ENGINE-HOUSE MANAGEMENT:
GENERAL CAUSES OF STEAM-ENGINE INEFFICIENCY.

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Chairman: Mr. F. H. LIVENS, Member of Council.

[*Abridged.*]

This Paper dealt with the subject rather from the point of view of the superintendent of the comparatively small plant, who has to handle all the details of the works, rather than with large installations where specialists can be employed to attend to the various sections of the station. It is divided into two distinct parts. The first was concerned with the wastage of steam before it arrived at the engine, while the second part dealt with the inefficient use of the steam on account of the poor condition of the engine.

Under the first heading the Author pointed out the importance of preventing leakage of steam at pipe-joints, and the advisability of so arranging the piping, by the introduction of expansion joints, that unnecessary stresses were eliminated. He recommended the use of magnesia for lagging pipes, saying that 2 inches of that material would retain about 93 per cent of the heat in the main. Steam-traps were condemned as being generally a source of loss, on account of their passing live steam, and as an alternative plug-cocks were put forward as a means of draining pipes. In any case, it was important that the outlet from the trap should be visible, and it was often worth while to collect the drainage water for return to the hot-well.

In the second part of the Paper brief reference was made to the maintenance of turbines and reciprocating engines, and the value of occasionally taking indicator cards was emphasized. In connexion with mixed pressure installations, one of the most important considerations was, according to the Author, the elimination of oil from the engine exhaust. He also suggested

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the possibility of extracting oil from feed-water by electrical means. The part of the plant, however, where the greatest economy could generally be effected was the condenser, where a reduction of 1 inch in the vacuum might mean a loss of 6 or 7 per cent in the steam consumption. Various methods of removing scale from condenser tubes were described, such as hydrochloric acid or warm caustic soda, and the circulation of sandy water was suggested as a means of scouring off the scale.

In conclusion, the Author recommended the occasional running of tests, under working conditions, as a means of determining the state of the plant, in preference to the keeping of daily records, as the latter were rarely inspected after they had been handed in, and only had the merit of giving some assurance that the attendant had visited the various parts of the plant to take the necessary readings.

Discussion.

The CHAIRMAN remarked on the wide field for criticism opened up by the Paper and invited those present to join in its discussion.

Mr. G. T. GILLESPIE said that he wished to deal with one small point—the covering of steam-pipes. He thought the Author had been rather sweeping in his remarks by leaving out of consideration a number of lagging materials which were better than clay and cow dung, although they were not so good as magnesia. He also asked what was the exact meaning of the statement that 2 inches of magnesia would retain 93 per cent of the heat in the main.

Mr. S. G. MARTLEW said that he had been able to effect savings in engine-room and boiler plant by attending to the arrangement of steam-pipes, and pointed out the losses which might be brought about by cold draughts blowing over steam-pipes. He admitted that he had failed to discover the ideal kind of steam-trap, although their name was legion, but did not agree with the Author's suggestion of using plug-cocks in their place. He had had some experience with an electrical method of eliminating oil from feed-water and had found it quite effective. The oil coagulated and was skimmed off automatically. The amount of current used was relatively small and was more than repaid by the saving of oil. Regarding the cleaning of condensers, Mr. Martlew pointed out the care which should be exercised in using hydrochloric acid, and

remarked that at Stonebridge Park it was necessary to clean the condensers only once a year. The metering of steam was, he said, very desirable, but the cost of the instruments, which was about £90 or £100 each, stood in the way.

Mr. A. E. A. EDWARDS suggested that the keeping of records was an advantage, in addition to the taking of indicator cards, as the losses which occurred outside the engine were often more serious than those which were due to the derangement of the engine itself. He had effected a saving, in one institution, of 1,000 tons of coal a year, by disconnecting the discharges of the steam-traps and making them visible. He recommended the laying of steam-pipes in trenches filled with loose fossil meal, as being just as efficient, but less costly than magnesia lagging. Mr. Edwards described an arrangement for extracting the oil from the steam in a Sheffield installation, and, at the request of Mr. L. BARROW, of Birmingham, made a sketch on the board. The steam was first passed through a separator and then through three old Lancashire boilers in series. Hardly any oil was ever found in the second or third boilers. Water was allowed to accumulate in the boilers to about the usual working level.

Mr. DRUITT HALPIN recounted how he had investigated a special form of lagging in Germany many years ago and found it useless. He had, however, used cork with success. The effectiveness of any insulating material depended, he said, on the air entrapped in the cells of the material, and the more minute the cells were the better were the insulating properties.

Mr. A. J. SKINNER asked for information about a method, which he had seen at work at the Royal Arsenal, Woolwich, for returning condensed water from the steam-pipes back to the boilers, and said that he thought that the use of sandy water for cleaning condensers would quickly wear away the tubes.

Mr. MARTLEW said that he had had some experience of cleaning condensers with sand, and had found that it tended to choke the circulating pumps. He agreed as to the desirability of having visible discharges for steam-traps, and mentioned the saving which could be effected in some installations by using exhaust-steam for heating purposes.

The CHAIRMAN said that he was, personally, a steam man, but

recently had been more concerned with internal-combustion engines, which had to be in fairly good order or they would not go at all, while a steam-engine would keep struggling on without giving signs of what was the matter with it. He mentioned the case of an engine in which the piston-rings were always disappearing. In the end it was worked quite satisfactorily without any rings. Mr. Livens believed that by the comparison of periodical tests a great saving could be effected, and advocated the use of the indicator.

Mr. DUNELL, in reply to the discussion, explained that the saving of 93 per cent by magnesia lagging might, perhaps, be more properly expressed as a loss of only 7 per cent of the heat brought into the pipes by the steam.