

## CHAPTER VI.

**EXPERIENCES IN SHEFFIELD AND ELSEWHERE.**

THE author has spent many years in the Prevention of Smoke in Sheffield and elsewhere, and sets down the information acquired, together with procedure, in the belief that this will prove of assistance to others entering upon similar work.

Public men and women, who have been to Sheffield, or passed through it in a train (nearly on a level with some chimney tops) and who have nothing better to say, never tire of libelling Sheffield's atmospheric conditions.

The fact is that Sheffield, in spite of being one of the greatest workshops of the world, with over one hundred thousand domestic chimneys, three thousand metallurgical furnace chimneys, six hundred boiler and furnace chimneys, which must make some smoke, yet will not suffer in comparison with any large industrial city in the country. For instead of being a bleak murky place, it is worthy of being patronised as a health resort, because of its beautiful suburbs, and because it receives more than the average amount of sunshine.

In 1890 Sheffield did undoubtedly deserve to be called "Smoky Sheffield," for the Corporation had done, and was doing, very little to prevent unnecessary smoke.

**Sheffield's Smoke Abatement Association.**—In 1890 there was in Sheffield a smoke Abatement Association, conducting a most vigorous campaign against smoke. It was formed and financed by a few leading citizens,

who were conclusively convinced that much of the smoke emitted was not necessary, and to prevent it would save coal, be profitable to the manufacturers and the whole of the citizens, and if the corporation would not do their smoke abatement duty they were determined to do it for them. The Association appointed an ex-policeman to act as Smoke Inspector (why a policeman instead of an engineer one wonders?), who observed chimneys, reported to the Association the worst offenders, and police court proceedings were taken. A number of the alleged offenders were convicted, orders made to abate the nuisances, and some small fines imposed, when the magistrates were practical men and satisfied that the excessive smoke was not necessary for trade processes.

The action of the Association was strongly supported by the "Press," especially by Sir W. C. Leng, Editor of the *Sheffield Daily Telegraph*, the latter almost daily in leading articles, and by letters to the Editor denouncing the smoke nuisance. Sir John Bingham who was one of the leading spirits of the Association, was apparently not satisfied with the progress made, and having taken steps to stop smoke at his own works, he was determined not to be annoyed by smoke from his neighbour's works, and he took court proceedings and procured an abatement order. The administrative action on the part of the Association greatly angered the manufacturers (and made it rather unpleasant for the Corporation), who enquired "what right or reason had the self-appointed authority to usurp the powers of the local authority, what did their so-called Inspector, an ex-policeman, know about the thousand and one difficulties of practical smoke prevention? He has not the remotest idea of what the chimneys serve that he complains about, he will call brown smoke (which we are allowed to make) black smoke, and he does not know that the smoke is necessary, for he is not allowed to visit the works, and yet

he is instructed by a silly set of busybodies to drag us before the magistrates and by committing perjury get the magistrates to convict us of an offence we are not guilty of. It is nothing less than an outrage on manufacturers, and if the persecution is pursued they will drive the trade out of Sheffield."

This outburst of the manufacturers did not dissuade the association, but made them more determined to continue the war against smoke.

**Action by the Corporation.**—Pressure by the Association, "Press," and Public compelled the Corporation to take action, and try if possible to settle the war between the Association and the manufacturers (one contending the smoke nuisance was not necessary, and the other that it was necessary for carrying on trade), by appointing an Expert Smoke Inspector in 1890, and the writer was appointed to do the work.

**Practical Smoke Prevention Policy.**—The Corporation realised at the commencement of its smoke abatement crusade, that the policy to pursue must be practical, in order that justice might be done to all parties concerned. Not only to prosecute for making smoke and procure penalties, but carry out in letter and spirit the smoke sections of the Public Health Act, 1875, by advising, and assisting the producers of smoke in the profitable prevention of it; and if they refused to do what was practicable to prevent unnecessary smoke, then take court proceedings to compel them.

**Smoke Observations.**—Not many days after the Corporation Inspector was appointed, a long letter appeared in the Sheffield Press, "Wanting to know where the Inspector was, what he was doing, had he taken a survey of the smoke, fearfully frightened and fled, or had he been smothered by the smoke? If not where was he, and when was he going to commence to stop the smoke, this year, next, or never?"

The Inspector had not fled, neither was he smoke-

smothered, but was making observations. Scores of chimneys emitted 10, 20, 30, 40, 50, and some even 60 minutes of black smoke in the hour, and the average emissions of black smoke were over 30 minutes per hour per chimney.

