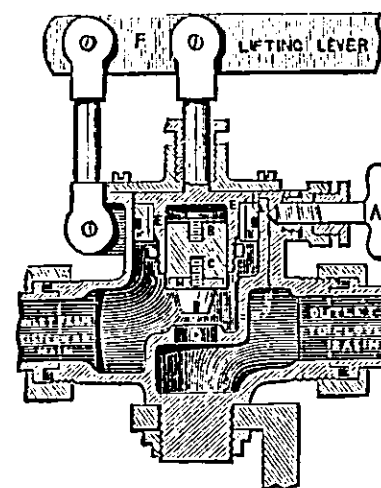
* In addition to No. 253, in List B.

No. 254. BEARD, DENT, AND HELLYER.

Self-closing Valve of American manufacture. Syphon waste preventer good, but not new.

No. 256. TYLOR, J., AND SONS.

Waste-not Valve applied in various forms of water supply for cisterns, closets, courts, and alleys, etc. It is self-closing and yet can be closed by hand.



The diagram shows the Patent Waste-not Regulator Closet Valve. The action is as follows: when the handle of the closet is pulled up the lever F raises the socket EE, which carries with it the ring valve KK, and also the loose plunger C; when the closet handle is dropped the lever F (which is raised by it but not fixed to it) commences to fall, the speed of its descent being governed by the amount of water passing to the top of the valve KK through the passage L, the amount being regulated by the screw A.

If the Lever F is held or propped up the loose plunger C will gradually slide down and close the opening D, partly by its own gravity, and partly by the pressure of water getting above it.

This peculiar action of the water pressure getting above the plunger is demonstrated by the tap closing itself when placed wrong way upwards.

It is an india-rubber washer, forming the seating which closes the opening D.

Grooved joints without solder, and will stand any pressure. Hydrants, sluice valves, main stop valves for connecting supply pipes to street mains. Excellent workmanship. A water meter. One made of glass to show working parts.

No. 257. JENNINGS AND CO.

Neat Shampooing arrangement. Ball trap made of india-rubber with glass door. This ball may become locked down to its seat. Good arrangement for periodically flushing urinals. Drawn lead pipes and traps made of lead and india-rubber (see also Section XV).

No. 280. THAMES BANK IRON CO.

The sluice and hydrants shewn are of ordinary patterns, and with no special points of merit. The sluice has one unnecessary joint.

No. 281. SHANKS AND CO.

Every kind of bath taps, combined and single. Lavatory taps. Ball taps in glass, top case made of brass. They are of the ordinary kind for their special uses, and are highly finished off in two or three kinds of metal and earthenware.

No. 329. HAYWARD, TYLER, AND CO.

A great variety and large collection of valves and cocks for fire service, and pumps for testing water mains. Workmanship and make good. Also a badly shaped sluice valve.

No. 331. EMANUEL, A., AND SONS.

Well finished and strong looking deep well pumps, valves, and cocks. Several good syphon and other form of waste preventers in gun metal and iron.

No. 372. QUIRK, BARTON, AND CO.

Well made tin lined lead pipes. The tin and lead are laid and rolled together so that they are closely amalgamated, but the tin lining is very thin, so that if any crevice or small hole should exist in the tin galvanic action would set in and injure the pipe. They were of small bore.

B.—FILTERS.

THE essential points of a good filter are the following:—

1. SIMPLICITY.
2. EFFICIENCY.
3. DURABILITY.

1. *Simplicity*.—When complicated apparatus is employed it is very apt to get out of order, and it also entails considerable expense. It is also difficult to get at the filtering medium for cleansing or renewal. A simple vessel, which will contain the filtering medium, is therefore the best.

2. *Efficiency*.—This is, of course, secured by obtaining a filtering medium which shall thoroughly remove impurity from drinking water, and at the same time yield nothing to the water which is likely to be injurious.

3. *Durability*.—The medium must be capable of acting efficiently for some reasonable length of time, so as to obviate the necessity of renewal too frequently.

The filters and media exhibited were the following:—

No. 253. DOULTON AND CO.

1. *Manganous Carbon (Dr. Bernays' patent)*.

This is a block, made of animal charcoal and peroxide of manganese. The influence of the charcoal would be assisted by the peroxide, which is an oxidising agent. The form is open to the objections against block filters generally, viz.: their liability to clog, and ultimately to become useless from retaining organic matter in their interstices. Perhaps the manganese oxide might assist in preventing this.

2. *Aërating Patent Filter*, for fixing to stone cisterns (Bailey Denton's patent). The filtering materials are sand or fine gravel and animal charcoal. The chief feature is an arrangement by which a current of air reaches the filtering material, thus obviating the dangers of non-aëration.

No. 398. GARDNER, E. AND J.

Filters. Filtering Materials.

These are the filters and materials brought forward by Lieut.-Col. Crease, C.B., Royal Marine Artillery.

The filters are very simple, being cylinders of earthenware, without reservoir. Through the bottom passes a screw rod, by means of which the filtering material may be subjected to the necessary pressure by means of a perforated plate. The pressure regulates the rate of flow of the water through the filtering medium.

The filtering medium is *Carferal*, a substance, the exact composition of which has not yet been made known. It consists, however, of carbon, iron (ferrum) and clay (alumina), and from those constituents its name has been compounded. It is granular in form, and resembles animal charcoal in appearance. It has considerable power in removing organic matter from water, and it yields nothing to water. The filtering action is rapid, and it has fair durability.

No. 432. HOOPER AND CO.

Carbon Blocks, to soften water and to prevent incrustation in kettles and boilers.

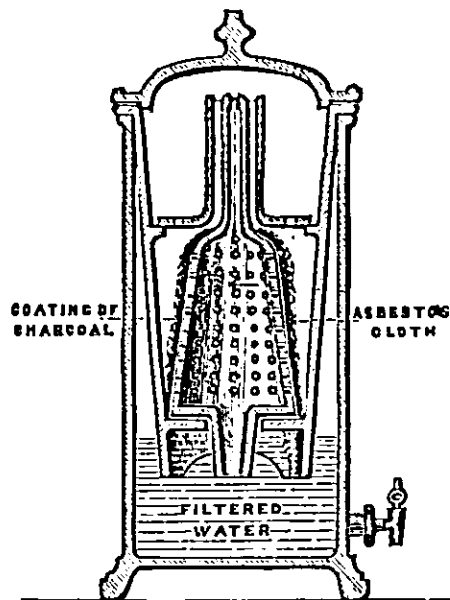
These could only act by allowing the calcium carbonate (chalk) to collect on their surfaces.

Filters. Compressed vegetable carbon.

Vegetable charcoal has long ago been shown to have very little efficacy in water filtration.

No. 401. MAIGNEN, P. A.

Filters. Maignen's *Filtre Rapide* for purifying and aerating water.



This form of filter consists in principle of sheets of cloth spread over frames so as to expose as large a surface as possible to the water. The method was originally invented for filtering wine, and afterwards modified so as to be applicable to water. An improvement has been introduced by substituting *asbestos* cloth instead of canvas, as the latter tends to decompose and yield organic matter to the water. A form called the "Bijou" filter is introduced for the table, consisting of a cone of perforated earthenware instead of the frame above mentioned; over this cone is stretched a cap of asbestos cloth. Filtering

media are also employed, such as animal charcoal, the so-called "carbo-calcis" and others. The "carbo-calcis" consists of finely-powdered animal charcoal freed as much as possible from extraneous matter and treated with lime. This is mixed with some of the water and poured over the filtering cloth in as great quantity as may be thought necessary: it adheres to the cloth and forms a filtering medium of greater or less thickness. It is obvious that other media may also be used in the same way. For rapidity of filtration, especially for removal of suspended matter, the method would probably prove useful. The use of asbestos cloth has the great advantage that it may be cleaned thoroughly, and even exposed to the action of fire, to get completely rid of all organic matter.

No. 401. MAGUIRE AND CO.

Maguire's Patent Renewable Animal Charcoal Filters, for domestic use.

These are simply earthenware cylinders, in which the lid of the section to contain the filtering medium is fitted in with a bayonet catch, and is easily removed for cleaning or renewal. The apparatus is made of earthenware throughout.

No. 352. RAMSEY, WILLIAM.

Filters, glass and Charcoal.

These present no special feature.

No. 286. SANITARY ENGINEERING AND VENTILATION COMPANY.

Cistern Filters, Portable Filters, Table Filters.

These filters are made with solid carbon blocks as the media, so-called *Silicated Carbon*, or animal charcoal mixed with silica (sand or powdered flint) and compressed into a solid form. They are so arranged that the parts are all accessible for cleansing and renewal; and provision is also made for the access of air to the filtering medium.

No. 402. SILICATED CARBON FILTER COMPANY.

1. *Filtering Medium, Silicated Carbon.*
2. *Filters, Domestic Filters, Ascension Filters, Table Filters, Pocket Travelling Filters.*

Main and constant-supply Filters, for placing under cistern, or attaching to main.

The silicated carbon is a solid block, of which animal charcoal is the active ingredient. All blocks are apt to clog rapidly, especially if the water passed through contain much suspended matter. Attempts to obviate this have been made by passing the water first through sponge; but this is not successful, for the sponge soon gets foul, and becomes itself a source of impurity. The Silicated Carbon Company have made an improvement by introducing asbestos into their filters instead: by that means the suspended matter is kept out, while the asbestos itself not only does not favour decomposition, but may be exposed to fire, when required, so as to purify it thoroughly. Block filters require cleaning by scraping or brushing, by passing distilled or quite clear water through them in an opposite direction to the usual current, or by passing a solution of potassium permanganate (Condy's fluid) and weak mineral acid (hydrochloric or sulphuric) through them, and then rinsing well with distilled water. Filtration through them is comparatively slow, taking about fifteen minutes on an average; whereas loose animal charcoal, carferal, or other similar granular substances, filter much more rapidly.

Pocket filters of all kinds soon have their power exhausted if the water used is markedly impure. They are useful, however, as strainers of suspended matter.

No. 269. SMITH, THOMAS AND COMPANY.

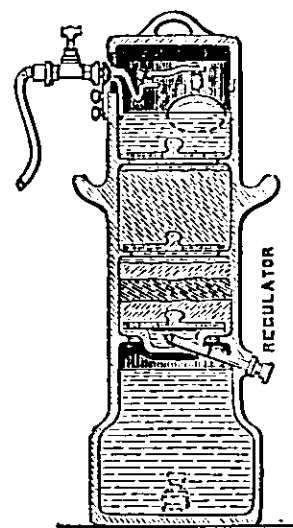
Filters.

These have the objection that the filtering medium is cemented in and is not accessible.

No. 400. SPONGY IRON DOMESTIC FILTER COMPANY.

Water Filters.—Domestic Spongy Iron Filters of different constitution, made of spongy (metallic) iron, prepared sand, and stone-ware filter cases.

These filters are different from most others in the market in their construction, as well as in the medium employed. The latter is spongy iron, a substance granular in appearance, and not unlike animal charcoal externally. About 26 cubic feet of it go to the ton. It is iron, chiefly in the metallic state, obtained by the roasting of hæmatite. Its action upon water, even in the cold, is like that produced by passing steam over red-hot iron, viz.: the iron is oxidised, and hydrogen is set free. The iron oxide then probably yields its oxygen in whole or in part to the organic matter in the water, and destroys it. In doing so, however, it also impregnates the water to a certain extent with iron. This is got rid of in these filters by causing the filtered water to pass through a layer of "prepared sand," which consists of very fine gravel or coarse sand, mixed with a proportion of *pyrolusite*, or crude manganese peroxide. This removes the traces of iron. The media also remove traces of lead from water.



The filtering process is rather slow, the rate being purposely slackened in order to effect thorough purification: about 22 minutes being the average time. The reservoir of the filter is filled through a minute perforation in a pipe which passes through it. This pipe can be opened from without, and cleaned by means of a brush, or it can be removed, and the small aperture cleaned. It is made of pure tin, the rest of the apparatus being earthenware. By a syphon arrangement the water is prevented from falling below a certain level, by which means the spongy iron is always kept wetted. This obviates the inconvenience of its drying up and caking so as to impede the flow of water. These filters can also be connected with the pipe of a constant supply or cistern, and be arranged to work with a ball-cock. The action of the medium is very powerful, and it is also durable, depending of course upon the character of the water passed through. Under ordinary circumstances the material may be renewed about once a twelvemonth.

Spongy iron has the advantage of yielding nothing to water likely to favour decomposition or the propagation of organic life. Animal charcoal, on the other hand, although a powerful filtering medium, is apt to yield phosphates to water, which tend to favour organic life,—so that water which has been filtered through it may become impure if stored. Water filtered through spongy iron may apparently be stored with impunity.

EXAMINATIONS IN SANITARY SCIENCE FOR LOCAL SURVEYORS AND INSPECTORS OF NUISANCES.

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THE great and increasing importance of the duties devolving upon Local Surveyors and Inspectors of Nuisances in connection with the various Acts relating to Public Health, the Sale of Food and Drugs Act, &c., has led the Council of the Sanitary Institute of Great Britain to establish Voluntary Examinations, to appoint a Board of Examiners, and to grant Certificates of Competency to Local Surveyors and Inspectors of Nuisances.

Visitors duly appointed by the Local Government Board and various bodies connected with the practical application of sanitary science are invited to be present at the Examinations.

The Examinations, which are arranged in two grades, are intended to enable Local Surveyors and Inspectors of Nuisances, or persons desirous of becoming such, or of obtaining the Certificate of the Institute, to prove their competency in the subjects of Examination. Successful Candidates will be placed on the Register of persons so certificated; this Register will be kept at the Offices of the Institute, and a copy will be forwarded to Local Boards and Sanitary Authorities on application.

Each Examination occupies a portion of two days. On the first day the Examination of Surveyors occupies four hours—viz., from 2 till 4, and from 6 till 8 p.m., and consists of written papers only. Inspectors of Nuisances have two hours' written examination on the first day—viz., from 4 till 6 p.m. On the second day the Examination, for both classes, commences at 11 a.m., and is *viva voce*,

with one or more questions to be answered in writing, *if deemed necessary*. A Certificate of competency, signed by the examiners, is granted to successful Candidates, entitling them to be designated as "Certificated by the Sanitary Institute of Great Britain."

As Rural Sanitary Authorities are able, under the Public Health Act, 1875, to obtain almost all the powers of Urban Sanitary Authorities, it is not considered advisable to make any distinction in the examination of the two classes of Surveyors.

As one person may, under the Public Health Act, 1875, be both Local Surveyor and Inspector of Nuisances, Candidates wishing to obtain the double qualification may enter for both Examinations on the same occasion.

Candidates are required to furnish to the Board of Examiners satisfactory testimonials as to personal character, and to give two weeks' notice to the Registrar previous to presenting themselves for Examination, stating whether they wish to be examined as Surveyors, as Inspectors of Nuisances, or as both. The fee for Examination must be paid to the Secretary, by Post-Office order or otherwise, at least six days before the day of Examination. On the receipt of the fee, a ticket will be forwarded admitting to the Examination.

The fees payable for the Examinations are as follows:—

For Surveyors £5 5s.

For Inspectors of Nuisances £2 2s.

Unsuccessful Candidates are allowed to present themselves a second time for one fee.

Examinations during the year 1882 are appointed to be held at the Rooms of the Institute:—

On Thursday and Friday, November 2nd and 3rd, 1882.

On Thursday and Friday, June 7th and 8th, 1883.

Forms to be filled up by Candidates previous to Examination will be supplied on application to the Secretary, 9, Conduit Street, W.

SYLLABUS of SUBJECTS for EXAMINATION.

FOR LOCAL SURVEYORS.

LAWS AND BYE-LAWS—A thorough knowledge of the Acts affecting Sanitary Authorities, as far as they relate to the duties of Local Surveyors; also, of the Model Bye-Laws issued by the Local Government Board.

SEWERAGE AND DRAINAGE—The Sanitary principles which should be observed in the preparation of schemes for, and the construction of, Sewerage works; the ventilation and flushing of sewers and drains; the internal drainage and other Sanitary arrangements of houses, privies, water-closets, dry-closets, and the removal of refuse; the Sanitary details of Builders' and Plumbers' work.

WATER SUPPLY OF TOWNS AND HOUSES—The Sanitary principles which should be observed in the preparation of schemes for, and the construction of, Water-works; the various ways in which water is likely to become polluted, and the best means of ensuring its purity.

REGULATION OF CELLAR DWELLINGS AND LODGING HOUSES—General principles of Ventilation; the amount of air and space necessary for men and animals; the means of supplying air, and of ensuring its purity.

HIGHWAYS AND STREETS—The Sanitary principles which should be observed in the construction and cleansing of streets and roads.

All persons who have passed the above Examination and received the Certificate for the First Grade are, by virtue of having so passed, entitled to become Members of the Institute for Life, upon payment of Five Guineas (without Annual Subscription), in addition to the fee paid for the Examination.

FOR INSPECTORS OF NUISANCES.

A thorough knowledge of the Provisions of the Acts and Model Bye-Laws relating to the duties of Inspector of Nuisances—also of the working of the Sale of Food and Drugs Act.

A fair knowledge of the principles of Ventilation, and the simple methods of Ventilating Rooms—Measurement of Cubic Space.

A knowledge of the Physical Characteristics of Good Drinking Water—the various ways in which it may be polluted, and the means of preventing pollution—Methods of Water Supply.

A knowledge of the proper conditions of good drainage.

The advantages and disadvantages of various Sanitary Appliances for Houses—Inspection of Builders' and Plumbers' work.

A knowledge of what constitutes a Nuisance, arising from any Trade, Business, or Manufacture.

A fair knowledge of the characteristics of good and bad Food (such as Meat, Fish, Milk, Vegetables), so as to be able to recognise unsoundness.

Some knowledge of Infectious Diseases, and of the Regulations affecting persons suffering or recovering from such diseases.

A knowledge of the best Methods of Disinfection.

Methods of Inspection, not only of Dwellings, Dairies, and Milk-Shops, but of Markets, Slaughter-Houses, Cow-Sheds, and offensive Trades.

Scavenging and the Disposal of Refuse.

All persons who have passed the above Examination and received the Certificate for the Second Grade are, by virtue of having so passed, entitled to become Associates of the Institute for Life, upon payment of Three Guineas (without Annual Subscription), in addition to the fee paid for the Examination.

LIST OF BOOKS SUGGESTED BY THE EXAMINERS AS USEFUL TO CANDIDATES.

SURVEYORS.

LAWS AND BYE-LAWS.

The principal Acts affecting Sanitary Authorities, viz:—

Gas Works Clauses Acts, 1847. *Price 6d.*
Water Works „ „ 1847. *Price 1s.; & 1863,*
price 3d.
Public Health Act, 1875. *Price 5s. 7½d.*
„ „ Water, 1878. *Price 4½d.*
Rivers Pollution Act, 1876. *Price 6d.*
Artizans' and Labourers' Dwelling Acts, 1868.
Price 7½d.; and 1875, price 1s.

*Sold by
Eyre & Spottiswoode.*

Local Government Board. Model Bye-Laws for Sanitary Authorities. *Eyre & Spottiswoode. Price 4s. 6d.*

†CHAMBERS, GEORGE F. Digest of the Law relating to Public Health and Local Government. 7th Edition. *Stevens & Son. Price £1 8s.*

†FITZGERALD, VESEY. Public Health Act and Local Government Act, 1875. 3rd Edition. *Waterlow Bros. & Layton. Price 12s. 6d.*

†GLEN, W.C., Q.C. Public Health Act. *Knight. Price £1 16s.*

†LUMLEY. Public Health Act, 1875. *Shaw & Son. Price £1 5s.*

†MICHAEL & WILL. On Gas and Water. *Butterworth. Price £1 5s.*

STRATTON'S Public Health Acts, 1875. 1880 Edition. *Knight. Price 3s. 6d.*

†WOOLRYCH. On the Metropolis Local Management Acts. 2nd Edition. *Shaw & Son. Price £1 1s.*

SEWERAGE AND DRAINAGE.

BOULNOIS, H. P., M.INST.C.E. Dirty Dust-Bins and Sloppy Streets. *E. & F. N. Spon. Price 3s. 6d.*

BUCHAN, W. PATON. Plumbing. *Crosby, Lockwood & Co. Price 3s. 6d.*

DENTON, J. BAILEY, M.INST.C.E. Sanitary Engineering. *E. & F. N. Spon. Price £1 5s.*

FIELD, ROGERS, M.INST.C.E. Bye-Laws and Regulations with reference to House Drainage. *E. & F. N. Spon. Price 1s.*

FOX, CORNELIUS B., M.D. Disposal of the Slop Water of Villages. *J. & A. Churchill. Price 1s. 6d.*

GALTON, DOUGLAS, C.B., F.R.S. Observations on the Construction of Healthy Dwellings. *Henry Frowde. Price 10s. 6d.*

HELLYER, S. S. The Plumber, and Sanitary Houses. 2nd Edition. *B. S. Batsford. Price 10s. 6d.*

LATHAM, BALDWIN, M.INST.C.E. Sanitary Engineering. *E. & F. N. Spon. Price £1 10s.*

RAWLINSON, ROBT., C.B. Suggestions as to Drainage, Sewerage, and Water Supply. *Knight. Price 3s.*

†Report of the Committee of The Local Government Board on Treatment of Town Sewage. *Hansard & Co. Price, Report 1s.; Plans 10s.*

RUSSELL, J. A. Two Lectures to Builders and Plumbers. *Simpkin, Marshall & Co., 1878. Price 1s. 6d.*

WATER SUPPLY OF TOWNS AND HOUSES.

†BUCHAN, A. Introductory Text Book of Meteorology. 2nd Edition. *W. Blackwood & Sons. Price 4s. 6d.*

†HUMBER, WILLIAM, ASSOC.M.INST.C.E. Water Supply of Cities and Towns. *Crosby, Lockwood & Co. Price £6. 6s.*

PARRY, JOSEPH, C.E. Water: its Composition, Collection, and Distribution. *F. Warne. Price 2s. 6d.*

†Sixth Report of the Royal Commissioners on Pollution of Rivers. *Hansard & Co. Price 16s.*

REGULATION OF CELLAR DWELLINGS AND LODGING HOUSES, VENTILATION, &C.

GALTON, DOUGLAS, C.B., F.R.S. Observations on the Construction of Healthy Dwellings. *Henry Frowde. Price 10s. 6d.*

HARTLEY, W. NOEL. Air and its Relation to Life. *Longmans, Green & Co. Price 6s.*

†PARKES, E. A., M.D., F.R.S., and F. DE CHAUMONT, M.D., F.R.S. A Manual of Practical Hygiene (Chapters on Air). *J. & A. Churchill. Price 18s.*

HIGHWAYS AND STREETS.

BOULNOIS, H. P., M.INST.C.E. Dirty Dust-Bins and Sloppy Streets. *E. & F. N. Spon. Price 3s. 6d.*

CODRINGTON, T., M.INST.C.E. Maintenance of Macadamised Roads. *E. & F. N. Spon. Price 6s.*

GENERAL.

†PARKES, E. A., M.D., F.R.S., and F. DE CHAUMONT, M.D., F.R.S. A Manual of Practical Hygiene. *J. & A. Churchill. Price 18s.*

†WILSON, G., M.A., M.D. Handbook of Hygiene and Sanitary Science. *J. & A. Churchill. Price 10s. 6d.*

INSPECTORS OF NUISANCES.

The Principal Acts relating to the Duties of Inspectors, viz:—

- Public Health Act, 1875. Price 5s. 7d.
 Water, 1878. Price 4d.
 "Canal Boats" Act, 1877. Price 3d.
 Sale of Food and Drugs Acts, 1875. Price 6d.; and
 1879, price 3d.
 Rivers Pollution Act, 1876. Price 6d.
 Artizans' and Labourers' Dwellings Acts, 1868. Price 7d.; and 1875, price 1s.
 Alkali, &c., Works Regulations Act, 1881. Price 5d.
 Nuisances Removal Acts, 1855. Price 1s.; 1860, price 3d.; and 1866, price 1d.
 Local Government Board. Model Bye-Laws for Sanitary Authorities. Eyre & Spottiswoode. Price 4s. 6d.
 Local Government Board. General Orders relating to Duties of Inspectors of Nuisances, issued March 10th and 13th, 1880.
 Metropolitan Board of Works. Bye-Laws under the Slaughter-houses, &c., Act; eight in number.
 Metropolitan Board of Works. The Dairies Cowsheds, and Milkshops Order of July, 1879.
 STRATTON'S Public Health Acts, 1875. 1880 Edition. Knight. Price 3s. 6d.
 †WOOLRYCH. On the Metropolis Local Management Acts. 2nd Edition. Shaw & Son. Price £1. 1s.
 BOULNOIS, H. P., M.INST.C.E. Dirty Dust-Bins and Sloppy Streets. E. & F. N. Spon. Price 3s. 6d.
 CORFIELD, W. H., M.A., M.D. The Laws of Health. Longman & Co. Price 1s. 6d.
 CORFIELD, W. H., M.A., M.D. Dwelling Houses: their Sanitary Construction and Arrangements. H. K. Lewis. Price 3s. 6d.
 F. DE CHAUMONT, F.S.B., M.D., F.R.S. Manuals of Health. The Habitation in Relation to Health. Society for Promoting Christian Knowledge. Price 1s.
 FIELD, ROGERS, M.INST.C.E. Bye-Laws and Regulations with Reference to House Drainage. E. & F. N. Spon. Price 1s.
 HARTLEY, W. NOEL. Water, Air, and Disinfectants. Society for Promoting Christian Knowledge. Price 1s.
 †PARKES, E. A., M.D., F.R.S., and F. DE CHAUMONT, M.D., F.R.S. A Manual of Practical Hygiene. (Chapters on Water, Air, Food, and Sewage). J. & A. Churchill. Price 18s.

† Books marked thus are Works of Reference.

It is not necessary that Candidates should study all the works mentioned in this List, as two or three are quoted in some subjects to afford greater facilities for obtaining the information.

CANDIDATES WHO HAVE RECEIVED CERTIFICATES AS LOCAL SURVEYORS.

- 1880, Nov. 5, BOULNOIS, H. PERCY, M.INST.C.E., Exeter.
 1880, Nov. 5, BURTON, W. KINNINMOND, Adam Street, Adelphi.
 1879, June 4, CAMERON, DONALD, Exeter.
 1880, June 2, CLARE, JESSE, Sleaford.
 1878, June 5, GAMBLE, S. G., A.M.I.C.E., Grantham.
 1881, June 3, GRIMLEY, SAMUEL S., Ashby-de-la-Zouch.
 1878, Nov. 7, HARGER, R., Skipton.
 1880, Nov. 5, HARLAND, A., A.R.I.B.A., High Barnet.
 1882, June 9, HUBBER, FRANK, Exeter.
 1880, Nov. 5, INNES, COSMO, M.INST.C.E., Adam Street, Adelphi.
 1878, June 5, JENKINS, W. J. P., Bodmin.
 1880, June 2, NICHOLS, H. B., Handsworth.
 1877, Oct. 29, PARKER, J., Town Hall, Bridgewater.
 1877, Oct. 29, ROBINSON, H. W., Ulverston.
 1879, June 4, TOUZEAU, E. M., Strand, W.C.
 1881, June 3, WHITCOMBE, A., A.R.I.B.A., John St., Adelphi.
 1882, June 9, WITTS, J. W., Market Harborough.

CANDIDATES WHO HAVE RECEIVED CERTIFICATES AS INSPECTOR OF NUISANCES.

- 1882, June 9, ABRAMS, H., Arthur Road, South Hornsey.
 1882, June 9, ATKINS, W., Kettering.
 1882, June 9, BAXTER, J., Walnut Tree Walk, S.E.
 1877, Oct. 29, BLANCHARD, THOMAS, Evesham.
 1879, Nov. 7, BOLT, BENJAMIN, Aston, Birmingham.
 1877, Oct. 29, BOOKER, F., St. Mary's Hall, Coventry.
 1878, Nov. 7, CHUBB, T. T., Whitechurch.
 1880, June 2, CLARE, J., Sleaford.
 1879, Nov. 7, CLARKE, A. LENNOX, Union Buildings, Selly Oak.
 1881, June 3, COWDEROY, J. T., Wolverhampton.
 1878, June 5, DALE, T. H., Town Hall, Hull.
 1878, Nov. 7, DAVIES, H., Wrexham.

1882, June 9, FAIRCHILD, S. G., Chesson Road, W., Kensington.
 1882, June 9, FINLAY, A., Town Hall, Scarborough.
 1878, Feb. 7, GANDER, C., Leicester.
 1880, Nov. 5, HARLAND, A., High Barnet.
 1878, Nov. 7, HARRIS, W., Solihull.
 1878, June 5, HAWKES, C., Hackney.
 1881, Nov. 4, HORROCKS, J.
 1879, Nov. 7, LAYWORTH, J., Bethnal Green.
 1882, June 9, LIGHTFOOT, F., Trevor Square, Knightsbridge.
 1879, Nov. 7, OSBORNE, J., Carlisle.
 1877, Oct. 29, PREBBLE, W. S., Blackburn.
 1881, June 3, RAINS, J., Kettering.
 1878, Feb. 7, ROBINSON, J., Farm Street, Berkeley Square.
 1881, Nov. 4, SORTWELL, W., Retreat Place, Hackney.
 1882, June 9, STEERS, G., Wellington Street, Bedford.
 1878, Feb. 7, WATTS, W. F., South Stoneham.
 1878, Feb. 7, WETHERILL, W., Norfolk Street, Batley.
 1878, Feb. 7, WILKINSON, W., Salford.
 1881, June 3, WILKINSON, W., Bury, Lancashire.
 1881, Nov. 4, WITTS, J. W., Market Harborough.
 1882, June 9, WRIGHT, NOAH, Coventry.

EXAMINATION QUESTIONS, 1881.

The following questions were required to be answered in writing.
 A *viva voce* examination took place on the following day.

JUNE 2nd, 1881.

SURVEYORS—PAPER I. 2 TO 4 P.M.

- 1.—What is a Provisional Order? When does it become law, and for what purposes may it be obtained?
- 2.—What are the most important provisions of the Public Health Act of 1875? How have they been modified by subsequent legislation?
- 3.—How are sewers ventilated in towns? Why are they ventilated? State the objections which have been made to the systems adopted, and criticise those objections. Illustrate your answers by sketches.
- 4.—Mention some of the plans used for flushing sewers in cases where a sufficient fall is impossible, and give your opinion on their practicability and sanitary advantages. State the objects to be obtained by flushing. To what extent does the admission of storm waters into sewers affect the question of flushing?
- 5.—If you are called upon to report whether or not the connections of the drainage of a house with the sewers have been properly made, in a town which has adopted the model bye-laws of the Local Government Board, to what points would you more particularly direct your attention? Illustrate your answer by sketches.
- 6.—How would you propose to deal with the excreta and slop waters in villages and isolated houses?

SURVEYORS—PAPER II. 6 TO 8 P.M.

- 1.—How is water filtered on a large scale for town supply? Illustrate your answer by sketches, and also state under what circumstances such filtration is likely to purify water sufficiently for health.
- 2.—What is meant by constant water service? How may water become polluted in places where this system is adopted?
- 3.—State the supply of water per head which you consider necessary—
 - (a) For an urban district?
 - (b) For a rural district?
 What proportion of this is generally used and what proportion wasted? Which is the more economical (as regards the expenditure of water), the constant or the intermittent system?

4.—What amount of fresh air must be supplied per hour for each individual for health? To what extent and in what manner does the quantity depend on the size of the room in relation to the number of occupants? Explain by one example how your result is arrived at.

5.—What are the objections to "made soils" as foundations for houses? What precautions would you take in respect to them? What are the chief causes of dampness in dwellings? How is dampness to be prevented or remedied?

6.—Under what circumstances could a new building be condemned as unfit for occupation?

INSPECTORS OF NUISANCES.—4 to 6 P.M.

1.—A nuisance having been reported to exist in a certain house, what steps would you take? What is meant by a recurring order?

2.—What are the provisions of the Public Health Act with regard to the exposure of infected persons and things?

3.—Describe the method of measuring the available air space in rooms. How much air space is desirable? How much should be insisted on?

4.—How is water likely to be contaminated—

(a) In wells in a country district?

(b) In cisterns in houses?

How can such contamination be prevented?

5.—Mention the various disinfectants in common use, and state which you consider the best for particular purposes? Describe the methods of use and the precautions necessary.

6.—What are the objects of a water trap? Describe good and bad forms of traps. What is meant by disconnection of waste-pipes, and what are its objects?

7.—Describe the duties of an Inspector of Nuisances with regard to food exposed for sale in his district?

8.—Describe any manufacturing process which is liable to be a nuisance. How would you deal with it?

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NOVEMBER 3rd, 1881.

#### SURVEYORS—PAPER I. 2 to 4 P.M.

1.—State the conditions under which the discharge of sewage matter into streams is prohibited by the Rivers Pollution Prevention Act, and also the conditions under which such discharge is not prohibited by this Act. Explain what is the meaning of a "stream" under the Act.

2.—Is foul air more likely to be found in the sewers of a town or of a village? and why? What are the best means of preventing its formation?

3.—What are the relative advantages and disadvantages of pipe and brick sewers? How can the objections to pipe sewers be overcome? Illustrate your answer by sketches.

4.—How much sewage would pass in twenty-four hours through a sewer of 8-ins. diameter, laid at an inclination which would give a velocity of 3-ft. per second, and what population would this sewer suffice for in a town with a public water supply where the rain and surface water, other than that from the roofs and paved yards of houses, is carried off by a separate system? Give your calculation in full.

5.—Draw the scheme of drainage you would suggest on the accompanying plans of a dwelling-house, and give sketches of the various traps you would employ, of the method of laying the drain and of its connection with the sewer, accompanied by a short description of the mode of executing the work you propose.

#### SURVEYORS—PAPER II. 6 to 8 P.M.

1.—If asked to advise as to the water supply of a town, what are the chief points to which you would direct your attention, if the supply is to be derived.

(a) From wells?

(b) From streams?

2.—Describe the construction of an ordinary rain gauge, and the precautions which should be taken in fixing it. Give instances of the amount of annual rainfall in various places. What weight of water does one inch of rain on an acre represent?

3.—What materials are used for the construction of cisterns and water pipes, and what are the advantages and disadvantages of each?

4.—Explain what is meant by ventilation of rooms? How far does the size of a room affect the question? Given, a room 12-ft. by 10-ft. by 10-ft. high, occupied by three persons, what means of ventilation would you adopt? To what extent would they be efficient?

5.—Write a specification for the construction of a macadamized road, 40-ft. wide, with 6-ft. foot-way on each side, across an estate on a clay soil, with cross section, and estimate of cost per foot run.

#### INSPECTORS OF NUISANCES.—4 to 6 P.M.

1.—Mention the principal Acts relating to the Public Health, and state briefly their most important provisions.

2.—What is the order of procedure prescribed by the Sale of Food and Drugs' Act in obtaining for analysis samples of articles suspected of being adulterated?

3.—Describe some simple means of ventilating sleeping rooms which you think would be efficient. What do you consider overcrowding?

4.—What are the physical characteristics of good drinking water?

5.—A house is found to be unhealthy, there are occasionally (not

always) offensive smells, perceived both in the basement and in the upper rooms; what is the most likely cause of this, and how would you proceed to investigate it?

6.—How should the soil pipes, sink pipes, and overflow pipes of a dwelling be dealt with so as to prevent any danger to the inmates? What do you consider a proper fall for a six inch house drain?

7.—How would you proceed to disinfect a house in which a case of Typhus Fever or Small Pox had occurred?

8.—In the inspection of a slaughter house, to what points would you specially direct your attention? What are the requirements of a properly constructed slaughter house?

## EXHIBITIONS OF SANITARY APPARATUS AND APPLIANCES.

THE Exhibitions of Sanitary Appliances are held annually in connection with the Autumn Congress, and unpatented exhibits are protected by a certificate granted by the Board of Trade, under the Protection of Inventions Act, 1878.

Judges are appointed by the Council to examine the several exhibits, and award Medals and Certificates of Merit to such objects as they may consider worthy.

In addition to the Ordinary Medals, a special Medal—the Richardson Gold Medal—is offered by the Institute, for a selected exhibit from the entire exhibition, and will be awarded by the Judges in cases of pre-eminent merit only. Selected exhibits of such a nature as to require practical trials which cannot be carried out on the spot, are submitted to such trials upon the Exhibitors defraying the necessary expenses.

The Exhibits are arranged in the following Classes:—

### CLASS I.—CONSTRUCTION AND MACHINERY.

Construction and Materials.  
Paints and other Protectives.  
Wall Papers.  
Decorative Materials.  
Machinery adapted for Sanitary Purposes.  
Washing Machines.

### CLASS II.—SEWERAGE AND WATER SUPPLY.

Water Closets.  
Dry Closets.  
Urinals.  
Sewage Treatment.  
Traps.  
Sinks.  
Baths and Lavatories.  
Apparatus for Water Supply.  
Cisterns.  
Flushing and Watering.  
Miscellaneous Sanitary Goods.

### CLASS III.—HEATING, LIGHTING, AND VENTILATION.

Heating Apparatus.  
Cooking Apparatus.

Smoke Preventing Appliances.  
Lighting, including Electric Lighting.  
Ventilation.

### CLASS IV.—PERSONAL HYGIENE, FOODS AND DISINFECTANTS.

Clothing.  
Beds, &c.  
Educational Appliances.  
Domestic Appliances.  
Foods.  
Filters, and Arrangements for Softening Water.  
Mineral Waters.  
Disinfectants.  
Disinfecting Apparatus.

### CLASS V.—MISCELLANEOUS.

*Articles of Sanitary interest not included in the above Classes, such as:—*

Scientific Instruments.  
Books on Sanitation.  
Prevention of Accidents.  
Methods for the Disposal of the Dead, &c., &c., &c.

The following are the Regulations made for the Exhibition at Newcastle-upon Tyne, in September, 1882 :—

- 1.—The Scale of Charge for Floor Space will be 7s. 6d. per foot frontage, with a depth of six feet; Wall Space 6d. to 1s. per square foot; Corners and Special Places will be charged at higher rates. No Floor Space will be allotted for a less sum than 15s., or Wall Space for less than 5s. All charges must be paid at the time of Allotment.
- 2.—Applications for Space must be made on the official form, and under the proper class. They must be sent to Mr. E. L. Box, the Curator of the Exhibition, at the Offices of the Institute, 9, Conduit Street, Regent Street, London, W., not later than Saturday, August 26th, 1882. No application after this date will be received unless accompanied by an extra payment of 5s. per foot frontage.
- 3.—A full and accurate description of the articles proposed to be shown must be forwarded with each application for space. (See No. 12.)
- 4.—The Exhibition Committee reserve the right to refuse, or order the removal of, any article not deemed suitable.
- 5.—Under the supervision and control of the Curator, Exhibitors will be permitted to erect benches or other contrivances for displaying their exhibits, but will be responsible for the removal of their Exhibits and Fittings at the close of the Exhibition, and must make good, to the satisfaction of the Borough Surveyor, any damage caused thereby.
- 5a.—Gas and Water will be supplied to the Exhibitors, for use in connection with their Exhibits, and charged for by the Institute. Efficient drainage is provided.
- 6.—Every Article exhibited shall bear a descriptive label, corresponding with the description forwarded with the application (See No. 3), and giving also the retail price at which the article can be obtained. The objects exhibited shall be either the actual Articles, Models, or Drawings.
- 7.—In addition to Articles and Inventions of a strictly technical character, articles of a general character relating to domestic comfort and economy, and life and labour saving apparatus, as well as books, drawings, and photographs, illustrative of the same, may be exhibited.
- 8.—Exhibitors will be permitted to employ persons to explain their exhibits, and such persons may receive orders, but will be prohibited from soliciting them.
- 9.—The Committee will not be responsible for insurance against fire, or in any way for the safety of any articles exhibited. The cost of conveying goods into, placing them in position in, and removing them from, the Exhibition, including unpacking and packing, must be borne by the Exhibitors.
- 10.—The position occupied by each Exhibitor will be determined by the Committee.
- 11.—Exhibits will be received at the Exhibition Building, Newcastle, from Tuesday, September 12th, to Tuesday, September 19th. Exhibits arriving after September 19th will only be admitted on payment of a fine of 5s. per foot frontage; but no exhibit will, under any circumstances, be admitted after Friday, September 22nd. No exhibits shall be removed before MONDAY, the 23rd of OCTOBER, and all exhibits must be removed by WEDNESDAY, the 25th OCTOBER.
- 12.—A Catalogue will be published under the authority of the Committee, mainly compiled from the information given by the Exhibitors on their application forms. A few pages in the Catalogue will be reserved for approved Advertisements. Terms for Advertisements (payable in advance):—Whole Page, £2; Half Page, £1. 5s.; Quarter Page, 15s. Particulars of Advertisements to be forwarded to the Curator not later than TUESDAY, 12th SEPTEMBER, 1882. An extra payment of 5s. must accompany every Advertisement forwarded after that date.