**Advisory Visits to the Works.**—The works of the worst offenders were visited first. The smoke makers said without exception when complaint was made "That they could not work their furnaces and fireplaces without making smoke, and if the Corporation made them stop the smoke it would stop the trade, and ruin industries." They were informed that the Corporation's intention was not to hinder but help trade. It was to advise and assist them as far as possible to prevent the emission of unnecessary smoke which was a waste of very valuable coal, a pollution, and poisoning of the air which everybody had to breathe, and which did irreparable damage. The manufacturers, though very hostile at first to any interference with their successful methods of working, when they realised the Corporation's practical policy, most willingly and without exception responded to reason, on the assurance that nothing would be done to interfere with the efficiency of the working of furnaces and fireplaces. Demonstrations were made to definitely determine how much smoke was absolutely necessary under the various working conditions. Boilers and furnaces of all sorts and sizes were thoroughly tested under the different working conditions, with different grades of coal, skilled, semi-skilled, and unskilled stokers. Instruction was given regarding furnaces, appliances, economical and smokeless stoking, and the many demonstrations provided data beyond doubt to the Corporation and the manufacturers that the under-mentioned amount of smoke was necessary for the efficient working of boilers and furnaces, and if the limits were exceeded, the excesses would be considered a statutory unnecessary nuisance.

**Smoke Limits.**—In 1895 the Corporation fixed the following smoke limits :—

1 Boiler	.	2	Minutes of black smoke in the hour.
2 Boilers,	.	3	" " " "
3 "	.	4	" " " "
4 and more,	.	6	" " " "

One boiler, 1, or more metallurgical furnaces served by the same chimney, 6 minutes in the hour.

The said limits are as low, if not the lowest in the country, and though not statutory the court accept them as just and reasonable, and consider excesses to be statutory nuisances, make orders of abatement, and impose penalties. When a chimney exceeds the limit allowed, the works are visited and demonstration is given that the excess smoke is unnecessary, in the presence of the manager, chief engineer (often others), and fireman, or suggestion is made to the management as to what is absolutely necessary to be done to prevent the excess of smoke.

**Intimation Notice.**—Very quickly the manufacturers found out the Corporation system of smoke abatement administration was not to hinder but help, and the Sheffield Manufacturers' Association requested the Corporation, after an excessive emission of smoke, to send them an "Intimation" that they might co-operate with the Corporation by taking up the matter with the persons concerned, and so secure the abatement of the nuisance forthwith. The day after the visit to the works an "Intimation Notice" is served on the offending firm, stating the date of the offence, the chimney and what it serves, time and number of minutes of smoke emitted, and also the Intimation is sent in response to the request of the Sheffield Manufacturers' Association, and it is sent without prejudice to any proceedings which the Corporation may decide to take with regard to the emissions of smoke referred to.

**Statutory Notices.**—Subsequently to the Intimation Notice, a Statutory Notice (authorised by the Health Committee and confirmed by the Council) is served on the said firm as follows :—(Name and address of the firm, and the occupier of the premises, described.) Take Notice that under the provisions of the Public Health Act, 1875, The Lord Mayor, Aldermen, and Citizens of the City of Sheffield acting by the Council as the Sanitary Authority of the said City, being satisfied of the existence of a nuisance at . . . arising from a certain chimney (not being the chimney of a private dwelling house) sending forth black smoke in such quantity as to be a nuisance, do hereby require you either forthwith, or within so many days from the service of this notice to abate the same, and for that purpose to provide (*state whatever is required*) what is necessary to abate the said nuisance.

If you make default in complying with the Requisitions of this Notice, or if the said nuisance though abated is likely to recur a summons will be issued requiring your attendance to answer a complaint which will be made in a court of summary jurisdiction, for enforcing the abatement of the nuisance, and prohibiting a recurrence thereof, and for recovering the costs and penalties that may be incurred thereby. (*Dated and signed by the Inspector.*)

Firms on receipt of Statutory Notices requiring them to take the necessary measures to abate the nuisances complied with the requirements of the Notice, for they knew that prosecution would follow non-compliance. They spent thousands of pounds in reconstructing furnaces, putting down additional boilers, larger and more modern, providing more draught, natural, induced, forced, balanced, etc., attaching to boilers mechanical stokers, sprinkling, coking, underfeed, chain-grated, etc., hollow bridges, automatic and hand-worked doors, hollow bars, and various kinds of patent bars,

grid doors, automatically closed, CO<sub>2</sub> and draught recorders, and many more devices, too numerous to mention, for which was claimed smokelessness and great coal economy.

The prejudices of some stokers against smoke preventing appliances were overcome by paying them reasonable wages for the difficult work they had to do and they gave the appliances the attention they required, and good results were obtained.

Corporation Departmental Managers who were responsible for the working of furnaces and fireplaces were informed that if any of the Corporation chimneys exceeded the limits they would be prosecuted, and they would have to pay the penalties, and they took the necessary steps (costly to the Corporation but an example to private firms) to abate the nuisances, to save their own pockets.

**Prosecutions and Penalties.**—When chimneys exceeded the limits after Statutory Abatement Notices had been served (a second time) the works were visited a second time to ascertain the cause or causes of continued nuisances, and what had been done, if anything, to comply with the notice. If it were found practicable on the day of the offence to abate the nuisance or if they had not carried out the requisitions of the Notice, or taken the necessary measures to abate the nuisance, then the cases were reported to the Health Committee, and without exception resolutions were passed authorising proceedings, for they were never advised to do so except when chimneys emitted unnecessary smoke. Before a conviction could be obtained it was necessary in evidence to satisfy the Court that the smoke complained of much, or little, was not necessary for the efficient working of boilers and furnaces, and to prevent it would not interfere with trade. When this was done by the Corporation, then there was no alternative for the Court but to convict, and make an order for abatement,

if they did not impose a penalty—if they carried out in letter and spirit the smoke sections of the Public Health Act, 1875. Cases conducted on the said lines the Courts have convicted, except in a few cases.

**Road Locomotives.**—Proceedings have been taken under the Highways and Locomotives (Amendment) Act, 1878, against scores of Steam Wagons and Traction Engines, for not consuming their smoke as far as practicable. When the chimney emits 2 minutes of preventable smoke of any colour, the engine is stopped, the name and address of the owner and driver taken, also the number of wagon, class of coal, condition of engine, tubes, load, and the distance covered during the 2 minutes emission. If the engine is out of repair, the coal unsuitable, and carelessness is evidenced on the part of the driver, then both the owner and the driver are summoned, and the Court have imposed fines of 20s. to 40s. on the owner, and from 10s. to 20s. on the driver. If the locomotive is out of repair and using unsuitable coal, but there has been no carelessness on the part of the driver, then the owner is summoned only, but if it is in good repair, with good coal and the smoke is due to carelessness, then the driver is summoned only. The Court have never imposed the full penalty, £5, either on the owner or driver.

When the engine is stationary, drivers will not put on the steam jet in the chimney to produce the necessary draught to burn the gases, and dense smoke is emitted from the chimney, and some have been summoned, and fined. Neither will they admit over the fire the necessary air for combustion, and drivers say, "if they do it will cause their tubes to leak." If only the necessary air is admitted into the fire-box, it will not cause the tubes to leak, but increase the temperature of the furnace, prevent the formation of smoke, and a nuisance. There are now many steam wagons on the streets which are specially constructed for burning gas coke in place of

coal, and from these there is no smoke nuisance, and such wagons relieve the driver of responsibility and fines.

**Railway Locomotives.**—When Railway Locomotives make unnecessary smoke they are reported to the Manager of the Railway Company, and a small fine for the first offence is imposed on the driver and fireman. This system has worked well for many years, but if it failed to prevent a recurrence of the nuisance, then proceedings would be taken under the Railway Clauses Consolidated Act, 1848, and the Regulation of Railways Act, 1868, and the Court could impose a penalty of £5 per day for every day the locomotive was not so constructed, and worked so as to consume its own smoke.

The penalties for contravention of the law have been magistrates orders made to provide more boiler power, more draught—natural or mechanical—necessary improvements in the furnace, better fuel, and the furnace to be worked so as to prevent, as far as practicable, a recurrence of the nuisance, and in addition fines have been imposed from 10s to £40, which have resulted in thousands of pounds being spent to modernise the working conditions and abate the nuisances.

**Average Smoke Emissions.**—When the Smoke Abatement Crusade started in Sheffield in 1890, the average emissions of black smoke per chimney per hour were over 30 minutes—to-day the average is about 3 minutes—in the hour, and has been about 3 minutes for many years, also there are about 7,000 hourly observations annually, on chimneys serving boilers and metallurgical furnaces, and the great reduction of unnecessary smoke is a positive proof of what can be done in the direction of practical and profitable smoke prevention.

**Sheffield's Sunshine.**—Even as far back as 1905-1909 when the anti-smoke campaign had been in progress

some little time, Sheffield could boast of its sunshine. The statistics for those four years showed that of the principal seaside places Bournemouth was highest, with 1,877 hours or 47 per cent., and Whitby lowest with 1,499 hours. The residential towns showed Cambridge first, with 1,603 hours, or 40 per cent., and Edinburgh at the bottom with 1,242 hours.