- 13.—PRIZE MEDALS and CERTIFICATES OF MERIT will be awarded at the discretion of the Judges, and their decisions will in all cases be final. The List of Awards will be published in the Transactions of the Institute for 1882.
- 14.—It may be impossible for the Judges to come to a satisfactory decision as to the merits of certain exhibits without practical trial, involving special testing and other investigations. In all such cases the following regulations will be adopted:—
  - (a) The Judges have power to take from the Exhibition any specimens they may require for testing.
  - (b) The Judges will select such Exhibits for further practical trial as they may deem desirable. Exhibitors of such selected Exhibits will then be communicated with, and if they desire to submit their Exhibits to a deferred practical trial they will be required to pay such an Entrance Fee as the Committee may determine, to defray the necessary expenses of testing the Exhibits; and also to furnish the Committee with a written or printed statement of the grounds upon which they claim special merit for their Exhibits.
- 15.—THE RICHARDSON MEDAL for an EXHIBIT SELECTED FROM THE ENTIRE EXHIBITION will be awarded by the Judges in case of pre-eminent merit only.
- 15a.—SILVER MEDALS OFFERED BY THE EXETER GAS COMPANY.—Three Silver Medals are offered by the Exeter Gas Company for best Gas Stoves exhibited under the following classes:—
  1. For the best Gas Stove or Gas Apparatus for cooking purposes for families, including a sufficient supply of hot water.
  2. For the best Gas Cooking Stove for an artisan's family of from four to eight persons.
  3. For the best and most economical Open Gas Fire.
- 16.—Protection in accordance with the Protection of Inventions Act, 1870, will be obtained from the Board of Trade for persons desirous of Exhibiting New Inventions.

Table giving particulars with reference to the exhibitions already held.

TABLE A.

|                                                      | 1877.<br>Leamington. | 1878.<br>Stafford. | 1879.<br>Croydon. | 1880.<br>Exeter. |
|------------------------------------------------------|----------------------|--------------------|-------------------|------------------|
| Number of Exhibitors ... ..                          | 117                  | 116                | 189               | 106              |
| „ of Exhibits ... ..                                 | 294                  | 319                | 710               | 500              |
| Space occupied (in square ft.) ...                   | .....                | .....              | .....             | 9725             |
| Number of days Exhibition was open... ..             | 14                   | 16                 | 17                | 19               |
| Total number of Visitors ... ..                      | .....                | .....              | .....             | 8955             |
| Number of Medals awarded ... ..                      | 13                   | 13                 | 12                | 12               |
| Number of Certificates awarded ...                   | None.                | 27                 | 47                | 47               |
| Number of Exhibits deferred for further trial ... .. | .....                | 7                  | 52                | 30               |

## CLASSIFIED LIST OF MEDALS AWARDED AT THE EXHIBITIONS.

### RICHARDSON MEDAL.

STAFFORD, 1878. SILICATE PAINT COMPANY, *Cannon Street, E.C.*, for Griffiths' Patent White.

### SILVER MEDAL.

Offered by the Exeter Gas Company.

EXETER, 1880. SANITARY & ECONOMIC SUPPLY ASSOCIATION, for Dr. Bond's Euthermic Ventilating Gas Stove.

## CLASS I.—CONSTRUCTION AND MACHINERY.

### (1). Construction and Materials.

CROYDON, 1879. WILLCOCKS & Co., *Burmantofts, Leeds*, for Silica Glazed and Enamelled Fire Clay Bricks and Faience.

### (2). Paints and other Protectives.

STAFFORD, 1878. SILICATE PAINT COMPANY, *Cannon Street, E.C.*, for Griffiths' Patent White, and for their preparations of Silicate Paint, Enamel Paint, and Petrifying Liquid.

### (3). Wall Papers.

CROYDON, 1879. WOOLAMS & Co., *High Street, Marylebone*, for Paper Hangings free from Arsenic.

### (4). Decorative Materials.

EXETER, 1880. WEBB, H. CHALK, *Worcester*, for Colouring Patterns through the Substance of Wood.

### (5). Machinery adapted for Sanitary Purposes.

CROYDON, 1879. AVELING & PORTER, *Rochester*, for Improved Six-Ton Steam Road Roller.

### (6). Washing Machines.

LEAMINGTON, 1877. BORWELL, J., *Britannia Foundry, Burton-on-Trent*, for Improved Washer, with table complete.

LEAMINGTON, 1877. BRADFORD, T. & Co., *High Holborn, W.C.*, for New Patent "Shuttle" Steam Power Washing Machine.

## CLASS II.—SEWERAGE AND WATER SUPPLY.

### (1). Water Closets.

LEAMINGTON, 1877. BOSTEL, D. T., *Duke Street, Brighton*, for Excelsior Water Closet.

### (2). Dry Closets.

LEAMINGTON, 1877. HARESCOUGH, B. B. & Co., *Bentinck Street, Leeds*, for Excreta Pail (oak) with Spring Lid.

EXETER, 1880. MOSER, L., *Southampton*, for Dry Closet, suitable for Ashes or Disinfecting Powder.

STAFFORD, 1878. MOULE'S PATENT EARTH CLOSET COMPANY, *5a, Garrick Street, W.C.*, for their Earth Closets.

LEAMINGTON, 1877. PARKER, J., *Woodstock, Oxford*, for Dry Earth Closet.

STAFFORD, 1878. SANITARY APPLIANCE COMPANY, *Salford*, for Sifting Ash Closet, with Soil Pail.

### (3). Urinals.

### (4). Sewage Treatment.

### (5). Traps.

### (6). Sinks.

No awards.

### (7). Baths and Lavatories.

LEAMINGTON, 1877. GALBRAITH, T., *Crawford Square, Londonderry*, for Hot-Air Bath.

CROYDON, 1879. LASCELLES, W., *Bunhill Row, E.C.*, for Concrete Bath in one piece.

EXETER, 1880. TYLOR & SONS, *Newgate Street, E.C.*, for Flushing Rim Lavatory Basin and Apparatus.

### (8). Apparatus for Water Supply.

CROYDON, 1879. DOULTON & Co., *Lambeth, London*, for Anti-Per-cussion High Pressure Valves.

LEAMINGTON, 1877. LE GRAND & SUTCLIFFE, *Bunhill Row, E.C.*, for Improvements in Well Sinking Apparatus.

### (9). Cisterns.

### (10). Flushing and Watering.

No awards.

### (11). Miscellaneous Sanitary Goods.

EXETER, 1880. BEAN, A. T., *5, Cannon Row, S.W.*, for Direct Acting Valveless Waste Preventer.

STAFFORD, 1878. DOULTON & Co., *Lambeth, London*, for Stanford's Patent Joints for Stoneware Pipes.

## CLASS III.—HEATING, LIGHTING, AND VENTILATION.

## (1). Heating Apparatus.

- EXETER, 1880. DOULTON & Co., *Lambeth, London*, for Ventilating Tile Stove.
- EXETER, 1880. SANITARY & ECONOMIC SUPPLY ASSOCIATION, *Gloucester*, for Dr. Bond's Euthermic Gas Stove.

## (2). Cooking Apparatus.

- STAFFORD, 1878. BILLING & Co., *Hatton Garden, E.C.*, for Apparatus for Cooking by Gas.
- LEAMINGTON, 1877. HARRIS, G. H., *Bristol Street, Birmingham*, for Economical Cooking Range.
- STAFFORD, 1878. HASSALL & SINGLETON, *Birmingham*, for Phoenix Portable Range, and the Birmingham Range with Reducible Fire without Gas.
- STAFFORD, 1878. LEONI, S. & Co., *Strand*, for Apparatus for Cooking by Gas.
- CROYDON, 1879. WENHAM, W. P., *Church Street, Croydon*, for an Improved Open or Close Range Kitchener.
- EXETER, 1880. WILSON ENGINEERING COMPANY, *Holborn, W.C.*, for Wilson Portable Close Cooking Range.

## (3). Lighting.

- CROYDON, 1879. HAMILTON & Co., *Leadenhall Street, E.C.*, for Patent Prismoidal Pavement and Floor Lights

## (4). Ventilation.

- STAFFORD, 1878. ELLISON, J. E., *Leeds*, for Conical Ventilators.
- EXETER, 1880. HUNT, NATHAN, *Bristol*, for Auto-Pneumatic Ventilation.
- EXETER, 1880. MOORE, J., *St. James' Walk, Clerkenwell, E.C.*, for Glass Louvre Ventilators.
- STAFFORD, 1878. PRITCHETT, G. E., *20, Spring Gardens, S.W.*, for Economic Hollow Flooring.

## CLASS IV. — PERSONAL HYGIENE FOODS, AND DISINFECTANTS.

## (1). Clothing.

No awards.

## (2). Beds, &amp;c.

- LEAMINGTON, 1877. CHORLTON & DUGDALE, *Manchester*, for Excelsior Spring Mattress.
- STAFFORD, 1878. POCOCK BROS., *Southwark Bridge Road*, for Universal Invalid Tubular Water and Air Bed.

## (3). Educational Appliances.

- EXETER, 1880. COLMAN & GLENDENNING, *Norwich*, for School Furniture.

## (4). Domestic Appliances.

- EXETER, 1880. CARTER, J., *Ga, Cavendish Street, W.*, for Invalid Furniture.
- LEAMINGTON, 1877. HANCOCK, F. & C., *Dudley, Worcester*, for Machine for Washing and Cooling Butter.
- CROYDON, 1879. READ, JEFFERSON, *Birmingham*, for Arcanum Process of Silver Plating Steel.

## (5). Foods.

No awards.

## (6). Filters and Arrangements for Softening Water.

- CROYDON, 1879. MAIGNEN, P. A., *Great Tower Street, E.C.*, for Filtre Rapide.
- LEAMINGTON, 1877. SPONGY IRON WATER PURIFYING COMPANY, *Oxford Street, W.C.*, for Bischof's Spongy Iron Filter.

## (7). Mineral Waters.

No awards.

## (8). Disinfectants.

- LEAMINGTON, 1877. CALVERT & Co., *Bradford, Manchester*, for Calvert's Carbolic Acid for disinfecting purposes.
- STAFFORD, 1878. MORRIS, LITTLE & Co., *Doncaster*, for Little's Soluble Phenyle.
- LEAMINGTON, 1877. SOCIÉTÉ FRANÇAISE D'HYGIÈNE, *Paris*, for Chemical Preparations and Apparatus.

## (9). Disinfecting Apparatus.

- CROYDON, 1879. FRASER BROS., *Commercial Road, E.*, for Portable Disinfecting Apparatus.
- CROYDON, 1879. WALKER, CHAS. W., *Wandsworth Common*, for Acid Pump and Syphon.

## CLASS V.—MISCELLANEOUS.

Articles of Sanitary Interest not included in the above Classes, such as :—

- (1). Scientific Instruments.
- (2). Books on Sanitation.
- (3). Prevention of Accidents.
- (4). Methods for the Disposal of the Dead.

No awards.

## (5.) Sundries.

- STAFFORD, 1878. DUNCAN, Maj. F., *The Common, Woolwich*, for Ambulance Wheeled Litter.
- CROYDON, 1879. SINCLAIR, J., *Leadenhall Street, E.C.*, for Tyn-dall's Smoke Respirator.



# CERTIFICATES AWARDED AT THE EXHIBITIONS.

\* Medal Awarded at a Previous Exhibition.

## CLASS I.—CONSTRUCTION AND MACHINERY.

### (1). Construction and Materials.

- CROYDON, 1879. ADAMS, R., 7, *Great Dover Street, S.E.*, for Adjustable Shoe, and Regulating Spring Hinge for Swinging Doors.
- CROYDON, 1879. ADAMS, R., 7, *Great Dover Street, S.E.*, for Fan-light Openers and Casement Fasteners.
- EXETER, 1880. CANDY & Co., *Newton Abbot*, for Granite Vitri-fied Bricks and Paving.
- CROYDON, 1879. \*PRITCHETT, G. E., F.S.A., 20, *Spring Gardens, S.W.*, for Improvements in Hollow Tile Flooring.
- EXETER, 1880. \*SALMON, BARNES & Co., *Ulverston*, for Revolving Shutters with Patent Balance Weight Motion.

### (2). Paints and other Protectives.

#### (3). Wall Papers.

No awards.

#### (4). Decorative Materials.

- CROYDON, 1879. DOULTON & Co., *Lambeth, London*, for Decorative Tiles for Covering Walls and Floors.

### (5). Machinery adapted for Sanitary Purposes.

- EXETER, 1880. MCCALLUM, J. B., *Stafford*, for Improved Non-Absorbent Tub or Pail Van.

### (6). Washing Machines.

- STAFFORD, 1878. \*BRADFORD, THOMAS, & Co., *Salford*, for Shuttle Steam-Power Washing Machine.
- EXETER, 1880. GARTON & KING, *Exeter*, for Vowel E. Bradford's Family Washing Machine.

## CLASS II.—SEWERAGE AND WATER SUPPLY.

### (1). Water Closets.

- CROYDON, 1879. BEARD, DENT & HELLYER, 21, *Newcastle Street, W.C.*, for Artizan Closet.
- STAFFORD, 1878. \*BOSTEL, D. T., *Duke Street, Brighton*, for "Excelsior" Water Closet.
- EXETER, 1880. DOULTON & Co., *Lambeth, London*, for an Economical Flush-Out Closet.
- EXETER, 1880. TYLOR, J., & SONS, 2, *Newgate Street, E.C.*, for "Clear Way" Regulator Valve Water Closet, without overflow communicating with Valve Box.

### (2). Dry Closets.

- EXETER, 1880. BRITISH SANITARY COMPANY, *Glasgow*, for Self-Acting Earth Closet.
- STAFFORD, 1878. \*HARESCOUGH, B. B. & Co., *Leeds*, for Excreta Pail (oak) with Patent Spring Lid.
- CROYDON, 1879. \*MOULE'S PATENT EARTH CLOSET COMPANY (LIMITED), 5a, *Garriek Street, W.C.*, for Earth Closet.
- CROYDON, 1879. ONIONS, J. C., (LIMITED), *Birmingham*, for Moser's Patent Self-Acting Dry Closet.
- EXETER, 1880. PARKER, J., *Woodstock*, for Dry Earth Com-mode without Separator.
- CROYDON, 1879. \*SANITARY APPLIANCE COMPANY, *Factory Lane, Salford*, for Patent Cinder-Sifting Ash Closet.
- EXETER, 1880. \*WIPPELL BROS. & Row, 231 and 232, *High Street, Exeter*, for Moule's Earth Closet.

### (3). Urinals.

No awards.

### (4). Sewage Treatment.

- STAFFORD, 1878. SHONE, ISAAC, *Wrexham*, for Pneumatic Liquid Ejector.

### (5). Traps.

- CROYDON, 1879. BEARD, DENT & HELLYER, 21, *Newcastle Street, W.C.*, for Patent Ventilating Drain Syphon.
- EXETER, 1880. CRAIG, J. & M., *Kilmarnock*, for Buchan's Patent Trap.
- CROYDON, 1879. DOULTON & Co., *Lambeth, London*, for Disconnecting Gully, with back and side Entrances and iron grating.
- CROYDON, 1879. EDWARDS, J. C., *Trefynant Ruabon*, for Dean's Patent External Drain Traps, with movable receptacle.
- CROYDON, 1879. HAMMOND & HUSSEY, *High Street, Croydon*, for Hornibrook's Patent Catchment Grating for Steep Gradients.
- CROYDON, 1879. HYGIENIC STOVE AND GRATE COMPANY, 15, *Peel Buildings, Birmingham*, for "Eagle" Sanitary Trap, for superseding Bell Traps.
- STAFFORD, 1878. POTTS & Co., *Handsworth, Birmingham*, for the Edinburgh Air-Chambered Sewer Trap.
- STAFFORD, 1878. STIFF, JAMES, & SONS, *Lambeth, London*, for Weaver's Ventilating Sewer Air Trap.

### (6). Sinks.

- CROYDON, 1879. JENNINGS, G., *Stangate, London*, for "Artizans' Dwellings Sink."
- CROYDON, 1879. STIDDER & Co., 50, *Southwark Bridge Road, S.E.*, for Swivel, Lock Plug, and Overflow for Sinks.

- EXETER, 1880. TYLOR, J. & SONS, 2, *Newgate Street, E.C.*, for Improved Enamelled Iron Slop Sink, with Patent Regulator Supply Valve.
- CROYDON, 1879. WILLCOCK & Co., *Burmantofts, Leeds*, for Fire-Clay Sanitary Sinks, and Water Troughs.

## (7). Baths and Lavatories.

- STAFFORD, 1878. GILLOW & Co., *Oxford Street, W.*, for Lavatory.
- CROYDON, 1879. JENNINGS, G., *Stangate, London*, for "Universal" Shampooing Apparatus.
- EXETER, 1880. \*LASCELLES, W., 121, *Bunhill Row, London*, for Concrete Bath, in one piece.
- STAFFORD, 1878. RUFFARD & Co., *Clay Works, Stourbridge*, for Porcelain Baths, moulded and glazed in one piece.

## (8). Apparatus for Water Supply.

- CROYDON, 1879. BRAITHWAITE & Co., *Leeds*, for Patent Syphon for Water Closet Cisterns.
- EXETER, 1880. \*DOULTON & Co., *Lambeth, London*, for Anti-percussion High Pressure Draw-off Valves.
- CROYDON, 1879. FINCH & Co., 181, *High Holborn, W.C.*, for large Way Waste Plug, with Protective Cover.
- CROYDON, 1879. HEADLEY & SONS, *Cambridge*, for Patent Hose Reel.
- CROYDON, 1879. \*LE GRAND & SUTCLIFFE, 100, *Bunhill Row, London*, for Improvements in Internal driving of Tube Wells.
- EXETER, 1880. TYLOR, J. & SONS, 2, *Newgate Street, E.C.*, for Improved Full-Way Stop Valve.
- EXETER, 1880. TYLOR, J. & SONS, 2, *Newgate Street, E.C.*, for "Waste Not" Regulator Valve.

## (9). Cisterns.

(10). Flushing and Watering.  
No awards.

## (11). Miscellaneous Sanitary Goods.

- EXETER, 1880. BRANKSEA ISLAND POTTERY COMPANY (LIMITED), *Poole, Dorset*, for Stoneware Pipes.
- EXETER, 1880. \*DOULTON & Co., *Lambeth, London*, for Stanford's Patent Joints for Stoneware Pipes.
- STAFFORD, 1878. OATES & GREEN, *Horley Green Fire Clay Works, Halifax*, for Patent Drain-cleaning Rods and Stoneware Horse Manger.
- CROYDON, 1879. PATENT VICTORIA STONE COMPANY, *Kingsland Road, E.*, for Artificial Stone Tubes.
- CROYDON, 1879. SHARP, JONES & Co., *Bourne Valley Pottery, Poole, Dorset*, for Rock Concrete Tubes.
- EXETER, 1880. WIPPELL BROS. & Row, 231 and 232, *High Street, Exeter*, for Ransome's Artificial Stone Air Brick.

## CLASS III.—HEATING, LIGHTING AND VENTILATION.

## (1). Heating Apparatus.

- STAFFORD, 1878. PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, for Warming and Ventilating Appliances.
- EXETER, 1880. PRITCHETT, G. E., 20, *Spring Gardens, S.W.*, for Corrugated Iron Hot-Water Warming Appliances.
- STAFFORD, 1878. SNELL, H. SAXON, *Southampton Buildings*, for the Thermhydic Ventilating Hot-water Open Fire Grate.
- EXETER, 1880. WIPPELL BROS. & Row, *Exeter*, for Conservatory Boiler, with Hot-Water Pipe.

## (2). Cooking Apparatus.

- CROYDON, 1879. \*BILLING & Co., *Hatton Garden, E.C.*, for the "Workman's" Cooking Stove, and other Improvements in Gas-Cooking Stoves.
- EXETER, 1880. CHORLTON & DUGDALE, 19, *Blackfriars Street, Manchester*, for "Sunlight Stove."
- EXETER, 1880. CONSTANTINE, T. J., *Fleet Street, E.C.*, for the Devonshire Cooking Range.
- STAFFORD, 1878. \*HARRIS, G. H., *Bristol Street, Birmingham*, for Economical Cooking Range.
- CROYDON, 1879. LEWIS, MRS. A., *Manchester*, for Tin Cooking Utensils.
- CROYDON, 1879. WALLER, THOS., 47, *Fish Street Hill, E.C.*, for Cooking Stove with Warm-Air Chamber.
- EXETER, 1880. WIPPELL BROS. & Row, 231 and 232, *High Street, Exeter*, for Cottage Range.

## (3). Lighting.

- CROYDON, 1879. BRAY & Co., *Blackman Lane, Leeds*, for Improved Gas Burners.
- CROYDON, 1879. CLARKE, F. W., PORTABLE GAS APPARATUS COMPANY (LIMITED), *Great Queen Street, W.C.*, for Patent Portable Gas Apparatus for Manufacturing Gas from Gasoline.
- STAFFORD, 1878. LEONI, S. & Co., *Strand, W.C.*, for the "Rheometer" Street Lamp Regulator.
- CROYDON, 1879. RANSOME, S. E., & Co., 10, *Essex Street, W.C.*, for "Milwaukee" Glass Lantern or Hurricane Lantern.
- EXETER, 1880. WILLEY & Co., *Exeter*, for their Exhibit of Gaseliers and Gas Brackets.
- EXETER, 1880. WIPPELL BROS. & Row, 231, *High Street, Exeter*, for Chappiuss Daylight Reflector.