Here are the average yearly records of the manufacturing towns for those four years :—

	Hours.	Percentage of possible duration.
Manchester, . . .	1,011	25
Bradford, . . .	1,067	27
Glasgow, . . .	1,109	28
Birmingham, . . .	1,167	29
Leeds, . . .	1,185	30
London, . . .	1,330	33
Dublin, . . .	1,337	33
Nottingham, . . .	1,350	34
Durham, . . .	1,360	34
Sheffield, . . .	1,385	35

Statistics, however, are not always absolutely convincing. In the first place, the records in some towns may be taken at a spot much further removed from the centre of the smoke area than in others; and it may have been that the four years under review were on the whole fairly dry years, thus allowing the smoke to get away and give the sun a chance. Anyway, it is the fact that the average in Sheffield for the last nine years is not quite as high as for those four years, though the difference is not really appreciable.

**Records Compared.**—The records given were taken at Weston Park (Sheffield). Here are the records taken at the same place from 1916, along with those taken at Attercliffe—which is one of the smokiest parts of the city—and those taken at the Leeds Philosophical Hall in Park Row :—

	Weston Park.	Attercliffe.	Leeds.
1916	1,166	764	1,285
1917	1,263	874	1,167
1918	1,268	838	1,087
1919	1,288	934	1,285
1920	1,082	710	937
1921	1,512	1,170	1,342
1922	1,257	—	1,106
1923	1,271	—	1,177

This gives an average for the eight years of 1,264 hours per annum for Sheffield, and 1,173 for Leeds. It should be added, however, that Weston Park is probably a mile away from the centre of Sheffield, whereas the Philosophical Hall is right in the heart of Leeds. On the other hand, the latter is probably as far removed from the smokiest part of Leeds (Hunslet) as Weston Park is from Sheffield's worst spot on the east-end of the city.

Since 1921 records have not been taken at Attercliffe, but up to that time they always showed from 35 to 40 per cent. less sunshine than at Weston Park, and there is no reason to suppose that the margin has been markedly different since 1921.

Sheffield's sunshine records, when compared with the sunshine records of other industrial cities, do not suffer, and it should be remembered that Sheffield is one of, if not the largest workshops of the world, and may now be called not smoky, but sunny Sheffield.

**Sheffield's Death Rate.**—The Medical Officer of Health Reports that in 1923, the death rate was 11·5 per 1,000 living, and it was the fifth year in succession that Sheffield established a fresh record for low death rate. In England and Wales in 1921-3 the death rate was 12·2; in Sheffield in 1921-3, 11·9. The death rate from all forms of Tuberculosis was less than that of any other town (considerably less than most), and less than the death rate of England and Wales, which was 12·2. In

1917, there were 1,544 cases, and in 1923 they were reduced to 1,414. Figures sometimes lie, but these figures and facts would warrant Sheffield, in comparison with other places, in advertising itself as a Health Resort.

**Smoke Abatement Defaulters.**—For fifty years about 1,700 of the 1,800 Local Authorities have done practically nothing in the direction of smoke abatement, in spite of its vital effect on Public Health. In many cases this is undoubtedly due to the fact that members of these bodies are largely elected from the class containing the chief offenders. But it is probable that in the majority of cases it is sheer apathy. Here and there Public-spirited men, or associations, have endeavoured to rescue the Authorities from dereliction of duty, but for the most part it may be said that the Smoke Sections of the Public Health Act, 1875, have been allowed to become a dead letter.

**Medical Officers of Health.**—The smoke abatement campaign is greatly indebted to a few Medical Officers of Health, and other Medical men, for their enthusiastic activity and splendid service rendered, but the majority have been loyal and faithful officials, carrying out the will and wishes of their Health Committees and have done practically nothing to prevent smoke, taking the line of least resistance, and if not believing in, yet acting on, the principle that cure is better than prevention, by erecting and running Hospitals and Sanatoriums to cure, instead of taking steps to prevent disease.

**Sanitary Inspectors.**—In the absence of smoke Inspectors, Sanitary Inspectors are expected to deal with all nuisances, including smoke nuisances.

But the sensible, and most efficient Sanitary Inspector knows that he does not possess the necessary technical knowledge, not being an engineer, to deal satisfactorily with the smoke nuisance, so that he wisely lets it alone, even if he has time to notice it.

**Engineers.**—It is appalling to find how few charge engineers have given the necessary attention to economical coal combustion, and the prevention of smoke. The writer when in the East was informed that the European Engineers told the native firemen that the more smoke, the more steam they made, and consequently chimneys poured out smoke the whole of the day as a result of such instruction. Engineers in the West do not give such silly instructions, but they are greatly to blame for excessive smoke, for not attaining the necessary information on economic coal combustion and not teaching the firemen how to prevent smoke, especially when the men whom they put on to stoke frequently have had no experience in stoking.