## (4). Ventilation.

- CROYDON, 1879. BIRD, PETER HINCKES, 1, *Norfolk Square, W.*, for his Method of Costless Ventilation.

- CROYDON, 1879. \*ELLISON, J. E., *Victoria Square, Leeds*, for Conical Ventilators.  
 CROYDON, 1879. KNEEL, U., 77, *Fore Street, E.C.*, for "Imperial" Ventilating Window.  
 EXETER, 1880. SHARP, C. H. & Co., *High Holborn, E.C.*, for Ornamental Inlet Ventilators.  
 CROYDON, 1879. WENHAM & Co., *Church Street, Croydon*, for Boyle's Mica-Valved Outlet Ventilator.

#### CLASS IV.—PERSONAL HYGIENE, FOODS, AND DISINFECTANTS.

##### (1.) Clothing.

- STAFFORD, 1878. BARTRUM, HARVEY & Co., *London*, for Patent Ventilatorium Waterproof Garments.

##### (2.) Beds, &c.

- STAFFORD, 1878. ALLEN, THOMAS, *St. Augustine's Parade, Bristol*, for Metallic Tubular Bedsteads and Invalid Bedrests.  
 CROYDON, 1879. BALL, ANCELL, *Spalding*, for Folding Invalid Bed.  
 EXETER, 1880. BROCK, WILLIAM & Co., 177, *Fore Street, Exeter*, for Bed Rest with Movable Arms.  
 EXETER, 1880. BROCK, WILLIAM, & Co., 177, *Fore Street, Exeter*, for "Nonsuch" Adjustable Chair.  
 CROYDON, 1879. BUSSEY & Co., *Museum Works, Peckham, S.E.*, for Patent Spring Mattress.  
 STAFFORD, 1878. \*CHORLTON & DUGDALE, *Manchester*, for "Excelsior" Spring Mattress.  
 CROYDON, 1879. \*CHORLTON & DUGDALE, *Manchester*, for "Excelsior" Spring Mattress Hospital Bed.  
 EXETER, 1880. CHORLTON & DUGDALE, *Manchester*, for "Invalids'" Adjustable Bed.  
 EXETER, 1880. \*CHORLTON & DUGDALE, *Manchester*, for "Excelsior" Spring Mattress.  
 EXETER, 1880. COLMAN & GLENDENNING, *Norwich*, for Patent Automaton Seat for Drapers.  
 STAFFORD, 1878. HAMILTON, W., *Brighton*, for Invalid "Grasshopper" Couch.  
 CROYDON, 1879. \*POCOCK BROS., *Southwark Bridge Road, S.E.*, for "Universal" Tubular Air and Water Bed.  
 EXETER, 1880. WIPPELL BROS. & ROW, *Exeter*, for Fernby's "Paragon" Camp Furniture.

##### (3.) Educational Appliances.

- STAFFORD, 1878. COLMAN & GLENDENNING, *Norwich*, for School Desks with Shifting Seats.  
 STAFFORD, 1878. LARMOUTH, THOMAS, & Co., *Salford*, for Dual Desk, with Separate Gangway Seat.

##### (4.) Domestic Appliances.

- STAFFORD, 1878. COMPOSTELLA FIRE LIGHT COMPANY, *Fenchurch Street, E.C.*, for the Compostella Fire Lights for Lighting Fires.  
 STAFFORD, 1878. \*HANCOCK, F. & C., *Dudley, Worcester*, for Machine for Washing and Cooling Butter.  
 EXETER, 1880. HANCOCK, F. & C., *Dudley, Worcester*, for Dough Kneading Machine.  
 EXETER, 1880. HANCOCK, F. & C., *Dudley, Worcester*, for New Propellor Churn.  
 STAFFORD, 1878. HILTON, W. H., *Leamington*, for Various Inventions for Promoting Domestic Economy.  
 EXETER, 1880. HUTCHINSON, A. & Co., *Great Winchester Street, E.C.*, for India Rubber Gas Tubing.  
 EXETER, 1880. WIPPELL BROS. & ROW, *High Street, Exeter*, for Improved Housemaid's Box with Sifter.

##### (5.) Foods.

- EXETER, 1880. FRY, J. S., & SONS, *Union Street, Bristol*, for Cocoa Extract and Preparations of Chocolate.

##### (6.) Filters and Arrangements for Softening Water.

- EXETER, 1880. MAIGNEN, P. A., 20 & 23, *Great Tower Street, E.C.*, for "Bijou" Filtre Rapide.  
 EXETER, 1880. \*MAIGNEN, P. A., 20 & 23, *Great Tower Street, E.C.*, for Filtre Rapide.  
 EXETER, 1880. SILICATED CARBON FILTER COMPANY, *Battersea*, for Silicated Carbon Double Chambered Table Filters.  
 EXETER, 1880. STEPHAN, J. A., *Worcester*, for Carbonised Iron Stone Mound Filter for Water.  
 STAFFORD, 1878. THORN & Co., *Stafford*, for Artificial Stone Filters, for Cleansing Rain Water for Domestic Use.

##### (7.) Mineral Waters.

- EXETER, 1880. CARTER & Co., *Old Refinery, Bristol*, for Preparations of Lime Juice, Aromatic Ginger Ale, and Quinine Tonic.  
 CROYDON, 1879. EVANS & Co., *Wrexham*, for Zoedone. (Patentee David Johnson, F.C.S.)  
 CROYDON, 1879. GULLIVER & Co., *Aylesbury*, for Lemonade, Lime Juice, and Ginger Ale.  
 STAFFORD, 1878. JEWSEBURY & BROWN, *Manchester*, for Seltzer Water.  
 CROYDON, 1879. NEWRY MINERAL WATER COMPANY (LIMITED), *Liverpool* for Ginger Ale and Lemonade.  
 EXETER, 1880. SKINNER, G. H., 13, *North Street, Exeter*, for Seltzer, Soda, and Potash Waters, and Orange Quinine Tonic.

## (8). Disinfectants.

|                |                                                                                                  |
|----------------|--------------------------------------------------------------------------------------------------|
| CROYDON, 1879. | CALVERT, F. C. & Co., <i>Bradford</i> , for Carbolic Acid.                                       |
| EXETER, 1880.  | CALVERT, F. C. & Co., <i>Bradford</i> , for Carbolic Acid and preparations of it.                |
| CROYDON, 1879. | JEYES' SANITARY COMPOUND COMPANY, <i>Bishopsgate Street, E.C.</i> , for Jeyes' Perfect Purifier. |

## (9) Disinfecting Apparatus.

|               |                                                                                   |
|---------------|-----------------------------------------------------------------------------------|
| EXETER, 1880. | CALVERT, F. C., & Co., <i>Bradford</i> , for Improved Vaporiser for Disinfecting. |
|---------------|-----------------------------------------------------------------------------------|

## CLASS V.—MISCELLANEOUS.

Articles of Sanitary Interest not included in the above Classes, such as :—

## (1). Scientific Instruments.

|                 |                                                                                                                      |
|-----------------|----------------------------------------------------------------------------------------------------------------------|
| EXETER, 1880.   | BIRD, P. HINCKES, 1, <i>Norfolk Square, N.W.</i> , for Large Legible Spirit Thermometer.                             |
| STAFFORD, 1878. | PRITCHETT, G. E., 20, <i>Spring Gardens, S.W.</i> , for Thermometrical Instruments.                                  |
| CROYDON, 1879.  | PRITCHETT, G. E., 20, <i>Spring Gardens, S.W.</i> , for Barometrical and Thermometrical Instruments.                 |
| EXETER, 1880.   | PRITCHETT, G. E., 20, <i>Spring Gardens, S.W.</i> , for Improvements in Thermometrical and Barometrical Instruments. |
| CROYDON, 1879.  | WEBSTER & Co., <i>Nottingham</i> , for Webster's Patent Photometer.                                                  |

## (2). Books on Sanitation.

|                 |                                                                                   |
|-----------------|-----------------------------------------------------------------------------------|
| STAFFORD, 1878. | LADIES' SANITARY ASSOCIATION, <i>Berners Street, W.</i> , for their Publications. |
|-----------------|-----------------------------------------------------------------------------------|

## (3). Prevention of Accidents.

|                |                                                                                                                        |
|----------------|------------------------------------------------------------------------------------------------------------------------|
| CROYDON, 1879. | SELIG, SONNENTHAL & Co. (Limited), <i>Lambeth Hill, Queen Victoria Street, E.C.</i> , for Patent Safety Belt Shippers. |
| CROYDON, 1879. | SINCLAIR, J., 104, <i>Leadenhall Street, E.C.</i> , for Chemical Fire Exterminator.                                    |

## (4). Methods for the Disposal of the Dead.

|                 |                                                                                           |
|-----------------|-------------------------------------------------------------------------------------------|
| STAFFORD, 1878. | LONDON NECROPOLIS COMPANY, <i>Strand, W.C.</i> , for Patent "Earth to Earth" Coffins.     |
| CROYDON, 1879.  | STRETTON, S., <i>Kidderminster</i> , for a Folding Bier and Car for Simplifying Funerals. |

## ALPHABETICAL LIST OF MEDALS AWARDED AT THE EXHIBITIONS.

## RICHARDSON MEDAL.

|                                                                                   |                 |
|-----------------------------------------------------------------------------------|-----------------|
| SILICATE PAINT COMPANY, <i>Cannon Street, E.C.</i> , for Griffiths' Patent White. | STAFFORD, 1878. |
|-----------------------------------------------------------------------------------|-----------------|

## SILVER MEDAL.

Offered by the Exeter Gas Company.

|                                                                                                       |                   |
|-------------------------------------------------------------------------------------------------------|-------------------|
| SANITARY AND ECONOMIC SUPPLY ASSOCIATION for Dr. Bond's Euthermic Ventilating Gas Stove.              | EXETER, 1880.     |
| AVELING & PORTER, <i>Rochester</i> , for Improved Six-Ton Steam Road Roller.                          | CROYDON, 1879.    |
| BEAN, A. T., 5, <i>Cannon Row, S.W.</i> , for Direct Acting Valveless Waste Preventer.                | EXETER, 1880.     |
| BILLING & Co., <i>Hatton Garden, E.C.</i> , for Apparatus for Cooking by Gas.                         | STAFFORD, 1878.   |
| BORWELL, J., <i>Britannia Foundry, Burton-on-Trent</i> , for Improved Washer, with table complete.    | LEAMINGTON, 1877. |
| BOSTEL, D. T., <i>Duke Street, Brighton</i> , for Excelsior Water Closet.                             | LEAMINGTON, 1877. |
| BRADFORD, T. & Co., <i>High Holborn, W.C.</i> , for New Patent "Shuttle" Steam Power Washing Machine. | LEAMINGTON, 1877. |
| CALVERT & Co., <i>Bradford, Manchester</i> , for Calvert's Carbolic Acid for disinfecting purposes.   | LEAMINGTON, 1877. |
| CARTER, J., 6a, <i>Cavendish Street, W.</i> , for Invalid Furniture.                                  | EXETER, 1880.     |
| CHORLTON & DUGDALE, <i>Manchester</i> , for Excelsior Spring Mattress.                                | LEAMINGTON, 1877. |
| COLMAN & GLENDENNING, <i>Norwich</i> , for School Furniture.                                          | EXETER, 1880.     |
| DOULTON & Co., <i>Lambeth, London</i> , for Stanford's Patent Joints for Stoneware Pipes.             | STAFFORD, 1878.   |
| DOULTON & Co., <i>Lambeth, London</i> , for Anti-Per-cussion High Pressure Valves.                    | CROYDON, 1879.    |
| DOULTON & Co., <i>Lambeth, London</i> , for Ventilating Tile Stove.                                   | EXETER, 1880.     |

|                                                                                                                                |             |       |
|--------------------------------------------------------------------------------------------------------------------------------|-------------|-------|
| DUNCAN, Maj. F., <i>The Common, Woolwich</i> , for Ambulance Wheeled Litter.                                                   | STAFFORD,   | 1878. |
| ELLISON, J. E., <i>Leeds</i> , for Conical Ventilators.                                                                        | STAFFORD,   | 1878. |
| FRASER BROS., <i>Commercial Road, E.</i> , for Portable Disinfecting Apparatus.                                                | CROYDON,    | 1879. |
| GALBRAITH, T., <i>Crawford Square, Londonderry</i> , for Hot-Air Bath.                                                         | LEAMINGTON, | 1877. |
| HAMILTON & Co., <i>Leadenhall Street, E.C.</i> , for Patent Prismoidal Pavement and Floor Lights.                              | CROYDON,    | 1879. |
| HANCOCK, F. & C., <i>Dudley, Worcester</i> , for Machine for Washing and Cooling Butter.                                       | LEAMINGTON, | 1877. |
| HARESCOUGH, B. B. & Co., <i>Bentick Street, Leeds</i> , for Excreta Pail (oak) with Spring Lid.                                | LEAMINGTON, | 1877. |
| HARRIS, G. H., <i>Bristol Street, Birmingham</i> , for Economical Cooking Range.                                               | LEAMINGTON, | 1877. |
| HASSALL & SINGLETON, <i>Birmingham</i> , for Phoenix Portable Range, and the Birmingham Range with Reducible Fire without Gas. | STAFFORD,   | 1878. |
| HUNT, NATHAN, <i>Bristol</i> , for Auto-Pneumatic Ventilation.                                                                 | EXETER,     | 1880. |
| LASCELLES, W., <i>Bunhill Row, E.C.</i> for Concrete Bath in one piece.                                                        | CROYDON,    | 1879. |
| LE GRAND & SUTCLIFFE, <i>Bunhill Row, E.C.</i> , for Improvements in Well Sinking Apparatus.                                   | LEAMINGTON, | 1877. |
| LEONI, S. & Co., <i>Strand</i> , for Apparatus for Cooking by Gas.                                                             | STAFFORD,   | 1878. |
| MAIGNEN, P. A., <i>Great Tower Street, E.C.</i> , for Filtre Rapide.                                                           | CROYDON,    | 1879. |
| MOORE, J., <i>St. James' Walk, Clerkenwell, E.C.</i> , for Glass Louvre Ventilators.                                           | EXETER,     | 1880. |
| MORRIS, LITTLE & Co., <i>Doncaster</i> , for Little's Soluble Phenyle.                                                         | STAFFORD,   | 1878. |
| MOSEB, L., <i>Southampton</i> , for Dry Closet, suitable for Ashes or Disinfecting Powder.                                     | EXETER,     | 1880. |
| MOULE'S PATENT EARTH CLOSET COMPANY, <i>5a, Garrick Street, W.C.</i> , for their Earth Closets.                                | STAFFORD,   | 1878. |
| PARKER, J., <i>Woodstock, Oxford</i> , for Dry Earth Closet.                                                                   | LEAMINGTON, | 1877. |
| POCOCK, BROS., <i>Southwark Bridge Road</i> , for Universal Invalid Tubular Water and Air Bed.                                 | STAFFORD,   | 1878. |
| PRITCHETT, G. E., <i>20, Spring Gardens, S.W.</i> , for Economic Hollow Flooring.                                              | STAFFORD,   | 1878. |
| READ, JEFFERSON, <i>Birmingham</i> , for Arcanum Process of Silver Plating Steel.                                              | CROYDON,    | 1879. |
| SANITARY APPLIANCE COMPANY, <i>Salford</i> , for Sifting Ash Closet, with Soil Pail.                                           | STAFFORD,   | 1878. |
| SANITARY & ECONOMIC SUPPLY ASSOCIATION, <i>Gloucester</i> , for Dr. Bond's Euthermic Gas Stove.                                | EXETER,     | 1880. |

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| SILICATE PAINT COMPANY, <i>Cannon Street, E.C.</i> , for Griffiths' Patent White, and for their preparations of Silicate Paint, Enamel Paint, and Petrifying Liquids. | STAFFORD,   | 1878. |
| SINCLAIR, J., <i>Leadenhall Street, E.C.</i> , for Tyn-dall's Smoke Respirator.                                                                                       | CROYDON,    | 1879. |
| SOCIÉTÉ FRANÇAISE D'HYGIÈNE, <i>Paris</i> , for Chemical Preparations and Apparatus.                                                                                  | LEAMINGTON, | 1877. |
| SPONGY IRON WATER PURIFYING COMPANY, <i>Oxford Street, W.C.</i> , for Bischof's Spongy Iron Filter.                                                                   | LEAMINGTON, | 1877. |
| TYLOR & SONS, <i>Newgate Street, E.C.</i> , for Flushing Rim Lavatory Basin and Apparatus.                                                                            | EXETER,     | 1880. |
| WALKER, CHAS. W., <i>Wandsworth Common</i> , for Acid Pump and Syphon.                                                                                                | CROYDON,    | 1879. |
| WEBB, H. CHALK, <i>Worcester</i> , for Colouring Patterns through the Substance of Wood.                                                                              | EXETER,     | 1880. |
| WENHAM, W. P., <i>Church Street, Croydon</i> , for an Improved Open or Close Range Kitchener.                                                                         | CROYDON,    | 1879. |
| WILCOCKS & Co., <i>Burmantofts, Leeds</i> , for Silica Glazed and Enamelled Fire Clay Bricks and Faïence.                                                             | CROYDON,    | 1879. |
| WILSON ENGINEERING COMPANY, <i>Holborn, W.C.</i> , for Wilson Portable Close Cooking Range.                                                                           | EXETER,     | 1880. |
| WOOLAMS & Co., <i>High Street Marylebone</i> , for Paper Hangings free from Arsenic.                                                                                  | CROYDON,    | 1879. |



# ALPHABETICAL LIST OF CERTIFICATES AWARDED AT THE EXHIBITIONS.

\* Medal Awarded at a Previous Exhibition.