It is no uncommon thing for engineers strongly to resent information regarding the prevention of smoke offered by Inspectors who visit the works to complain of excessive smoke, and when prosecuted they complain of "persecution."

**Firemen.**—With charge engineers taking little or no interest in their firemen it is not to be wondered that firemen take no interest in the prevention of smoke and the saving of coal. A fireman recently, whose employer promised to pay the fee for him to attend a series of lectures on smoke abatement, refused to attend the lectures, unless he paid him time at the union rate of wages.

The employer declined and the fireman did not attend the lectures, probably thinking he knew more about firing than the lecturer.

**Magistrates.**—Magistrates, of course, know that it is their duty to administer the law in its letter, and spirit, and impose penalties on law breakers as a deterrent to future contravention.

But some magistrates dismiss cases without either rhyme or reason, showing more sympathy with the offenders than with the sufferers. Such decisions reduce

the opportunity for courts to convict for contravention of smoke law.

**County Councils.**—County Councils are supposed to be the supervisors of the authorities under their jurisdiction. Occasionally it is recorded of them that on receipt of a smoke complaint they have written to the authority in whose district the nuisance is, requesting that the step be taken to abate it, and it ends there as far as the County Council is concerned. A notice may be served to abate the nuisance by the authority in whose district it is, but if the notice is not obeyed but continues, often nothing further is done and both local authority and County Council, if challenged, would be able to justify their action or inaction.

**The Ministry of Health (late Local Government Board).**—The Ministry of Health is responsible for the National Health, and is expected to spend the necessary money, and take the necessary steps, to procure and preserve it. Thirty years ago experts were agreed that national smoke abatement action was necessary, and a communication was sent to the President of the Local Government Board suggesting the creation of a Smoke Abatement Department and the appointment of one or more competent officers to supervise, advise and assist local authorities and manufacturers regarding the difficult problems of practical smoke prevention, assuring him that it was a great national need, and if supplied would produce great national benefit. The reply was, "The suggestions have been placed on record for consideration in the event Parliament decides to take action on the smoke question."

The Ministry of Health has received deputations, appointed a Departmental Committee on Smoke and Noxious Vapours Abatement, introduced into the House of Lords Smoke Abatement Bills, which were not very strong at birth, and succumbed on second reading, also have promised (when Government business of more importance than smoke is not so congested) a

Smoke Abatement Bill. So there is a prospect of something being done some day.

**Parliament.**—Parliament did take legislative action on the smoke question 50 years ago, and many questions have been asked in the House of Commons since as to whether the Government intended to take action to deal nationally with unnecessary smoke, and the replies have invariably been—"The Government is considering the matter." If Parliament does decide to take action then the Health Minister may consider, and act on the many practical suggestions submitted for dealing efficiently and profitably with air purification.

**The General Public.**—The general public have suffered air poisoning for centuries without a protest, and they richly deserve all the disabilities and damage received therefrom. Had they protested and demanded that everything should be done that was practicable to prevent air poisoning, and threatened Members of Parliament that unless they did it, votes would be given to others who would, action would have been taken years ago. Parliament, receiving the public mandate, would have passed the necessary legislation and the Ministry of Health would have demanded that the local authorities should put in motion all the administrative machinery. But this has not been done, and the greatest of all the defaulters are the general public who have, on this great health question, been appallingly apathetic.

**India and Smoke Abatement.**—As far back as 1904 when Lord Curzon was Viceroy of India, the Orient cried out against the smoke nuisance, the damage being done by it, and they were anxious to preserve from damage the magnificent memorial in course of erection in Calcutta, to the memory of Queen Victoria.

The writer was asked by the India Office to go to India permanently as the Government Smoke Abatement Expert, and in December, 1905, went to India for 6 months to deal with the smoke nuisance in Bengal.

During the 3 weeks' voyage from London to Bombay, the writer was continually reminded of his smoke abatement commission by the huge volumes of black smoke and smuts emitted from the funnels of the vessel which carried him.

Possibly the chief engineer and others responsible for it thought that it did not matter how much smoke they made when out at sea. But it did matter to the passengers for it was impossible for any to sit on deck (unless protected by the awning) without being covered with smuts. The boilers were fitted with a "Forced Draught Smoke Consumer"—misnamed, for it was a smoke maker, forcing the gases unconsumed out of the funnels instead of consuming them in the furnaces. There are two reasons why owners of vessels should give their Engineers strict instructions to stop the smoke nuisance, (1) Because the comfort and pleasure of the passengers demand it, and (2) There would be a great saving of fuel.