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| ADAMS, R., 7, <i>Great Dover Street, S.E.</i> , for Adjustable Shoe, and Regulating Spring Hinge for Swinging Doors.          | CROYDON,  | 1879. |
| ADAMS, R., 7, <i>Great Dover Street, S.E.</i> , for Fanlight Openers and Casement Fasteners.                                  | CROYDON,  | 1879. |
| ALLEN, THOMAS, <i>St. Augustine's Parade, Bristol</i> , for Metallic Tubular Bedsteads and Invalid Bedrests.                  | STAFFORD, | 1878. |
| BALL, ANCELL, <i>Spalding</i> , for Folding Invalid Bed.                                                                      | CROYDON,  | 1879. |
| BARTRUM, HARVEY, & Co., <i>London</i> , for Patent Ventilatorium Waterproof Garments.                                         | STAFFORD, | 1878. |
| BEARD, DENT, & HELLYER, 21, <i>Newcastle Street, W.C.</i> , for Artizan Closet.                                               | CROYDON,  | 1879. |
| BEARD, DENT, & HELLYER, 21, <i>Newcastle Street, W.C.</i> , for Patent Ventilating Drain Syphon.                              | CROYDON,  | 1879. |
| BIRD, PETER HINCKES, 1, <i>Norfolk Square, N.W.</i> , for his Method of Costless Ventilation.                                 | CROYDON,  | 1879. |
| BIRD, PETER HINCKES, 1, <i>Norfolk Square, N.W.</i> , for Large Legible Spirit Thermometer.                                   | EXETER,   | 1880. |
| *BILLING & Co., <i>Hatton Garden, E.C.</i> , for the "Workman's" Cooking Stove, and other Improvements in Gas-Cooking Stoves. | CROYDON,  | 1879. |
| *BOSTEL, D. T., <i>Duke Street, Brighton</i> , for "Excelsior" Water Closet.                                                  | STAFFORD, | 1878. |
| *BRADFORD, THOMAS & Co., <i>Salford</i> , for Shuttle Steam-Power Washing Machine.                                            | STAFFORD, | 1878. |
| BRAITHWAITE & Co., <i>Leeds</i> , for Patent Syphon for Water Closet Cisterns.                                                | CROYDON,  | 1879. |
| BRANKSEA ISLAND POTTERY COMPANY (LIMITED) <i>Pool, Dorset</i> , for Stoneware Pipes.                                          | EXETER,   | 1880. |
| BRITISH SANITARY COMPANY, <i>Glasgow</i> , for Self-Acting Earth Closet                                                       | EXETER,   | 1880. |
| BROCK, WILLIAM, & Co., 177, <i>Fore Street, Exeter</i> , for Bed Rest with Movable Arms.                                      | EXETER,   | 1880. |
| BROCK, WILLIAM, & Co., 177, <i>Fore Street, Exeter</i> , for "Nonsuch" Adjustable Chair.                                      | EXETER,   | 1880. |
| BRAY & Co., <i>Blackman Lane, Leeds</i> , for Improved Gas Burners.                                                           | CROYDON,  | 1879. |

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| BUSSEY & Co., <i>Museum Works, Peckham, S.E.</i> , for Patent Spring Mattress.                                                                                  | CROYDON,  | 1879. |
| CALVERT, F. C., & Co., <i>Bradford</i> , for Carbolic Acid.                                                                                                     | CROYDON,  | 1879. |
| CALVERT, F. C., & Co., <i>Bradford</i> , for Carbolic Acid and preparations of it.                                                                              | EXETER,   | 1880. |
| CALVERT, F. C., & Co., <i>Bradford</i> , for Improved Vaporiser for Disinfecting.                                                                               | EXETER,   | 1880. |
| CANDY & Co., <i>Newton Abbot</i> , for Granite Vitri-fied Bricks and Paving.                                                                                    | EXETER,   | 1880. |
| CARTER & Co., <i>Old Refinery, Bristol</i> , for Preparations of Lime Juice, Aromatic Ginger Ale, and Quinine Tonic.                                            | EXETER,   | 1880. |
| *CHORLTON & DUGDALE, <i>Manchester</i> , for "Excelsior" Spring Mattress.                                                                                       | STAFFORD, | 1878. |
| *CHORLTON & DUGDALE, <i>Manchester</i> , for "Excelsior" Spring Mattress Hospital Bed.                                                                          | CROYDON,  | 1879. |
| CHORLTON & DUGDALE, <i>Manchester</i> , for "Sun-light Stove."                                                                                                  | EXETER,   | 1880. |
| CHORLTON & DUGDALE, <i>Manchester</i> , for "Invalids'" Adjustable Bed.                                                                                         | EXETER,   | 1880. |
| *CHORLTON & DUGDALE, <i>Manchester</i> , for "Excelsior" Spring Mattress.                                                                                       | EXETER,   | 1880. |
| CLARKE, F. W., PORTABLE GAS APPARATUS COMPANY (LIMITED), <i>Great Queen Street, W.C.</i> for Patent Portable Gas Apparatus for Manufacturing Gas from Gasoline. | CROYDON,  | 1879. |
| COLMAN & GLENDENNING, <i>Norwich</i> , for School Desks with Shifting Seats.                                                                                    | STAFFORD, | 1878. |
| COLMAN & GLENDENNING, <i>Norwich</i> , for Patent Automaton Seat for Drapers.                                                                                   | EXETER,   | 1880. |
| COMPOSTELLA FIRE-LIGHT COMPANY, <i>Fenchurch Street, E.C.</i> , for the Compostella Fire Lights for Lighting Fires.                                             | STAFFORD, | 1878. |
| CONSTANTINE, T. J., <i>Fleet Street, E.C.</i> , for the Devonshire Cooking Range                                                                                | EXETER,   | 1880. |
| CRAIG, J. & M., <i>Kilmarnock</i> , for Buchan's Patent Trap.                                                                                                   | EXETER,   | 1880. |
| DOULTON & Co., <i>Lambeth, London</i> , for Decorative Tiles for Covering Walls and Floors.                                                                     | CROYDON,  | 1879. |
| DOULTON & Co., <i>Lambeth, London</i> , for Disconnecting Gully, with back and side Entrances and iron grating.                                                 | CROYDON,  | 1879. |
| DOULTON & Co., <i>Lambeth, London</i> , for an Economical Flush-Out Closet.                                                                                     | EXETER,   | 1880. |
| *DOULTON & Co., <i>Lambeth, London</i> , for Antipercussion High Pressure Draw-off Valves.                                                                      | EXETER,   | 1880. |
| *DOULTON & Co., <i>Lambeth, London</i> , for Stanford's Patent Joints for Stoneware Pipes.                                                                      | EXETER,   | 1880. |

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| EDWARDS, J. C., <i>Trefymant, Ruabon</i> , for Dean's Patent External Drain Traps, with movable receptacle.                      | CROYDON,  | 1879. |
| *ELLISON, J. E., <i>Victoria Square, Leeds</i> , for Conical Ventilators.                                                        | CROYDON,  | 1879. |
| EVANS & CO., <i>Wrexham</i> , for Zoedone. (Patentee David Johnson, F.C.S.)                                                      | CROYDON,  | 1879. |
| FINCH & CO., 181, <i>High Holborn, W.C.</i> , for large Way Waste Plug, with Protective Cover.                                   | CROYDON,  | 1879. |
| FRY, J. S., & SONS, <i>Union Street, Bristol</i> , for Cocoa Extract and Preparations of Chocolate.                              | EXETER,   | 1880. |
| GARTON & KING, <i>Exeter</i> , for Vowel E. Bradford's Family Washing Machine.                                                   | EXETER,   | 1880. |
| GILLOW & CO., <i>Oxford Street, W.</i> , for Lavatory.                                                                           | STAFFORD, | 1878. |
| GULLIVER & CO., <i>Aylesbury</i> , for Lemonade, Lime Juice, and Ginger Ale.                                                     | CROYDON,  | 1879. |
| HAMILTON, W., <i>Brighton</i> , for Invalid "Grasshopper" Couch.                                                                 | STAFFORD, | 1878. |
| HAMMOND & HUSSEY, <i>High Street, Croydon</i> , for Hornibrook's Patent Catchment Grating for Steep Gradients.                   | CROYDON,  | 1879. |
| *HANCOCK, F. & C., <i>Dudley, Worcester</i> , for Machine for Washing and Cooling Butter.                                        | STAFFORD, | 1878. |
| HANCOCK, F. & C., <i>Dudley, Worcester</i> , for New Propellor Churn.                                                            | EXETER,   | 1880. |
| HANCOCK, F. & C., <i>Dudley, Worcester</i> , for Dough Kneading Machine.                                                         | EXETER,   | 1880. |
| *HARESCUGH, B. B. & CO., <i>Leeds</i> , for Excreta Pail (oak) with Patent Spring Lid.                                           | STAFFORD, | 1878. |
| *HARRIS, G. H., <i>Bristol Street, Birmingham</i> , for Economical Cooking Range.                                                | STAFFORD, | 1878. |
| HEADLEY & SONS, <i>Cambridge</i> , for Patent Hose Reel.                                                                         | CROYDON,  | 1879. |
| HILTON, W. H., <i>Leamington</i> , for various Inventions for Promoting Domestic Economy.                                        | STAFFORD, | 1878. |
| HUTCHINSON, A. & CO., <i>Great Winchester Street, E.C.</i> , for India Rubber Gas Tubing.                                        | EXETER,   | 1880. |
| HYGIENIC STOVE AND GRATE COMPANY, 15, <i>Peel Buildings, Birmingham</i> , for "Eagle" Sanitary Trap, for superseding Bell Traps. | CROYDON,  | 1879. |
| JENNINGS, G., <i>Stangate, London</i> , for "Artizans' Dwellings Sink."                                                          | CROYDON,  | 1879. |
| JENNINGS, G., <i>Stangate, London</i> , for Universal Shampooing Apparatus.                                                      | CROYDON,  | 1879. |
| JEWSBURY & BROWN, <i>Manchester</i> , for Seltzer Water.                                                                         | STAFFORD, | 1878. |
| JEYES' SANITARY COMPOUND COMPANY, <i>Bishopsgate Street, E.C.</i> , for Jeyes' Perfect Purifier.                                 | CROYDON,  | 1879. |

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| KNELL, U., 77, <i>Fore Street, E.C.</i> , for "Imperial" Ventilating Window.                                             | CROYDON,  | 1879. |
| LADIES' SANITARY ASSOCIATION, <i>Berners Street, W.</i> , for their Publications.                                        | STAFFORD, | 1878. |
| LARMOUTH, THOMAS, & CO., <i>Salford</i> , for Dual Desk, with Separate Gangway Seat.                                     | STAFFORD, | 1878. |
| *LASCELLES, W., 121, <i>Bunhill Row, London</i> , for Concrete Bath, in one piece.                                       | EXETER,   | 1880. |
| *LE GRAND & SUTCLIFFE, 100, <i>Bunhill Row, London</i> , for Improvements in Internal driving of Tube Wells.             | CROYDON,  | 1879. |
| LEONI, S. & CO., <i>Strand, W.C.</i> , for the "Rheometer" Street Lamp Regulator.                                        | STAFFORD, | 1878. |
| LEWIS, MRS. A., <i>Manchester</i> , for Tin Cooking Utensils.                                                            | CROYDON,  | 1879. |
| LONDON NECROPOLIS COMPANY, <i>Strand, W.C.</i> , for Patent "Earth to Earth" Coffins.                                    | STAFFORD, | 1878. |
| MAIGNEN, P. A., 20 & 23, <i>Great Tower Street, E.C.</i> , for "Bijou" Filtre Rapide.                                    | EXETER,   | 1880. |
| *MAIGNEN, P. A., 20 & 23, <i>Great Tower Street, E.C.</i> , for Filtre Rapide.                                           | EXETER,   | 1880. |
| MCCALLUM, J. B., <i>Stafford</i> , for Improved Non-Absorbent Tub or Pail Van.                                           | EXETER,   | 1880. |
| *MOULE'S PATENT EARTH CLOSET COMPANY (LIMITED), 5a, <i>Garrick Street, W.C.</i> , for Earth Closet.                      | CROYDON,  | 1879. |
| NEWRY MINERAL WATER COMPANY (LIMITED), <i>Liverpool</i> , for Ginger Ale and Lemonade.                                   | CROYDON,  | 1879. |
| OATES & GREEN, <i>Horley Green Fire Clay Works, Halifax</i> , for Patent Drain-cleaning Rods and Stoneware Horse Manger. | STAFFORD, | 1878. |
| ONIONS, J. C., (LIMITED), <i>Birmingham</i> , for Moser's Patent Self-Acting Dry Closet.                                 | CROYDON,  | 1879. |
| PARKER, J., <i>Woodstock</i> , for Dry Earth Commode without Separator.                                                  | EXETER,   | 1880. |
| PATENT VICTORIA STONE COMPANY, <i>Kingsland Road, E.</i> , for Artificial Stone Tubes.                                   | CROYDON,  | 1879. |
| *POCOCK BROS., <i>Southwark Bridge Road, S.E.</i> , for "Universal" Tubular Air and Water Bed.                           | CROYDON,  | 1879. |
| POTTS & CO., <i>Handsworth, Birmingham</i> , for Edinburgh Air-Chambered Sewer Trap.                                     | STAFFORD, | 1878. |
| PRITCHETT, G. E., 20, <i>Spring Gardens, S.W.</i> , for Warming and Ventilating Appliances.                              | STAFFORD, | 1878. |
| PRITCHETT, G. E., 20, <i>Spring Gardens, S.W.</i> , for Thermometrical Instruments.                                      | STAFFORD, | 1878. |
| *PRITCHETT, G. E., 20, <i>Spring Gardens, S.W.</i> , for Improvements in Hollow Tile Flooring.                           | CROYDON,  | 1879. |

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| PRITCHETT, G. E., 20, <i>Spring Gardens, S.W.</i> ,<br>for Barometrical and Thermometrical In-<br>struments.                        | CROYDON,  | 1879. |
| PRITCHETT, G. E., 20, <i>Spring Gardens, S.W.</i> ,<br>for Corrugated Iron Hot-Water Warming<br>Appliances.                         | EXETER,   | 1880. |
| PRITCHETT, G. E., 20, <i>Spring Gardens, S.W.</i> ,<br>for Improvements in Thermometrical and<br>Barometrical Instruments.          | EXETER,   | 1880. |
| RANSOME, S. E., & Co., 10, <i>Essex Street, W.C.</i> ,<br>for "Milwaukee" Glass Lantern or Hur-<br>ricane Lantern.                  | CROYDON,  | 1879. |
| RUFFARD & Co., <i>Clay Works, Stourbridge</i> , for<br>Porcelain Baths, moulded and glazed in one<br>piece.                         | STAFFORD, | 1878. |
| *SALMON, BARNES & Co., <i>Ulverston</i> , for Revolving<br>Shutters with Patent Balance Weight Motion.                              | EXETER,   | 1880. |
| *SANITARY APPLIANCE COMPANY, <i>Factory Lane</i> ,<br><i>Salford</i> , for Patent Cinder-Sifting Ash Closet.                        | CROYDON,  | 1879. |
| SELIG, SONNENTHAL & Co. (Limited), <i>Lambeth</i><br><i>Hill, Queen Victoria Street, E.C.</i> , for Patent<br>Safety Belt Shippers. | CROYDON,  | 1879. |
| SHARP, JONES & Co., <i>Bourne Valley Pottery</i> ,<br><i>Poole, Dorset</i> , for Rock Concrete Tubes.                               | CROYDON,  | 1879. |
| SHARP, C. H. & Co., <i>High Holborn, E.C.</i> , for<br>Ornamental Inlet Ventilators.                                                | EXETER,   | 1880. |
| SHONE, ISAAC, <i>Wrexham</i> , for Pneumatic Liquid<br>Ejector.                                                                     | STAFFORD, | 1878. |
| SILICATED CARBON FILTER COMPANY, <i>Battersea</i> ,<br>for Silicated Carbon Double Chambered Table<br>Filters.                      | EXETER,   | 1880. |
| SINCLAIR, J., 104, <i>Leadenhall Street, E.C.</i> , for<br>Chemical Fire Exterminator.                                              | CROYDON,  | 1879. |
| SKINNER, G. H., 13, <i>North Street, Exeter</i> , for<br>Seltzer, Soda, and Potash Waters, and Orange<br>Quinine Tonic.             | EXETER,   | 1880. |
| SNELL, H. SAXON, <i>Southampton Buildings</i> , for<br>the Thermhydric Ventilating Hot-Water Open<br>Fire Grate.                    | STAFFORD, | 1878. |
| STEPHAN, J. A., <i>Worcester</i> , for Carbonised Iron<br>Stone Mound Filter for Water.                                             | EXETER,   | 1880. |
| STIDDER & Co., 50, <i>Southwark Bridge Road, S.E.</i> ,<br>for Swivel, Lock Plug, and Overflow for Sink.                            | CROYDON,  | 1879. |
| STIFF, JAMES, & SONS, <i>Lambeth, London</i> , for<br>Weaver's Ventilating Sewer Air Trap.                                          | STAFFORD, | 1878. |
| STRETTON, S., <i>Kidderminster</i> , for a Folding<br>Bier and Car for Simplifying Funerals.                                        | CROYDON,  | 1879. |
| THORN & Co., <i>Stafford</i> , for Artificial Stone<br>Filters, for Cleansing Rain Water for Do-<br>mestic Use.                     | STAFFORD, | 1878. |

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| TYLOR, J., & SONS, 2, <i>Newgate Street, E.C.</i> , for<br>"Clear Way" Regulator Valve Water Closet,<br>without overflow communicating with Valve<br>Box. | EXETER,  | 1880. |
| TYLOR, J., & SONS, 2, <i>Newgate Street, E.C.</i> , for<br>Improved Enamelled Iron Slop Sink, with<br>Patent Regulator Supply Valve.                      | EXETER,  | 1880. |
| TYLOR, J., & SONS, 2, <i>Newgate Street, E.C.</i> , for<br>Improved Full-Way Stop Valve.                                                                  | EXETER,  | 1880. |
| TYLOR, J. & SONS, 2, <i>Newgate Street, E.C.</i> , for<br>"Waste Not" Regulator Valve.                                                                    | EXETER,  | 1880. |
| WALLER, THOS., 47, <i>Fish Street Hill, E.C.</i> , for<br>Cooking Stove with Warm-Air Chamber.                                                            | CROYDON, | 1879. |
| WEBSTER & Co., <i>Nottingham</i> , for Webster's<br>Patent Photometer.                                                                                    | CROYDON, | 1879. |
| WENHAM & Co., <i>Church Street, Croydon</i> , for<br>Boyle's Mica-Valved Outlet Ventilator.                                                               | CROYDON, | 1879. |
| WILLCOCK & Co., <i>Burmantofts, Leeds</i> , for Fire-<br>Clay Sanitary Sinks, and Water Troughs.                                                          | CROYDON, | 1879. |
| WILLEY & Co., <i>Exeter</i> , for their Exhibit of<br>Gaseliers and Gas Brackets.                                                                         | EXETER,  | 1880. |
| *WIPPELL BROS. & Row, 231, <i>High Street</i> ,<br><i>Exeter</i> , for Moule's Earth Closet.                                                              | EXETER,  | 1880. |
| WIPPELL BROS. & Row, 231, <i>High Street</i> ,<br><i>Exeter</i> , for Ransome's Artificial Stone Air<br>Brick.                                            | EXETER,  | 1880. |
| WIPPELL BROS. & Row, 231, <i>High Street, Exeter</i> ,<br>for Conservatory Boiler, with Hot-Water<br>Pipe.                                                | EXETER,  | 1880. |
| WIPPELL BROS. & Row, 231, <i>High Street</i> ,<br><i>Exeter</i> , for Cottage Range                                                                       | EXETER,  | 1880. |
| WIPPELL BROS. & Row, 231, <i>High Street</i> ,<br><i>Exeter</i> , for Chappiuss Daylight Reflector.                                                       | EXETER,  | 1880. |
| WIPPELL BROS. & Row, 231, <i>High Street</i> ,<br><i>Exeter</i> , for Fernby's "Paragon" Camp Fur-<br>niture.                                             | EXETER,  | 1880. |
| WIPPELL BROS. & Row, 231, <i>High Street, Exeter</i> ,<br>for Improved Housemaid's Box with Sifter.                                                       | EXETER,  | 1880. |

## PAPERS AND ADDRESS READ AT THE CONGRESSES OF THE INSTITUTE.

### PRESIDENT'S ADDRESS.

- B. W. RICHARDSON, M.D., F.R.S. A Theory as to the Natural or Glandular Origin of the Contagious Diseases. LEAMINGTON, 1877.
- E. CHADWICK, C.B. The need of reform in the Administrative Organisation of the Sanitary Service, with special reference to the Appointment of Medical Officers of Health. STAFFORD, 1878.
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## DONATIONS DURING 1881.

|                                        | £  | s. | d.     |
|----------------------------------------|----|----|--------|
| CHARLES SHRIMPTON, M.D. (General Fund) | .. | .. | 5 5 0  |
| CHARLES SHRIMPTON, M.D. (Library Fund) | .. | .. | 0 10 6 |
| SAMUEL J. BARBER ( " )                 | .. | .. | 0 10 6 |

## BYE-LAWS.

(For Index to Bye-Laws, see page 161.)

### ELECTION OF FELLOWS, MEMBERS, ASSOCIATES, HONORARY MEMBERS, AND HONORARY FOREIGN ASSOCIATES.

1. The Institute shall consist of Fellows, Members, Associates, Annual and Life Subscribers, Honorary Members, and Honorary Foreign Associates. The government and management of the Institute shall be vested in the Council, under the Control of the bye-laws, and of the Resolutions of Special General Meetings.

2. Fellows shall be elected by ballot by the Council, and shall include scientific men of eminence, persons of distinction as Legislators or Administrators, and others who have done noteworthy Sanitary work.

3. No person shall be balloted for as a Fellow unless his name has been duly proposed, seconded, and approved by a majority at a previous regular Meeting of the Council, and his name and address, together with the names of the proposer and seconder, inserted in the summons convening the Meeting at which such ballot shall take place.

4. Fellows shall be elected by a majority of the Council present at the Meeting at which their names are brought forward for election, and the votes shall be taken by ballot.

5. Any candidate for membership with the Institute shall procure a recommendation signed by three Fellows or Members, according to Form 1 (see page 160).

6. The names of Candidates for Membership, together with their addresses and the names of the Fellows or Members recommending them, shall be inserted in the summons convening the Meeting of Council at which such candidates are brought forward for election.

7. All Members (except those who have passed the examination and received the certificate of competence for Local Surveyors) shall be elected by a majority of the Council present at the Meeting at which their names are brought forward for election, and the votes shall be taken by ballot.

8. Persons who have obtained the certificate of competence for Local Surveyors are entitled to admission as Members without ballot.

9. Every Candidate for admission as an Associate of the Institute shall procure a recommendation, signed by two Fellows, Members, or Associates, according to Form 2 (see page 160).

10. The names of Candidates, together with their addresses and

the names of the persons recommending them, shall be inserted in the summons convening the Meeting of Council at which such candidates are to be brought forward for election.

11. All Associates (except those who have passed the examination and received the certificate of competence for Inspectors of Nuisances) shall be elected by a majority of the Council present at the meeting at which their names are brought forward for election, and the votes shall be taken by ballot.

12. Persons who have obtained the certificate of competence for Inspectors of Nuisances are entitled to admission as Associates without ballot.

13. The Council shall have the power to elect from time to time distinguished personages as Honorary Members of the Institute, without payment of fees or subscriptions.

14. The Honorary Members elected in each year shall not exceed five in number.

15. The Council shall have power to elect from time to time as Honorary Foreign Associates, gentlemen who have promoted the advancement of Sanitary Science, without the payment of fees or subscriptions.

16. When a person shall have been elected a Fellow, Member, or Associate, the Secretary shall inform him thereof by letter, as soon as possible, in the terms of the Form 3 in the Appendix (page 161); and shall at the same time forward to him a copy of the bye-laws of the Institute, together with a copy of the Form 4 in the Appendix (page 161).

17. Every person so elected shall pay his admission fee and first annual contribution, and shall return the Form 4 duly signed, within three calendar months after the day of his election, otherwise his election shall be void; but the Council shall have the power, in particular cases, of extending the period of such payment and signature respectively.

18. Notice shall be sent by the Secretary to all Honorary Members, and Honorary Foreign Associates, on their election.

19. The names of all Fellows, Members, Associates, Honorary Members, and Honorary Foreign Associates, elected by the Council, shall be entered on the minutes of the Meeting at which they were elected, and a register of the same shall be kept by the Secretary, and also a list of the Subscribers.

20. Honorary Members and Honorary Foreign Associates shall have forwarded to them, by the Secretary, on their election, a copy of the Diploma of the Institute, signed by the President, the Chairman of Council, and the Registrar, in the Form 5 (see page 162).

21. Fellows, Life Members, and Life Associates are entitled to a Diploma, on application to the Secretary.

22. Fellows, Members, and Associates, having occasion to designate themselves as belonging to the Institute, shall state the class to which they belong as follows, viz.:—Fellow San. Inst., Mem. San. Inst., Assoc. San. Inst.

23. A Special Meeting of the Council, consisting of the Chairman of Council and not less than ten members, shall have power to remove any Fellow, Member, or Associate from the Institute, upon receiving a requisition to that effect, with the reasons stated, signed by not less than twenty Fellows or Members of the Institute.

#### SUBSCRIBERS.

24. Persons of either sex may become Subscribers without election or ballot. (See page 162. Form G.)

25. The amount of the Annual Subscription shall be One Guinea.

26. Annual Subscribers shall be entitled to attend the Anniversary and Ordinary Meetings, and to take part in the same, with free admission to all Congresses, Conversazioni, and Exhibitions held by the Institute, and to make use of the library when formed.

27. Donors of Ten Guineas and upwards are Life Subscribers.

#### CONTRIBUTIONS TO THE FUNDS.

28. Each Fellow shall pay £10. 10s. on taking up the Fellowship, which shall entitle him to all the privileges of the Institute for life, together with a copy of all publications issued by the Institute.

29. Every Member shall pay an Admission Fee of £3. 3s., except Medical Officers of Health and Medical Men holding certificates in Sanitary Science from any University or Medical Corporation, or persons holding the certificate for Local Surveyors granted by the Institute.

30. Each Member shall pay £2. 2s. per annum, except those who have become Life Members, or who have passed the examination for Local Surveyors. Members shall be entitled to all the privileges and advantages of the Institute, together with a copy of all publications issued by the Institute, so long as they continue to pay their subscription.

31. Persons who have passed the examination for Local Surveyors may become Members for Life on payment of £5. 5s.

32. Members elected previous to the 12th December, 1878, shall only be liable to pay the same Subscription as at their election.

33. Every Associate shall pay an Admission Fee of £2. 2s., except those holding the certificate of Inspector of Nuisances granted by the Institute.

34. Each Associate shall pay £1. 1s. per annum, except those who have passed the examination for Inspector of Nuisances. Associates shall be entitled to all the publications issued by the Council so long as they continue to pay their subscriptions.

35. Persons who have passed the examination for Inspectors of Nuisances may become Associates for Life on payment of £3. 3s.

36. All yearly Subscriptions shall be due in advance on the 1st of January in each year. The Subscription shall become due on election.

37. Members, Associates, and Subscribers may commute their Annual Subscription, and become Life Members, Life Associates, and Life Subscribers, on payment of £10. 10s.

38. If the Annual Subscription of any Member or Associate shall be in arrear for two years, the Secretary shall give notice thereof to the Member or Associate; and if the said Subscription shall continue in arrear at the expiration of three months after such notice, the Council (having through the Secretary given the defaulting Member or Associate due notice of their intention) shall have the power to strike the name of such Member or Associate off the Register, and he shall thereupon cease to be a Member or Associate of the Institute: but shall remain liable for any arrears of Subscription which shall be due at the date of his so ceasing to be a Member or Associate.

39. Any Member or Associate desirous of withdrawing from the Institute must give notice in writing to that effect to the Secretary; and on payment of all Subscriptions and arrears which may be due from him up to that period, he shall henceforth cease to be a Member or Associate.

40. Any person whose name shall have been struck off under the foregoing bye-law, may, on payment of his arrears, be readmitted by the Council.

41. No person who shall have ceased to belong to the Institute, either by resignation or otherwise, shall have any claim to have any part of his Entrance Fee or Subscription returned, neither shall he retain any interest in the property belonging to the Institute.

#### ELECTION OF COUNCIL AND OFFICERS.

42. The President, the Vice-Presidents, the Examiners, the Registrar, the Judges, and the Curator of the Exhibitions, the Honorary Foreign Secretaries and the Secretary, shall be elected by the Council.

43. The Council, the Trustees, the Treasurer, and the Auditors shall be elected by the Fellows and Members at the Annual General Meeting.

44. The Council shall prepare a list of persons whom they nominate as eligible to fill the vacancies created by the retiring Members of Council, and of the gentlemen they recommend as eligible to fill the offices of Trustees, Treasurer, and Auditors.

45. The list so prepared shall be the balloting list, and a copy shall be sent to every Fellow and Member at least seven days before the Annual General Meeting.

46. The election shall be by ballot by the Fellows and Members, and shall take place in the following manner:—

Previous to the commencement of the ballot, the Meeting shall choose two or more Fellows or Members as Scrutineers, who shall receive the balloting lists and report the result of the ballot to the Chairman.

Every Fellow and Member intending to vote at the election may, if he think fit, erase any name or names from the balloting list, and may substitute in the place thereof the name or names of any other person or persons, in accordance with the

conditions laid down in Bye-law 51, and shall hand into the Scrutineers such balloting list as aforesaid either with or without such erasure and substitution of names.

On the receipt of such list from the voter, if the voter's qualification be not objected to, or if objected to, and the Chairman shall be satisfied that the voter is duly qualified, the Scrutineers shall deposit such list in the balloting-box. The decision of the Chairman in such matter shall be final.

Any balloting list containing a greater number of names proposed for any office than the number to be elected to such office, shall be absolutely and wholly void, and shall be rejected by the Scrutineers.

If the votes in any case be equal, the Chairman shall give the casting vote.

The ballot shall commence not sooner than four o'clock P.M., and shall continue open for one hour.

#### THE PRESIDENT AND VICE-PRESIDENTS.

47. The President shall be elected by the Council at a meeting specially convened for that purpose, and shall be a person distinguished for the interest he has taken in the promotion and advancement of Sanitary Science.

48. The President shall be *ex-officio* a member of the Council and of all Committees, and shall take the chair by right at all meetings of the Institute, of the Council, and of the Committees, at which he is present.

49. The Council shall have power to elect as Vice-Presidents persons distinguished for the interest they have taken in sanitary work.

50. The Vice-Presidents shall be elected annually, and shall not exceed six in number, and shall be *ex-officio* members of the Council.

#### THE COUNCIL.

51. The Council shall consist of twenty-four Fellows and Members (in addition to the *ex-officio* Members). Not less than two-thirds of these twenty-four shall be Fellows.

52. The President, Vice-Presidents, Trustees, Treasurer, and Registrar shall be *ex-officio* Members of Council.

53. The Council shall have the direction and management of the concerns of the Institute, the appointment and dismissal of the paid officers and attendants, and the prescribing of their respective duties, subject to the control of the bye-laws, and of all resolutions of meetings which have been duly summoned and held in accordance with the bye-laws, and which resolutions have been duly entered on the Minutes and confirmed.

54. Any casual vacancies occurring in the Council may be filled up by the remaining members thereof.

55. At each Annual General Meeting one-fourth of the twenty-four elected Members of the Council shall retire, and shall not be

eligible for re-election for one year. The Council shall submit to the Annual Meeting the names of the six gentlemen whom they recommend to fill up the vacancies.

56. The Secretary shall forward a printed list, with his initials attached, to each Member of Council (including *ex-officio* members) of the names of the existing *elected* Members of Council, and the number of attendances of each Member, at least seven days prior to the ordinary Monthly Meeting of the Council in March. Each Member of Council present at such meeting shall strike off from the list the names of six Members whom he suggests for retirement, and shall deliver the same, enclosed in a blank envelope, to the Chairman, who shall announce the names of the retiring Members.

57. Upon such announcement the Members present shall proceed by ballot to choose six other Fellows or Members to be recommended to the Annual General Meeting, to take the places of the retiring Members.

58. At the first meeting after their election the Council shall proceed to elect, by ballot, a Chairman and Vice-Chairman, who shall be *ex-officio* Members of all Committees.

59. The Chairman of the Council after two years' service shall not be re-eligible to the office for at least one year.

60. All matters requiring immediate decision, and occurring between the date of one Council Meeting and another, shall be decided by the Chairman of the Council at his discretion, subject to confirmation at the next meeting of Council.

61. The Council shall meet on the fourth Thursday in every month, except during the months of August and September.

62. Five members of the Council shall constitute a quorum.

63. All questions shall be decided in the Council by vote, unless a ballot is provided for or demanded. The Chairman shall have a second or casting vote.

64. At each meeting of Council the Minutes of the previous meeting shall be read, and if approved as correct, shall be signed by the Chairman of the meeting.

65. The Minutes of each Annual and Special General Meeting shall be read and signed in a similar manner by the Chairman presiding at the first meeting of Council after such Annual or Special General Meeting.

66. A Special Meeting of the Council shall be summoned on the Secretary receiving a notice to do so, signed by the Chairman or any five Members of Council, describing the business intended to be brought forward. Seven days' notice, at least, shall be given of any Special Meeting of Council; such notice to state particularly the business for which the Special Meeting has been summoned, and no other business to be entered upon.

67. All Committees shall be appointed by the Council.

68. No act, order, or resolution of any Committee shall bind the Institute, unless it be done or made by the direction and authority of the Council or be ratified by them.

69. A statement of the funds of the Institute and of the receipts



and payments during the past year shall be made up to the 31st of December, under the direction of the Council; and after having been verified and signed by the Auditors shall be laid before the Annual General Meeting.

70. The Council shall draw up a yearly report on the state of the Institute, which shall be read at the Annual General Meeting.

71. The Council shall have power to elect as Corresponding Members of Council, Fellows and Members of the Institute who have distinguished themselves in the cause of Sanitary Science, and aided in promoting the objects of the Institute.

72. The names of all Corresponding Members of Council shall be entered on the Minutes of the meeting at which they were elected, and shall be printed in the Calendar.

73. As early as possible in each year the Council shall cause to be published a Calendar of the Institute for the year, a copy of which, together with all other Reports of proceedings and catalogue of Exhibitions, shall be supplied free of charge to all Fellows, Members, Associates, and Subscribers.

74. The Council shall arrange for the publication of the papers read at the meetings, or of such documents as may be calculated to advance Sanitary knowledge: and they shall have power to make such arrangements for carrying into effect the bye-laws, and for the general management of affairs, as in their opinion may from time to time be necessary.

#### THE MEETINGS.

75. The Meetings of the Institute shall be as follows:—

- 1st. The Annual General Meeting of Fellows and Members only.
- 2nd. Special General Meetings of Fellows and Members only, for the purpose of making, altering, and establishing Bye-laws and Regulations, or for any other special business for which such meeting may be convened.
- 3rd. The Anniversary Meeting.
- 4th. Ordinary Meetings.

76. The Annual General Meeting shall be held in May in each year, at four o'clock in the afternoon, to receive and deliberate upon the Report of the Council on the state of the Institute with the annual statement of the Accounts, and to elect the Council and Officers for the ensuing year.

77. No question shall be discussed, or motion be made, at the Annual General Meeting, the Anniversary Meeting, or Ordinary Meetings, relative to the direction and Management of the concerns of the Institute: such direction and management being vested in the Council, under the control of the bye-laws, and of the Resolutions of Special General Meetings.

78. The Council may at any time call a Special General Meeting of Fellows and Members for a specific purpose relative to the direction and management of the concerns of the Institute; and the Council

shall at all times call such meeting within fourteen days on a requisition in writing, signed by twenty, being either Fellows or Members, specifying the nature of the business to be transacted.

79. A notice shall be sent to those Fellows and Members who reside in the United Kingdom, at least seven days before the time appointed by the Council for such Special General Meeting; and the notice shall specify the nature of the business to be transacted, and no other business shall be transacted at that meeting. All Fellows and Members shall have a right, subject to the provision of Bye-law No. 85, to attend and vote, and twenty shall constitute a quorum.

80. The Fellows and Members of the Institute may from time to time, by resolution of a Special General Meeting confirmed at a subsequent Special General Meeting held not less than seven and not more than fourteen days after the former meeting, make, alter, or repeal such bye-laws as they may think fit.

81. At all General Meetings the Chair shall be taken by the President, or, in his absence, by one of the Vice-Presidents, or by the Chairman of the Council, or by some Member to be chosen by the meeting.

82. The Chairman shall have a second or casting vote at all General Meetings; and in all matters in dispute his decision shall be final.

83. Motions made at any General Meeting of the Institute shall be in writing, and signed by the Mover and Seconder.

84. All Fellows and Members are entitled to take part in the Annual General Meeting, subject to the provisions contained in these bye-laws, and ten shall form a quorum.

85. No Fellow or Member, whose Fees or Subscriptions are in arrear, shall be entitled to be present, to debate, or to vote at any General Meeting.

86. The Anniversary Meeting shall be held on the second Thursday in July in each year, to commemorate the formation of the Institute, when an address shall be delivered, to be called the "Annual Address."

87. The presentation of the Medals and Certificates of Merit awarded to successful Exhibitors shall be made at the Anniversary Meeting.

88. No business shall be transacted at the Anniversary Meeting except the delivery of the Address and the discussion arising thereupon.

89. All Fellows, Members, Associates, Honorary Members, Honorary Foreign Associates, and Annual and Life-Subscribers shall be entitled to attend and to take part in the proceedings at the Anniversary Meeting, and at the Ordinary Meetings.

90. Every Fellow or Member shall have the privilege of introducing one stranger, to be present at the Anniversary Meeting, or at the Ordinary Meetings of the Institute, on writing his name in a book provided for that purpose, or sending with him a card signed with his name, according to a form provided.



91. The Council shall arrange, at their first meeting in October, a programme of the Ordinary Meetings to be held during the Session for the reading and discussion of papers, and the delivery of Lectures and Addresses.

92. A copy of such programme shall be supplied to every Fellow, Member, Associate, and Subscriber.

93. The Council shall appoint a Committee of Referees, to whom all papers shall be referred before being read.

94. The business of the Ordinary Meetings of the Institute shall be conducted as nearly as possible in the following order:—

1. The Minutes of the preceding meeting to be read, and after having been approved as correct, to be signed by the Chairman.
2. Communications from the Council to be brought forward.
3. A list of the names of those persons who have joined the Institute since the previous Ordinary Meeting to be read.
4. Original Communications to be read and discussed.

#### THE EXAMINERS AND EXAMINATIONS.

95. A Board of Examiners shall be appointed once a year by the Council to carry out the Examinations for Local Surveyors and Inspectors of Nuisances, and a Certificate shall be granted to successful Candidates, signed by the Examiners, according to Form 7 (see page 163).

96. The times and places for holding the Examinations shall be determined by the Council.

97. The names of the Examiners, the syllabus of subjects for Examination, and the printed questions set at each Examination during the year, together with the list of successful candidates, and full particulars relating to the Examinations, shall be published in the Annual Calendar of the Institute, under the authority of the Council.

98. The fees charged for the Examination and Certificate shall be as follows:—For local Surveyors, Five Guineas; for Inspectors of Nuisances, Two Guineas. Unsuccessful Candidates are entitled to present themselves a second time for one fee.

#### THE REGISTRAR.

99. The Registrar shall sign all certificates and diplomas, and shall keep the Register of persons certificated by the Institute. In concert with the Board of Examiners he shall prepare an Annual Report of the Examinations, to be presented to the Council.

#### THE TREASURER AND AUDITORS.

100. The Treasurer shall receive all money due to the Institute, and shall pay it into a bank in London appointed by the Council.

101. All moneys, except investments, shall be kept at such bank in the name of the Institute.

102. The Treasurer shall make all payments ordered by the Council by cheque, signed by himself and countersigned by the Secretary.

103. He shall cause an account to be kept of all receipts and payments.

104. No cheque shall be drawn without a previous vote of the Council, except such sums as may be required for petty cash.

105. All receipts for Fees and Subscriptions paid to the Institute shall be signed by the Treasurer or the Secretary.

106. The Accounts shall be audited once a year by the Auditors elected by the Annual General Meeting.

107. The Auditors shall have access at all reasonable times to all books and accounts of the Institute, and shall sign the Annual Statement of Accounts before it is submitted to the Council.

#### THE SECRETARIES.

108. The Council shall have power to appoint any gentlemen at their discretion as Honorary Foreign Secretaries.

109. The Secretary shall be appointed by the Council, and shall receive such remuneration and be subject to such notice as the Council may from time to time think fit.

110. He shall give security to the satisfaction of the Council, and he shall not be engaged in any other business or profession whatever.

111. The Secretary shall, under the direction of the Council, conduct the correspondence of the Institute, attend all meetings of the Institute, of the Council (and of the Committees when required); take Minutes of the proceedings of such meetings, and read the Minutes of the preceding meetings.

112. He shall issue all notices of meetings, and shall prepare, under the direction of the Council, an Annual Report of the state of the Institute. He shall have the superintendence of all persons employed and paid by the Council under him, and shall conduct the ordinary general business of the Institute.

113. The Secretary shall attend to the collection of the Subscriptions; he shall prepare the statement of the expenditure of the funds, and present all accounts to the Council for inspection and approval.

114. The Secretary shall prepare lists when required of those Members whose Subscriptions are in arrear, and report the same to the Treasurer.

115. He shall, under the direction of the Treasurer, keep the accounts of the Institute.

116. The Secretary shall attend all meetings of the Board of Examiners, shall take the minutes of such meetings, and read the Minutes of preceding meetings. He shall issue all notices relating to Examinations.

## THE LIBRARY.

117. With a view to the formation of a Library and Collection, all Fellows, Members, and Associates are expected, within twelve months after their election, to deliver to the Council an original paper on some subject connected with Sanitary Science, or to make a donation to the Library or Collection.

118. The Library shall be under the direct control and government of the Council.

119. A Catalogue shall be prepared and kept of all books belonging to the Library.

120. The name of the donor shall be entered in every book presented to the Institute.

## THE EXHIBITIONS.

121. Previous to the holding of any Exhibition by the Institute, the Council shall issue a prospectus containing the Rules, Regulations, and Conditions, with full particulars relating to such Exhibition.

122. A Catalogue of each Exhibition shall be published under the direction of the Council.

123. The Judges shall make their Report exclusively to the Council, by whom the Medals and Certificates of Merit shall be awarded, and such Medals and Certificates shall be presented at the Anniversary Meeting. (See page 163. Form 8.)

## THE CONGRESSES.

124. The Council shall hold Congresses at such times and places as they may deem most convenient, at which addresses shall be delivered and papers read and discussed, upon subjects of general interest relating to Sanitary Science.

125. The Council shall issue a prospectus previous to the holding of each Congress, setting forth the particulars relating to such Congress.

126. At each Congress the Council shall issue "Congress Tickets," entitling the holder to admission to all the meetings held in connection with the Congress. The price of the "Congress Tickets" shall be Half-a-Guinea each.

## THE PROPERTY OF THE INSTITUTE.

127. The property and effects of the Institute of what kind soever shall be vested in three Trustees for the use of the Institute, and in furtherance of the objects for which it has been established.

128. Under no pretence whatever shall the property and effects, or the income or revenue of the Institute derived from the voluntary contributions or otherwise howsoever, be applied in making any dividend, gift, division or bonus unto or between any one belonging to the Institute, excepting in the case of the fees received on account of the Examinations.

129. Every paper and contribution presented to the Institute shall be considered the property thereof, unless there shall have been some previous arrangement to the contrary, and the Council may publish the same in any way and at any time they may think proper to do so.

130. Should the Council refuse or delay the publication of any paper beyond a reasonable time, the author thereof shall have a right to copy the same, and to publish it as he may think fit, having previously given notice in writing to the Secretary of his intention to do so. No person shall publish or give his consent for the publication of any communication presented and belonging to the Institute without the previous consent of the Council.

## DONATIONS AND BEQUESTS.

131. The names of all persons who have presented any additions to the Library or to the Collection of Plans, Models, &c., or who have made any voluntary contribution to the funds of the Institute, shall be recorded and published as benefactors to the Institute.