Sir William Emerson, Architect for the Queen Memorial Hall, Calcutta, travelling in the train with the writer from Bombay to Calcutta, remarked that it was his third visit to Calcutta, and it was time something drastic was done to stop the smoke nuisance, or the lovely buildings erected and projected would be incalculably damaged. The writer on arriving in Calcutta found scores of chimneys, as far as could be seen, pouring out volumes of dense black smoke. The chimneys were Government, Corporation, Jute Mill, Engineering Works, Ocean-going Steamers (moored), Locomotives, and many more. The smoke nuisance from Government and Corporation chimneys being no better, but worse, if anything, than the rest, it was imperative that these works should be visited first. Government and Corporation Officials, especially the former, resented interference, saying, "That Government nuisances were exempt." But when the fact that it was unnecessary was demonstrated to them and that its prevention would be a great



saving of coal, both Government and Corporation Officials took the suggested steps to abate the nuisance, and they were an example to the rest of the offenders.

The works were visited, and they all with one accord said, "We cannot help making smoke with poor coal, native stokers, and climatic conditions, but if anyone can tell us how to stop it we will try." It was evident by the amount of smoke emitted that the native stokers had either been told by the engineers that the more smoke they made, the more steam, or they believed the only way to make a lot of steam was to make a lot of smoke.

The native stokers were taught how to fire scientifically, sensibly, smokelessly, and economically, and when they saw the steam gauge finger go up instead of down, and no black smoke pouring from the chimney, they were mystified, but their doubts subsided when informed that the smoke was consumed and made steam instead of being discharged from the chimney.

**Smoke Abatement Act.**—A Smoke Abatement Act was passed, giving powers to proceed against all unnecessary smoke of any colour, density, or duration, from furnaces and fireplaces, also empowering the courts to impose heavy penalties for contravention of the Act, make orders for the abatement of nuisances, and also power to impose heavy daily penalties for failure to obey the abatement orders.

**Government Smoke Abatement Commission.**—A Government Smoke Abatement Commission was appointed (including natives), representative of the various industries. The Commission very quickly got to work; they decided on a practical smoke abatement policy and commenced to administer the Smoke Abatement Act.

**Smoke Inspectors.**—When the writer definitely decided not to stay permanently in India as the Government Smoke Expert, two Inspectors were appointed, and trained to take charge of the Government smoke abatement work

in Calcutta and district. One had been in Government service a number of years as Chief Engineer, and the other had been Foreman for a number of years in a large engineering works. Eight years later Lord Curzon, speaking in the House of Lords on Lord Newton's "Smoke Abatement Bill," said, "When I was Viceroy of India, I secured the services of the Sheffield Smoke Abatement Expert to deal with the smoke nuisance in Bengal, and he had recommended measures which had ended the smoke nuisance in Calcutta and Bombay."

#### DEPARTMENTAL COMMITTEE ON "SMOKE AND NOXIOUS VAPOURS ABATEMENT."

This Committee was appointed in 1914 by Sir (then Mr.) Herbert Samuel, President of the Local Government Board, with the late Mr. Russell Rea, M.P., as Chairman. The work of the Committee was suspended during the war, and when it was reconstituted by Dr. Addison, Minister of Health, in January, 1920, Lord Newton was appointed Chairman.

The Committee were to consider the present state of the law with regard to the pollution of the air by smoke and other Noxious Vapours, and its administration, and to advise what steps were desirable and practicable with a view to diminishing the evils still arising from such pollution.

One hundred and fifty witnesses were examined by the Committee.

The writer, when giving evidence before the Committee in 1914 (London), was asked if the excellent work done in Sheffield, India, and other places visited could be done throughout the country? and the reply was "Yes."

The Committee also visited, and have taken evidence in, the following manufacturing areas—Manchester, Glasgow, Stoke-on-Trent, Swansea, and Sheffield.

When the Committee came to Sheffield in 1921, the

writer took them to the large works, and demonstrated the practical and profitable prevention of smoke, and the Committee requested him to give additional evidence at the Public Enquiry held in Sheffield, and Lord Newton asked what would have to be done to compel the defaulting authorities to administer the law? and the reply was—The appointment of competent Government Officers to advise and assist Local Authorities and Manufacturers regarding the difficult problems of smoke abatement, and to take proceedings when necessary, charging the cost to the defaulting authorities.

In 1920 the Committee issued an Interim Report on the subject of domestic smoke, and in 1921 their Final Report.