132. Every person desirous of bequeathing to the Institute any Manuscripts, Books, Maps, Plans, Drawings, Instruments, or other personal property, is requested to make use of the following form in his will:—

*Form of Bequest.*

'I give and bequeath to the SANITARY INSTITUTE OF GREAT BRITAIN in London [*here enumerate and particularise the effects or property to be bequeathed*]. And I hereby declare that the receipt of the Treasurer of the said Institute for the time being shall be an effectual discharge to my executors for the said legacy or bequest.'

## APPENDIX.

## FORM 1.

## SANITARY INSTITUTE OF GREAT BRITAIN.

## FORM OF APPLICATION FOR ADMISSION OF MEMBERS.

(This form must be signed by at least Three Fellows or Members of the Institute.)

Name \_\_\_\_\_

Place of Residence \_\_\_\_\_

Title, Profession, or Occupation \_\_\_\_\_

being desirous of becoming a Member of the SANITARY INSTITUTE OF GREAT BRITAIN, we, the undersigned, do recommend him as in every respect a proper person to be elected a Member of the Institute.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 18 .

This application was read on the \_\_\_\_\_  
and balloted for on the \_\_\_\_\_

## FORM 2.

## SANITARY INSTITUTE OF GREAT BRITAIN.

## FORM OF APPLICATION FOR ADMISSION OF ASSOCIATES.

(This Form must be signed by at least Two Fellows, Members, or Associates of the Institute.)

Name \_\_\_\_\_

Place of Residence \_\_\_\_\_

Title, Profession, or Occupation \_\_\_\_\_

being desirous of becoming an Associate of the SANITARY INSTITUTE OF GREAT BRITAIN, we, the undersigned, do recommend him as a proper person to be elected an Associate of the Institute.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 18 .

This Application was read on the \_\_\_\_\_  
and balloted for on the \_\_\_\_\_

## FORM 3.

## SANITARY INSTITUTE OF GREAT BRITAIN.

\_\_\_\_\_ 18 .

SIR,

I have the honour to inform you that you have this day been elected a \_\_\_\_\_ of the SANITARY INSTITUTE OF GREAT BRITAIN. I forward you herewith a copy of the Bye-laws of the Institute, together with a form, which you are requested to sign and return to me with the admission fee and annual subscription, amounting to \_\_\_\_\_, within three months of the date of your election.

I am, Sir, &c.,

\_\_\_\_\_  
Secretary.

## FORM 4.

I, the undersigned, having been elected a \_\_\_\_\_ of the SANITARY INSTITUTE OF GREAT BRITAIN, do hereby promise that I will be governed by the Bye-Laws and Regulations of the said Institute, as they are now formed, or as they may hereafter be altered or amended; that I will advance the objects of the said Institute as far as shall be in my power; and that I will attend the Meetings thereof as often as I conveniently can. Provided, however, that whenever I shall signify in writing to the Secretary that I am desirous to withdraw my name therefrom, I shall (after the payment of any arrears which may be due by me at that period, and after giving up my Books, Papers, or other property belonging to the Institute, in my possession or entrusted to me), be free from this obligation.

Witness my hand this \_\_\_\_\_ day of \_\_\_\_\_ 18

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## FORM 5.

## Diploma.

This is to certify that at a Meeting of the Council of  
THE SANITARY INSTITUTE OF GREAT BRITAIN duly convened

\_\_\_\_\_ was enrolled as

And this our Diploma was duly conferred upon him.

Witness our hands this \_\_\_\_\_ day of \_\_\_\_\_ 18

\_\_\_\_\_ *President.*

\_\_\_\_\_ *Chairman of Council*

\_\_\_\_\_ *Registrar.*

## FORM 6.

## SANITARY INSTITUTE OF GREAT BRITAIN.

FORM OF APPLICATION FOR ENROLMENT OF SUBSCRIBERS.  
To the Council.

I desire to be enrolled\* \_\_\_\_\_

\_\_\_\_\_ of the SANITARY INSTITUTE OF GREAT BRITAIN.

Name \_\_\_\_\_

Title, Profession, or Occupation \_\_\_\_\_

Address \_\_\_\_\_

Date \_\_\_\_\_

Donors of Ten Guineas, or upwards, are Life Subscribers. Sub-  
scribers of One Guinea are Annual Subscribers.

\* State here whether as Life Subscriber or Annual Subscriber.

## FORM 7.

## Certificate

OF

THE SANITARY INSTITUTE OF GREAT BRITAIN.

\_\_\_\_\_ having been examined by  
the Officers of the Board appointed for that purpose, and in their  
opinion having been found competent, as regards his Sanitary know-  
ledge, to discharge the duties of

The Council of the SANITARY INSTITUTE OF GREAT BRITAIN, at a  
Meeting duly convened, ordered this certificate to be granted.

Witness our hands \_\_\_\_\_ day of \_\_\_\_\_ 18 .

\_\_\_\_\_ } *Examiners.*

\_\_\_\_\_ *Registrar*

## FORM 8.

## Certificate of Merit.

Awarded by the Council of THE SANITARY INSTITUTE OF GREAT  
BRITAIN.

To \_\_\_\_\_

For \_\_\_\_\_

Exhibited at the Exhibition of the Institute, held at \_\_\_\_\_

By Order. \_\_\_\_\_

\_\_\_\_\_ *Secretary.*

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## HONORARY FOREIGN ASSOCIATES.

- PROF. LUDOVIC BRUNETTI, Padua.  
 DR. LADREIT DE LA CHARRIÈRE, Médecin-en-Chef des Sourds-muets, 1, Rue Bonaparte, Paris.  
 A. DURAND CLAYE, Ingénieur des Ponts et Chaussées, 89, Rue Richelieu, Paris.  
 MARIÉ-DAVY, Président Société Française d'Hygiène à l'Observatoire de Montsouris.  
 DR. P. L. DURANT, Professeur d'Hygiène, Geneva.  
 P. DUVERNEY, 8, Place l'Anvers, Paris.  
 LUIGI GABBA, Milan.  
 DR. GALEZOWSKI, 29, Boulevard Haussman, Paris.  
 J. C. JÄGER, Heerengracht, Amsterdam.  
 ALPHONSE JOLTRAIN, Sec. de la Société Française d'Hygiène, 49, Avenue Wogram, Paris.  
 BARRON LARREY, 91, Rue de Lille, Paris.  
 DR. MALACHIA DE CRESTOFORIS, Milan.  
 MOUTARD MARTIN, 9, Rue de l'Echelle, Paris.  
 MARIANI, 41, Boulevard Haussman, Paris.  
 EMILÉ MULLER, 19, Rue des Martyrs, Paris.  
 PROF. GIACENTO PACCHIOITI, Turin.  
 C. SARODI, Ingegnere, Genoa.  
 DR. PASSANT, 39, Rue de Grenelle, St. Germain, Paris.  
 PROF. DR. JAETANUS PENI, Milan.  
 DR. C. RICORD, 6, Rue de Bournon, Paris.  
 HENRY ROGER, Président de l'Association des Médecins de France, 17 Boulevard de la Madeleine, Paris.  
 PROF. DR. GEORGIO ROSTER, All'Instituto, Florence.  
 DR. CHARLES SAFFRAY, Secrétaire de la Société Française d'Hygiène, 19, Rue Gerande, Paris.  
 DR. PROSPER DE PIÉTRA SANTA, Rédacteur en Chef du Journal d'Hygiène 79, Boulevard de Courselles, Paris.  
 LUIGI DEL SARTO, Direttore dell'Ufficio d'Arte Municipale, Florence.  
 CAVALIERE EMILIO BIGNAMI SORMANI, Ingegnere de la Ville, Milan.  
 LÉON TEMPLE, Montpellier.  
 M. TRÉHYON, 71, Rue St. Anne, Paris.  
 PROF. COMMENDATORE SALVATORE TOMMASI, Senatore, Regno d'Italia All'Università di Napoli, Italia.  
 PROF. CAVALIERE MARINO TURCHI, All'Università di Napoli, Italia.

## FELLOWS.

## Date of Election.

1881. Dec. ADAMS, G. E. D'Arcy, M.D., S.SC. CERT. CAMB., 1, Clifton Gardens, Maida Vale, W.  
 1880. May. AITKEN, PROF. William, M.D., F.R.S., Woolston, near Southampton.  
 1880. Dec. ANGELL, Lewis, M.INST.C.E., Town Hall, Stratford, E.  
 1880. Dec. BARTLETT, GEN., J.P., Exmouth, Devon.  
 1878. Dec. BARTLETT, II. Critchett, PH.D., F.C.S., 39, Duke Street, Grosvenor Square, W.  
 1879. Jan. BASS, Hamar, M.P., Burton-on-Trent.  
 1878. Dec. BELL, C. W., J.P., D.L., Bramblehurst, East Grinstead, Sussex.  
 1878. Dec. BRABAZON, RT. HON. LORD, 83, Lancaster Gate, Hyde Park.  
 1880. Jan. BRAYE, RT. HON. LORD, 40, Grosvenor Street, London, and Stanford Sard, Rugby.  
 1878. Dec. BRIGHTEN, W. G., 4, Bishopsgate Street Without, E.C.  
 1881. Nov. BROWNING, Benjamin, L.R.C.P., M.R.C.S., F.C.S., S.SC. CERT. CAMB., 70, Union Road, Rotherhithe.  
 1878. Dec. BURBERY, J. Stone, Beatrice Villa, Lorne Road, Southsea, Hants.  
 1878. Dec. BURDETT, Henry C., F.S.S., 39, Gloucester Road, Regent's Park, N.W.  
 1882. Feb. BURGESS, Peter, M.A., M.B., Commercial Bank of Scotland, Wishaw, Lanarkshire, N.B.  
 1878. Dec. CAREW, R. R., Carpenders, Watford, Herts.  
 1880. Feb. CARPENTER, Alfred, M.D. LOND., M.R.C.S., S.SC. CERT. CAMB., Duppas House, Croydon.  
 1878. Dec. CARTER, R. Brudenell, F.R.C.S., 69, Wimpole Street, Cavendish Square, W.  
 1878. Dec. CHADWICK, Edwin, C.B., Park Cottage, East Sheen, Mortlake, S.W.  
 1880. July. CHILDS, CAPT. James, The Terrace, Clapham Common.  
 1878. Dec. CLARK, Daniel, Carlisle.  
 1881. July. COLES, William R. E., 44, Berners Street, Oxford Street, W.

1880. Dec. COLLINS, H. H., F.R.I.B.A., 5, *Randolph Road, W.*  
 1878. Dec. COLMAN, J. J., M.P., *Carrow House, Norwich.*  
 1878. Dec. CORFIELD, PROF. W. H., M.A., M.D. OXON., F.R.C.P. LOND., 10, *Bolton Row, Mayfair, W.*  
 1881. May. DAYEY, Alexander George, M.D., L.R.C.P., M.R.C.S., 9, *Belvedere Street, Ryde, Isle of Wight.*  
 1878. Dec. DE CHAUMONT, PROF. F. S. B. F., M.D., F.R.S., *Woolston Lawn, Southampton.*  
 1878. Dec. DENISON, A., 6, *Albermarle Street, W.*  
 1878. Dec. DOULTON, Henry, *Lambeth.*  
 1878. Dec. DREWRY, G. Overend, M.D., 57, *Queen Anne Street, W.*  
 1878. Dec. DYKE, T. J., F.R.C.S., *The Hollies, Merthyr Tydfil.*  
 1878. Dec. EASSIE, William, C.E., F.I.S., F.G.S., 11, *Argyll Street, Regent Street, W.*  
 1881. Oct. EATON, John, M.D., *Orchard House, Cleator Moor, Cumberland.*  
 1880. Apr. ELLIS, W. Horton, F.M.S., *Hartwell House, Exeter.*  
 1878. Dec. EVANS, T. W., *Allestree Hall, Derby.*  
 1878. Dec. FIELD, Rogers, B.A., M.INST.C.E., 5, *Cannon Row, Westminster, S.W.*  
 1879. Jan. FORTESCUE, RT. HON. EARL, 20, *Charles Street, Berkeley Sq., London; and Castle Hill, South Molton, Devon.*  
 1878. Dec. GALTON, CAPT. Douglas, R.E., C.B., D.C.L., F.R.S., 12, *Chester Street, Grosvenor Place, S.W.*  
 1878. Dec. GILCHRIST, J., M.D., *Crichton House, Dumfries.*  
 1880. July. GRANTHAM, R. B., M.INST.C.E., 22, *Whitehall Place, London, S.W.*  
 1878. Dec. GRIFFITHS, E. F. G. ASSOC.M.INST.C.E., 18, *Abingdon Street, S.W.*  
 1880. Jan. GRIMSHAW, Thomas Wrigley, M.D., *Priorsland, Carrickmines, Dublin.*  
 1878. Dec. HARKER, J., M.D., *King Street, Lancaster.*  
 1881. May. HARRIS, Thomas, F.R.I.B.A., 20, *High Holborn, W.C.*  
 1879. Feb. HAVILAND, A., M.R.C.S.  
 1880. Apr. HIME, Thomas Whiteside, A.B., M.B., L.R.C.S., 217, *Glossop Road, Sheffield.*  
 1881. May. HODSON, George, ASSOC.M.INST.C.E., *Town Hall, Loughborough.*  
 1878. Dec. HOWARD, James, *Clapham Park, Bedfordshire.*  
 1878. Dec. JONES, LIEUT.-COL., V.C., ASSOC.M.INST.C.E., *Hafod-y-wern Farm, Wrexham.*

1878. Dec. LEAF, Charles J., F.I.S., F.S.A., *Pain's Hill, Cobham, Surrey.*  
 1878. Dec. LEAF, W., *Pain's Hill, Cobham, Surrey.*  
 1878. Dec. LIVESEY, J., M.INST.C.E., 9, *Victoria Chambers, Westminster, S.W.*  
 1878. Dec. LONGSTAFF, G. B., M.B., M.A., CERT. PREV. MED., *Southfield Grange, Wandsworth, S.W.*  
 1878. Dec. LUBBOCK, SIR John, BART., D.C.L., F.R.S., *Lombard Street, E.C.*  
 1878. Dec. MACKAY, John Alexander Dixie, *Christ Church, Oxford.*  
 1878. Dec. MARSH, Lory, M.D., *Greenhithe, Kent.*  
 1878. Dec. MASON, J., J.P., *Lynsham Hall, Witney, Oxford.*  
 1879. Feb. MOFFAT, T., M.D., F.R.G.S., *Hawarden, Flint.*  
 1878. Dec. MOLYNEUX, HON. Francis G., *Earl's Court, Tunbridge Wells.*  
 1880. Dec. NORTHCOTE, RT. HON. SIR STAFFORD, *Carlton Club, and Pynes House, Exeter.*  
 1878. Dec. NORTHUMBERLAND, HIS GRACE THE DUKE OF, D.C.L., LL.D., 2, *Grosvenor Place, S.W.*  
 1878. Dec. OHREN, Magnus, ASSOC.M.INST.C.E., F.C.S., *Lower Sydenham.*  
 1878. Dec. OLLARD, J. F., *Lloyds, E.C.*  
 1878. Dec. OLLARD, William Ludlam, *Musticott House, Walsoken, Wisbeach.*  
 1878. Dec. PAGET, J., J.P., *Stuffynwood, Mansfield.*  
 1880. Dec. PEGGS, J. Wallace, ASSOC.M.INST.C.E., 21, *Queen Anne's Gate, S.W.*  
 1878. Dec. RICHARDSON, Benjamin Ward, M.D., LL.D., F.R.S., 25, *Manchester Square, W.*  
 1878. Dec. RICHARDSON, J., M.INST.C.E., *Methley Park, Leeds.*  
 1881. Jan. ROBBINS, W. Morgan, 107, *High Street, Ilfracombe.*  
 1881. Oct. ROBINS, Edward Cooksworthy, F.S.A., F.R.I.B.A., 14, *John Street, Adelphi.*  
 1882. May. ROBINSON, Henry, PROF. M.INST.C.E., 7, *Westminster Chambers, S.W.*  
 1878. Dec. RUSSELL, HON. F. A. R., *Pembroke Lodge, Richmond Park.*  
 1878. Dec. RUSSELL, James A., M.A., M.B., B.SC., *Canaan Lane, Woodville, Edinburgh.*  
 1878. Dec. SALT, Thomas, M.P., 85, *St. George's Square, S.W.*  
 1878. Dec. SCOTT, MAJ.-GEN. H. Y. D. Scott, R.E., C.B., F.R.S., *Ealing.*

1881. Nov. SMITH, William Robert, M.D., F.R.S.E., F.O.S., S.S.O. CERT. CAMB., 15, *Imperial Square, Cheltenham.*  
 1880. Jan. SNELL, H. Saxon, F.R.I.B.A., 22, *Southampton Buildings, W.C.*  
 1878. Dec. STEPHENS, Henry C., F.C.S., *Avenue House, Finchley.*  
 1879. July. SYMONS, G. J., F.R.S., 62, *Camden Square, N.W.*  
 1880. Dec. TEMPLE, RIGHT REV. Frederick, D.D., LORD BISHOP OF EXETER, *The Palace, Exeter.*  
 1880. June. THOMPSON, John, M.D., F.R.C.S., J.P., *Lynton House, Bideford.*  
 1878. Dec. TURBERVILL, COL. T. Picton, *Eucenny Priory, Bridgend, Glamorgan.*  
 1878. Dec. TURNER, Ernest, F.R.I.B.A., 246, *Regent Street, W.*  
 1879. Aug. URE, J., LORD PROVOST OF GLASGOW, *Helensburgh, N.B.*  
 1881. June. VARLEY, Cromwell F., F.R.S., M.INST.C.E., *Cromwell House, Bexley Heath.*  
 1880. Dec. WARING, COL. G. E., JUN., C.E., *Newport, Rhode Island, U. S. America.*  
 1882. Feb. WHITELEGGE, Benjamin Arthur, B. SC., M.D., S.S.CERT. CAM., *Knutsford, Cheshire.*  
 1879. Jan. WILSON, George, M.A., M.D., 23, *Claremont Road, Leamington.*  
 1878. Dec. WYATT-EDGELL, REV. E., B.A., 40, *Grosvenor Street, W.*

## MEMBERS.

## \* Life Members.

1876. July. ADAMSON, Daniel, *Dunkinfield, near Manchester.*  
 1879. Dec. ADDIS, William Judson, C.E., M.S.A., R.A.S., *Prome, British Burmah.*  
 1882. July. ALCOCK, Samuel, *Sunderland.*  
 1877. Mar. ALLEN, Henry Robert, *North Street, Hackney, E.*  
 1882. July. ANDREW, CAPT. C. W., 286, *Kennington Park Road, S.E.*  
 1876. July. ANNINGSO, Bushell, M.A., M.D., *Cambridge.*  
 1876. July. ATKINS, F. H., 62, *Fleet Street, E.C.*  
 1878. July. ATWOOL, J., *War Office, Whitehall, S.W.*  
 1878. July. BAKER, R., *Ballingdon House, Green Lanes, N.*  
 1876. .... BALL, F., 18, *Bell Street, Henley-on-Thames.*  
 1878. Jan. BANNER, E. G., 11, *Billiter Square, E.C.*

1876. July. BARBER, Samuel J., *Eastwood, Notts.*  
 1877. .... BARROW, B., F.R.C.S., J.P., *Southlands, Ryde, Isle of Wight.*  
 1879. Dec. BARR, William Alexander, M.D., M.R.C.S., 45, *Abington Street, Northampton.*  
 1877. July. BARRY, J. G., 8, *Old Jewry, E.C.*  
 1882. Jan. BARTLETT, Robert V. O., 1, *St. John's Place, Newport, Isle of Wight, and Brixton, S.W.*  
 1878. Oct. BAUGH, Alfred Charles, C.E., 3, *Temple Row, Wrexham.*  
 1877. .... BEARD, Neville, *The Mount, Ashbourne.*  
 1876. July. BELL, Thomas, L.R.C.P. LOND., *Uppingham, Rutland.*  
 1878. Oct. BEMROSE, Henry H., *Lonsdale Hill, Uttoxeter Road, Derby.*  
 1877. .... BENNET, J. Henry, M.D., *The Ferns, Weybridge.*  
 1877. July. BENNETT, Hugh, M.R.C.S., *Builth Wells, Brecon.*  
 1876. July. BERESFORD, Robert, M.D., *Oswestry, Salop.*  
 1876. July. BEST, Frederick A., M.R.C.S., *Church Hill, Walthamstow.*  
 1878. July. BICKERSTETH, E. R., F.R.C.S., 2, *Rodney Street, Liverpool.*  
 1878. Oct. BINDLEY, CAPT., *Burton-on-Trent.*  
 1881. June. BINDON, William J. Vereker, D.S.C. PUB. HEALTH EDIN., M.D., *Appins, West End Lane, Hampstead.*  
 1878. Sept. BIRCH, R. W. Peregrine, M.INST.C.E., 2, *Westminster Chambers, S.W.*  
 1877. Sept. BIRD, Peter Hinckes, F.R.C.S., S.S.O. CERT. CAMB., 1, *Norfolk Square, W.*  
 1881. Nov. \*BOND, Frederick Adolphus, M.B., C.M. EDIN., S.S.O. CERT. EDIN., *Brinklow, Coventry.*  
 1877. .... BOSTEL, D. T., 19, *Duke Street, Brighton.*  
 1878. Oct. BOSTOCK, H., *The Oaklands, Rowley Avenue, Stafford.*  
 1880. Nov. \*BOULNOIS, H. Percy, M.INST.C.E., 2, *Mount Radford Crescent, Exeter.*  
 1877. Oct. BOWER, Thomas, *Lytham, Lancashire.*  
 1876. July. BRETT, A. T., M.D., *Watford House, Herts.*  
 1877. .... BREWER, G. B.  
 1881. Jan. BROOKS, James, F.R.I.B.A., 35, *Wellington Street, Strand.*  
 1876. July. BROWN, P., M.D., *Blaydon House, Blaydon-on-Tyne.*  
 1876. .... BURNS, R. Scott, C.E., *Oak Lea, Edgeley Road, Stockport.*  
 1876. Aug. BURNEY, G., *Millwall Docks, E.*  
 1881. Nov. BURTON, Robert Graves, M.D. EDIN., L.R.C.S. EDIN., *Hanwell, W.*