The Committee's recommendations were :—

(a) With regard to Industrial Smoke—

1. "That the Minister of Health should have power to compel or act in place of any defaulting authority which refuses to perform its duty in administering the law with regard to smoke."

2. "That the general legal obligation on all manufacturers, users, and occupiers of any business premises or processes, engines or plant, should be to use the best practicable means having regard to all the circumstances of the case for avoiding the pollution of the air by smoke, grit, or any other noxious emissions, that the same law should also apply to all Government establishments and all rail and road locomotives and motor cars of whatever weight or type, and to steamers on rivers, estuaries and lakes. It must be clearly understood that questions of cost must be taken into account in determining what is practicable."

3. "That the Minister of Health should be empowered to fix standards from time to time, and in any case in which the emission exceeds the standard

so fixed the onus of proof that the manufacturer is using the best practicable means should be on the manufacturer."

4. "That the duty of enforcing the law with regard to pollution of the air by smoke, should be transferred from the local sanitary authorities in whose jurisdiction it now rests, to the county authorities, *i.e.*, the Councils of Counties and County Boroughs; minor authorities should still have power to take proceedings if they so desire."

5. "That the Minister of Health should be empowered to constitute Joint Committees, consisting of two or more Councils in cases where it appears to him that this course would lead to the better administration of the law with regard to smoke in any given area."

6. "That the Minister of Health should assign to one or more competent Officers the duty of advising and assisting local authorities and manufacturers with regard to the difficult smoke problems, these officers should report annually on the steps which are being taken, and the progress which has been made in the suppression of avoidable smoke."

7. "That the laws should enable much larger fines to be imposed than at present."

8. "That legislation should be introduced at an early date with a view to consolidating in one measure the various existing statutory provisions with regard to the pollution of the air by smoke, and providing for their amendment where necessary, to give effect to the above recommendations."

(b) With regard to Domestic Smoke.

9. "That the Central Housing Authority should decline to sanction any housing scheme submitted by a local authority or public utility society unless specific provision is made in the plans for the

adoption of smokeless methods for supplying the required heat as suggested in our Interim Report. The only exception to this rule should be when the Central Authority are fully satisfied that the adoption of such methods is impracticable."

10. "That the Government should encourage the co-ordination and extension of research into domestic heating generally. This is a matter of great importance in view of the many outstanding problems which demand enquiry."

11. "That Local Authorities should be empowered to make bye-laws requiring the provision of smokeless heating arrangements in new buildings other than private dwelling-houses, such, for example, as hotels, clubs, offices, and the like."

(c) General.

12. "That Gas and Electricity Undertakers should be given every facility and encouragement to increase and cheapen the supply of gas and electricity, and that the practice followed by some Municipal Authorities of overcharging for gas and electricity, in order to allocate the profits thus accruing to the relief of the rates, should be discontinued."

(d) With regard to Noxious Vapours.

13. "That the Alkali, etc., Works Regulation Act, 1906, should be amended so as to apply generally to all manufactures from which noxious vapours might come."

14. "That a list of such noxious vapours should be included in the Act, and the Minister of Health should be empowered to add to this list from time to time, other noxious vapours after due enquiry."

15. "That a general obligation should be placed on every manufacturer of using the best practicable

means for preventing the escape of noxious or offensive vapours."

16. "That the present system of registration should be continued, and the Minister of Health should be empowered to require the registration of classes of work, not at present required to be registered."

17. "That the Minister of Health should be empowered to fix standards from time to time, after due public enquiry, with regard to noxious vapours, in cases where he finds it desirable, and these standards should have the same legal force as those which we recommend with regard to smoke."

**Smokeless Cities.**—There is a great amount of nonsense talked and written in advocacy of smokeless cities in lectures, articles, and even books, by theorists and dreamers, who know very little of the thousand and one difficulties of practical smoke prevention without injury to industry. The Press is constantly reminding the country that during the coal strike, when the miners ceased work and there was no coal to feed the furnaces and fires so that they went out, there was no smoke, with resultant clear skies, more sunshine, and things were seen that had been obscured by the smoke clouds, and there was pure air, fit for people to breathe, and the implication is that these ideal atmospheric conditions should not be for a short period but that those who suffer most from the smoke should demand their permanence.

There could be permanently smokeless cities, and a smokeless country, if all furnaces and fires were put out and never relighted, but a sensible people would never demand or even desire such a senseless thing, for a smokeless country, even with its purer air, clear skies and more sunshine would be a country of universal poverty, but a country with its furnaces and fires making only the necessary smoke for the carrying on of industries,

though a little smoky, would be a country of universal prosperity. What is needed is less talking and writing of nonsense, and the use of common sense in determining how much smoke is necessary for trade processes, and suggesting how profitably to prevent the unnecessary smoke.

**Necessary Smoke.**—Many years of experience of the practical working of furnaces and fireplaces has proved that from 15 to 20 per cent. of the smoke now made is necessary, and to stop it would stop trade. When lighting up the furnaces and fires, recharging them, processes requiring comparatively low temperatures, varying working conditions, atmospheric conditions, accidents, and at other times, it is absolutely a physical impossibility to prevent the emission of smoke and noxious vapours for short periods, and what cannot be cured must be endured, without grumbling, for it is a lesser evil than putting out the furnaces and fires.

**Federation of British Industries.**—In 1924, a Smoke Abatement Bill to amend the law relating to smoke nuisances and for other purposes connected therewith passed its second reading in the House of Lords. The Federation prevailed upon the Government to amend *Section 334* of the Public Health Act, 1875, which provides for the exemption of certain trade processes, and enacts:—"Nothing in the Act shall be construed to extend to mines of different descriptions, so as to interfere with, or to obstruct the efficient working of the same, nor to the smelting of ores and minerals, nor to the calcining, puddling and rolling of iron and other metals, nor to the conversion of pig iron into wrought iron, so as to obstruct, or interfere, with any of such processes, respectively." The amendment adds to the said processes:—Reheating, annealing, hardening, forging, converting and carburising iron and other metals, and would if it became law exempt all furnace smoke necessary in the processes named.

**Necessary Smoke Standards.**—The statute does not fix the necessary smoke standards. It says "a chimney sending forth black smoke in such quantity as to be a nuisance, and the duty of fixing the necessary smoke standards which constitute a statutory nuisance (if exceeded) devolves upon the administrative authority.

Some authorities fix 2 minutes, other 4 minutes, and others 6 minutes in the half hour, per chimney, regardless of the number of boilers and furnaces served by the chimney. Any excess of the limit is considered unnecessary smoke, a nuisance, and proceedings are taken for its abatement. Other authorities fix limits from 2 minutes to 20 minutes in the hour, proportionate to the number of boilers and furnaces served by the chimney.

Some magistrates accept the limits, and convict for excesses, while other magistrates reject them, and fix their own limits for conviction, which are invariably higher than the limits of the local authority.

The fixing of the limits should not be left to the local authority, for many local authorities allow considerably more smoke than is necessary, which is a waste of the manufacturers' money, and adding unnecessarily to the smoke nuisance.

**The Ministry of Health.**—It is the duty of the Ministry of Health (the Central Health Authority) from time to time to fix the smoke Standards. To commission experts to visit the works to determine definitely by demonstration under the various working conditions, how much smoke was absolutely necessary for the practical, efficient and satisfactory working of furnaces and fireplaces. The time of smoke emission necessary in the hour for boilers, furnaces and fireplaces would be fixed as Smoke Standards, and any excess of the standards would be a statutory nuisance. The standards being statutory would be accepted by the courts, and uniformly administered by the local authorities with justice and great benefit to all.

**Unnecessary Smoke.**—It is folly to advocate the stopping of all smoke, necessary and unnecessary, and it is none the less foolish to demand a statutory right, in even special heat treatment processes, to make 80 per cent. more smoke than is absolutely necessary for the processes, for to do so is a waste of valuable fuel, and a public health nuisance in addition.

## CHAPTER VII.

**SMOKE PREVENTERS AND FUEL SAVERS.**

SINCE uneven or careless stoking lies at the root of the smoke evil, many attempts have been made to eliminate the human element and to secure even and equal stoking by mechanical means.

Several types of apparatus have been evolved and meet with varying degrees of success, but it is necessary that those operating the machines should understand thoroughly the principles upon which they work in order to secure the best results.

For this purpose an account is given in the following pages of some of these machines, and it will be seen that the adoption of one or other is likely to enable a steam user to effect considerable economy in his fuel bill, and at the same time avoid giving offence by the emission of smoke.

**“ Bennis ” Patent Machine Stoker, fitted with Patent Pneumatic Gear and Self-cleaning Compressed Air Furnace.**—This stoker receives small fuel or slack by hand or mechanical means, into a hopper of about 3 cwts. capacity. There are two hoppers to each Lancashire boiler. Under each hopper is a cast-iron feeding-box, in the interior of which is a simple pusher plate with an adjustable reciprocating motion. The fuel falls in front of the pusher plate, and is pushed over a ledge formed by the bottom of the feeding box.

The weight of fuel so pushed over is regulated by means of an adjustable cam on the driving shaft, so that the rate of feed can be seen by noting the position