1880. Dec. \*BURTON, W. Kinninmond, 1, *Adam Street, Adelphi, W.C.*  
 1878. Oct. BUTLER, G. J., *Shrewsbury.*  
 1876. Aug. CARLINE, John, ASSOC.M.INST.C.E., *Lewisham Board of Works, S.E.*  
 1882. Jan. CARRITT, Ernest, 4, *Lime Street Square, E.C.*  
 1876. July. CARTER, W. Allan, 5, *St. Andrew's Square, Edinburgh.*  
 1878. Oct. CHAMPION, A. J.  
 1881. May. CHESTON, Horace, A.R.I.B.A., 1, *Great Winchester Street, London, E.C.*  
 1881. Oct. CHILD, Edwin, M.R.C.S., *Vernham, New Malden, Kingston-on-Thames.*  
 1880. Jan. COLLINGRIDGE, W., M.R.C.S., M.A., M.D., S.SC. CERT. CAMB., *Port of London Sanitary Offices, Greenwich.*  
 1878. Sept. COLLINS, W., 3, *Park Terrace, East Glasgow.*  
 1876. .... COLLINS, W. J., M.D., 1, *Albert Terrace, N.W.*  
 1877. .... COOTE, T., *Oaklands, St. Ives, Hunts.*  
 1878. Sept. CORBETT, J., 24, *Barton Arcade, Manchester.*  
 1877. .... CROOKES, W., F.R.S., 7, *Kensington Park Gardens, W.*  
 1877. Sept. CROWLEY, Frederick Ashdell, *Alton, Hants.*  
 1877. Oct. DAVIES, Hugh, 1, *Hill Street, Wrexham.*  
 1881. Oct. DAY, Ernest, 5, *Foregate Street, Worcester.*  
 1878. Sept. DELAHUNTY, James, *Waterford.*  
 1878. May. DENNIS, W., M.INST.C.E., 3, *Victoria Street, Westminster.*  
 1877. July. DODD, J., 6, *Thomas Street, Liverpool.*  
 1878. Oct. DOUGLAS, George, *Burslem.*  
 1877. .... DOULTON, James D., *Lambeth, S.W.*  
 1876. Dec. DOWSON, A., ASSOC.M.INST.C.E., 3, *Great Queen Street, Westminster, S.W.*  
 1877. Aug. DYER, F., 66, *High Street, Camden Town, N.W.*  
 1877. Aug. EBURY, RT. HON. LORD, *Manor Park, Rickmansworth.*  
 1877. .... ELLIOT, Robert, M.D., F.R.C.P. LOND., J.P., 35, *Lowther Street, Carlisle.*  
 1877. Aug. EVANS, R., *Water Works Office, Chepstow.*  
 1881. Dec. FARR, Archer, L.R.C.P. EDIN., L.M., L.F.P. S. GLASG., L.S.A. & S.SC. CERT. EDIN., 37, *Queen Street, E.C., and 370, Coldharbour Lane, Loughboro Park, S.W.*  
 1876. .... FARR, William, C.B., M.D., D.C.L., F.R.S., 78, *Portsmouth Road, Maida Vale, W.*  
 1878. June. FORSHAW, Edward, *Bank Chambers, Hanley.*

1879. Dec. \*FOSTER, Reginald Le Neve, F.C.S., *North Road, Droylsdon, Manchester.*  
 1878. July. FRY, Miss C. A., *St. Catherine's, Oxford.*  
 1878. .... GENTLES, Thomas Lawrie, L.F.P.S. GLASG., *Wellington House, Derby.*  
 1878. June. GILL, D., *Furleigh, Weston-super-Mare.*  
 1877. Oct. GREEN, Joseph, *Union Street, North Shields.*  
 1878. Oct. GRIFFITHS, Robert, *County Surveyor, Stafford.*  
 1878. July. GRIFFITHS, Thomas, *Silverdale, Oxton, Birkenhead.*  
 1878. Mar. GRIGGS, R., 11, *Gray's Inn Square, W.C.*  
 1877. Aug. HAMILTON, SIR, R. N. C., K.C.B., *Avon Cliffe, Stratford-on-Avon.*  
 1881. June. HAMMOND, Frederick, 2, *Coleman Street Buildings, Moorgate Street, E.C.*  
 1876. July. HARKER, THE REV. W.  
 1880. Nov. \*HARLAND, A., 70, *Stanhope Street, N.W.*  
 1882. June. HARRIS, Alfred E., L.R.C.S., L.R.C.P., M.O.H., *Sunderland.*  
 1877. Sept. HARRISON, C., M.D., S.SC. CERT. CAMB., *Newland, Lincoln.*  
 1882. June. HARRISON, Thomas Harnett, ASSOC.M.INST.C.E., 21, *Harrington Street, Liverpool.*  
 1876. July. HARTLEY, R., L.R.C.P. EDIN., *Pemberton, Wigan, Lancashire.*  
 1878. May. HOLT, H. P., ASSOC.M.INST.C.E., F.G.S., *Fairlea, Palatine Road, Didsbury, Manchester, and 5 Westminster Chambers, S.W.*  
 1878. July. HOOKER, J., F.C.S., 104, *Upper Thames Street, E.C.*  
 1877. July. HOOPER, Rev. R. P., M.A., F.R.G.S., 31, *Cambridge Road, Hove, Brighton.*  
 1877. Mar. HOWARD, E., 84, *Upper Whitecross Street, E.C.*  
 1882. June. \*HUBBER, Frank, *George Street, Exeter.*  
 1878. Mar. HUMPHREY, PROF. G. M., M.D., F.R.S., *Cambridge.*  
 1878. June. HUSBAND, H. Aubrey, M.R.C.S., 27, *Chalmers Street, Edinburgh.*  
 1878. Sept. HYDE, Samuel, M.R.C.S., *Clifford Lodge, Buxton.*  
 1877. June. ILIFFE, W., M.R.C.S., *Hartington Street, Derby.*  
 1878. Sept. INGILBY, SIR Henry D., BART., 9, *Hereford Gardens, Park Lane, W.*  
 1882. July. JONES, John Watkin, *Maesyffynon, Tonalaw, near Pont-y-pridd, South Wales.*  
 1878. .... KEMPSON,  
 1877. .... LAKE, W. C., M.D., *Teignmouth, Devon.*



1876. July. LATHAM, Baldwin, M.INST.C.E., F.M.S., F.G.S., 7, Westminster Chambers, S.W.
1878. May. LAW, Henry, M.INST.C.E., 5, Queen Anne's Gate, S.W.
1877. .... LAWS, J., Blyth, Northumberland.
1878. July. LAWSON, R., Lansdowne Road, Notting Hill.
1877. Oct. LAYTON, Thomas, Kew Bridge, Middlesex.
1878. Oct. LEE, John, Church Street, Ashbourne.
1876. July. LE GRAND, A., 100, Bunhill Row, E.C.
1878. Oct. LEMON, James, M.INST.C.E., F.R.I.B.A., Lansdowne House, Southampton.
1877. .... LEON, George I., 79, Gloucester Place, Portman Square.
1881. Dec. LEONARD, Hugh, 7, Hanover Square, W.
1878. .... LEVESON, E. J., Cluny, Sydenham Hill.
1880. Dec. \*LINGARD, J. Edward, ASSOC.M.INST.C.E., Rodney Chambers, Derby.
1877. July. LLOYD, Thomas, The Square, Winchester.
1877. Apr. LUSH, John Alfred, M.D., M.R.C.P. LOND., Salisbury.
1882. Apr. LYTE, F. Maxwell, F.C.S., F.I.C., Union Club, Trafalgar Square.
1878. July. McARTHUR, A., M.P., Raleigh Hall, Brixton Rise.
1879. July. MACFARLANE, Walter, Saracen Foundry, and 22, Park Circus, Glasgow.
1878. Nov. MACKAY, John B., 2, Bouverie Street, Fleet Street, E.C.
1878. Oct. MACLAGAN, James McGregor, M.D., Riding-Mill-on-Tyne, Northumberland.
1878. May. MANSERGH, James, M.INST.C.E., 3, Westminster Chambers, Victoria Street, S.W.
1878. Oct. MARTEN, H. J., M.INST.C.E., The Birches, Codsall, Wolverhampton.
1878. Sept. MARTIN, J. M., C.E., Castle Chambers, Exeter.
1880. July. MATHESON.
1878. Sept. MASON, Hugh H., M.R.C.S., Abbey Lodge, Barking.
1876. .... MEGGET, A., 7, Huntris Row, Scarborough.
1878. .... MEIKLEJOHN, J., Dalkeith, N.B.
1877. Oct. MELISSENOS, G. C. A., Melisurgo, ASSOC.M.INST.C.E., Palazzo Cocozzo, 76, Via Pocio, Naples.
1878. Sept. MILLER, John Faure, M.D., 28, Rue de Matignon, Faubourg St. Honoré, Paris.
1877. .... MILNER, I.
1878. June. MOORE, J. H., St. Michael's Lodge, Bournemouth.

1879. Feb. \*MOSELEY, George, F.R.C.S., Breadalbane Lodge, Spencer Road, Eastbourne.
1882. Apr. NANSON, Thomas, 9, Park Crescent, Stockwell Park Road, S.E.
1877. Sept. NELSON, E. M., Hanger Hill House, Ealing.
1877. Sept. NELSON, George H., The Lawn, Warwick.
1878. Sept. NICHOLS, G. B., C.E., Handsworth, Birmingham.
1876. July. NIXON, Charles J., Addiscombe, Cranborne Road, Bournemouth.
1878. May. NORMAN, W. S., 13, Warwick Road, W.
1877. Sept. OGLE, William, M.A., M.D., F.R.C.P., The Elms, Duffield Road, Derby.
1881. Mar. \*PAGE, Herbert Markant, S.S.C. CERT. CAMB., M.R.C.S., 16, Prospect Hill, Redditch.
1877. .... PAGLIARDINI, T., 75, Upper Berkeley Street, Portman Square, W.
1878. May. PARKER, J., Woodstock.
1877. .... PARKER, W. C., M.INST.C.E., Whitehall Club, S.W.
1878. .... PATTINSON, S., Ruskington, Sleaford, Lincoln.
1877. June. PEEL, Edmund, Brynffys Ruabon, North Wales.
1882. Jan. PERRY, Henry Robert, A.R.I.B.A., Oak Cottage, Western Bank, Derby.
1881. June. PERRY, John Tavenor, A.R.I.B.A., 9, John Street, Adelphi.
1879. Dec. \*POWELL, George Thompson, Rotherwood, Sydenham Hill, and 11, Pancras Lane, E.C.
1877. .... \*POWELL, J., 10, St. George's Crescent, Liverpool.
1879. July. PRALL, Samuel, M.D., West Malling.
1878. June. PRITCHARD, E., C.E., F.G.S., 27, Great George Street, Westminster, S.W.
1877. .... PRITCHETT, G. E., F.S.A., 20, Spring Gardens, S.W., and Oak Hall, Bishop's Stortford.
1877. Aug. PULLIN, T. H. S., M.D., Sidmouth.
1877. Sept. RAE, Robert, 337, Strand, W.C.
1881. Jan. RAINGER, Charles Henry, 9, Bath Place, Cheltenham.
1876. July. REDWOOD, T. Hall, M.D., The Lawn, Rhymney.
1881. June. REED, Frederick H., A.R.I.B.A., 10, Belmont Hill, Lee, S.E.
1878. Oct. RICHARDS, E. M., ASSOC.M.INST.C.E., Town Hall, Leamington.
1878. Oct. RICHARDSON, R.,
1878. Oct. RUSSELL, J. B., M.D., Medical Officer of Health, Glasgow.
1878. July. SANDYS, MAJOR M., 87, Jermyn Street, S.W.

1881. July. SCHMIDT, E. W. C. F., A.R.I.B.A., *Eastbourne, Sussex.*  
 1876. Oct. SHAFTESBURY, RT. HON. EARL OF, K.G., 24, *Grosvenor Square, W.*  
 1878. June. SHIPWAY, J. H.  
 1876. July. SHONE, Isaac, ASSOC.M.INST.C.E., *Wrexham.*  
 1878. Oct. SHRIMPTON, Charles, M.D. PARIS, 11, *Willswood Park, Torquay.*  
 1877. .... SILLAR, W. O., *St. James' Lodge, Kidbrooke Park Road, Blackheath, S.E.*  
 1878. Nov. SKRINE, Henry Duncan, *Claverton Manor, Bath.*  
 1877. .... SLADE-KING, Edwyn, M.D., LIC. IN STATE MED., R.C.P. EDIN., *Croft Side, Ilfracombe.*  
 1877. June. SMITH, R. W., *Mount Rundell Harborne, Birmingham.*  
 1877. May. SMITH, W. R., *Clifton House, Clifton-by-Ashbourne, Derbyshire.*  
 1878. Oct. SPRUCE, Samuel, *Beech House, Tamworth.*  
 1878. July. STAINTHORPE, W. Waters, M.D., S.S.C. CERT. EDIN., *Kirkleatham, Redcar.*  
 1876. July. STIFF, E., *London Pottery, Lambeth.*  
 1876. July. SUTCLIFFE, R., 100, *Bunhill Row, E.C.*  
 1877. Sept. SWETE, Horace, M.D., S.S.C. CERT. CAMB., F.C.S., *The Grove, Worcester.*  
 1880. Jan. \*SYKES, J. F. J., B.SC. PUB. HEALTH, M.B., L.R.C.P., M.R.C.S., 7, *Thayer Street, Manchester Square.*  
 1876. Oct. TAYLOR, John W., M.D., D.SC., *Rothsay House, Scarborough.*  
 1881. Nov. TAYLOR, Shepherd T., M.B. LOND., L.R.C.P., M.R.C.S., *Grove House, Norwich.*  
 1877. .... TEMPLETOWN, GEN. RIGHT HON. VISCOUNT, K.C.B., 49, *Charles Street, Berkeley Square.*  
 1878. July. THOMAS, W. Cave, 53, *Welbeck Street, W.*  
 1878. .... THOMPSON, James, A.B., M.D., M.R.C.S., 1, *Matheson Road, West Kensington.*  
 1878. .... THORNLEY, J. E. Lyndon, *Bickenhill near Birmingham.*  
 1878. Oct. TROTTER, Arthur E. H., *Stockton-on-Tees.*  
 1879. July. TYLOR, William Alfred, 2, *Newgate Street, E.C.*  
 1882. July. VIGERS, Edward, A.R.I.B.A., F.S.I., 38, *Parliament Street, S.W., and 79, Elgin Road, Paddington.*  
 1877. June. WALKER, J. H., L.R.C.P. EDIN., *Pickering, Yorkshire.*  
 1877. Sept. WALLER, Thomas, 47, *Fish Street Hill, E.C.*  
 1881. May. WEBB, Phillip, 1, *Raymond Buildings, Gray's Inn, W.C.*  
 1878. Oct. WELFORD, J., 4, *Warwick Place, Paddington, W.*

1880. May. WHITE, William, F.S.A., F.R.I.B.A., 30A, *Wimpole St., W.*  
 1877. Sept. WHITWILL, Mark, *Redland House, Durdham Park, Bristol.*  
 1878. July. WILKINSON, William, *Town Hall, Salford.*  
 1881. July. \*WITHERS, J. B. Mitchell, F.R.I.B.A., 5, *Surrey Street, Sheffield.*  
 1882. July. \*WITTS, J. W., *Market Harborough.*  
 1877. Sept. WOOD, Jacob, M.P.S., 186, *Highbury Park, N.*  
 1882. Jan. WORSNOP, Frederick, 48, *Westfield Road, Burley Road, Leeds.*  
 1878. Sept. \*YUILL, W., ASSOC.M.INST.C.E., 3, *Fenchurch Avenue, E.C.*

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## ASSOCIATES.

\* Life Associates.

1881. May. BAMLETT, Adam Carlisle, *Thirsk, Yorkshire.*  
 1882. June. \*BAXTER, John, 2, *Walnut Tree Walk, Kennington Road, S.E.*  
 1879. Dec. \*BLAKE, Edward Thomas, M.D., 47, *Seymour Street, Hyde Park, W.*  
 1879. Aug. BOLDING, John T., 19, *South Moulton Street, W.*  
 1879. Nov. \*CLARKE, A. Lennox, *Union Buildings, Selly Oak, King's Norton.*  
 1882. Mar. DENSHAM, Charles A., 55, *Cochrane Street, St. John's Wood.*  
 1880. Feb. EMPTAGE, Daniel, *Dane Hill Sanitary Works, Margate.*  
 1881. Nov. \*HORROCKS, Joseph.  
 1882. Feb. KENNINGTON, Thomas, 47, *Colmore Row, Birmingham.*  
 1880. Feb. KINSEY, W. Barns, *Hop Exchange, Southwark, S.E.*  
 1879. Nov. \*LAPWORTH, J., *Vestry Hall, Bethnal Green, E.*  
 1882. July. \*LIGHTFOOT, Thomas, 3, *Trevor Square, Knightsbridge.*  
 1881. Nov. \*RAINS, Joseph, *Kettering.*  
 1881. Nov. \*SORTWELL, W., 9, *Retreat Place, Paragon Road, Hackney, E.*  
 1882. June. \*STEERS, George, *Wellington Street, Bedford.*  
 1881. June. \*WILKINSON, W., *Parson's Lane, Bury.*

## SUBSCRIBERS.

\* Life Subscribers.

1879. Oct. ANGELL, A. Torrington, 144, *Fulham Road, S.W.*  
 1879. Oct. BATTEN, MAJ.-GEN. S. J., 14, *Notting Hill Square.*  
 1879. Sept. BOURNE, Stephen, *Atherley, Wallington, Surrey.*  
 1879. .... COBHAM, George R., *Gravesend.*  
 1879. June. COLES, Cowper, C.B., 2, *Albany, Piccadilly.*  
 1879. Apr. DENHAM, W. Hempson, F.L.S., F.S.S., *Southsea.*  
 1881. Jan. DIXON, Joshua, *Winslade, Exeter.*  
 1880. .... DOMENICHETTI, Richard, M.D., *Trinity Lodge, Louth, Lincolnshire.*  
 1877. Sept. FLEETWOOD, The Local Board of.  
 1879. Mar. GOODALL, Abraham, F.R.C.S., F.R.G.S., INSP. - GENL.,  
 4, *Elvaston Place, Queen's Gate.*  
 1879. June. HALL, Alexander Lyons, F.R.G.S., *Lyons Court, Ladbroke Road, W., and Lyons Court, co. Antrim, Ireland.*  
 1879. Oct. JENKINS, B., 37, *Outram Road, Croydon.*  
 1879. Sept. JEWEL, J.  
 1877. .... LADIES SANITARY ASSOCIATION, 22, *Berners Street, Oxford Street, W.*  
 1879. .... MIDDLETON, Reginald E., ASSOC.M.INST.C.E., 5, *Westminster Chambers, S.W.*  
 1879. Sept. \*PRATT, M., *Brigstock House, Thornton Heath, Croydon.*  
 1877. .... RIVERS PURIFICATION ASSOCIATION, 232, *Gresham House, E.C.*  
 1878. Oct. SOUTHPORT, The Mayor and Corporation of.  
 1880. .... STEPHENSON, F. C., *Hill House, Little Heath, Charlton, S.E.*  
 1877. Sept. TOTTENHAM SANITARY ASSOCIATION, *High Cross, Tottenham.*  
 1879. Feb. WALLACE, Miss, 6, *Hyde Park Gardens.*

## APPENDIX.

## PAPERS READ

AT

## ORDINARY MEETINGS OF THE INSTITUTE,

## AND DISCUSSIONS THEREUPON.