

INCRUSTATIONS IN WATER MAINS.

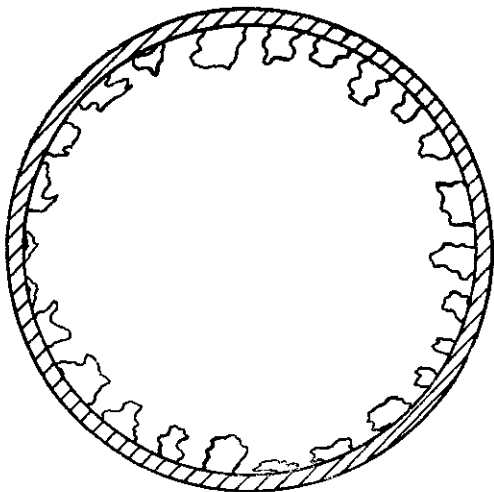
WELLINGTON WATER SUPPLY.

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THE break in the Wainui-o-mata pipes across the Hutt River afforded an opportunity of inspection.

Incrustations were numerous throughout the entire length viewed from the end pier that was standing in the stream. Diagram marked No. 1 drawn to scale correctly shows how the water-way is obstructed. Measurements showed the greatest depth of an incrustation to be two inches, and, as they were thickly studded all round the pipe, it will be well within the truth to put down the loss of capacity from 15 to 20%. This subject is engaging the attention of water engineers in England: and it is being recognised that no water supply scheme can be considered to be complete which does not make adequate provision, by the insertion of hatch boxes and scour pipes along the line of mains, for their periodical scraping and the removal of the mud, filth, and corrosions.

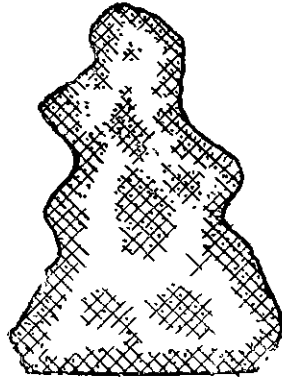
It was generally thought that if pipes, both



NO. 1—SECTION OF PIPE—WAINUI MAIN.

inside and out, are properly coated with Dr. Angus Smith's well known preparation it will effectually prevent corrosion. This, however, is not borne out by experience. The 24 inch pipes from Wainui-o-mata were all coated with this preparation, and the result is clearly seen on inspection of diagram No. 1. With certain waters, pipes would corrode whether coated or not. Water obtained from upland surfaces is very liable to corrode pipes, while that obtained from wells is not. Pipes may also be well or ill covered with the protecting coat, and in ordinary pipes an engineer is entirely at the mercy of the manufacturer. Cast iron pipes are less liable to this defect than wrought iron ones, and cases have occurred where a wrought iron service pipe would not last 18 months before it was completely blocked up and no water could pass at all. Not only is the scraping of pipes necessary for the removal of adhesions, but for the purpose of seeing that no foreign substances get into them. Pieces of wood, macadam, and even rabbits have been found lodged therein; also pieces of bone, brick-bats, etc., and a common cause of obstruction is in the overleading of joints, when lead finds its way inside, in large quanti-

ties and remains there for many years until the pipes are cut or taken up for some other purpose. At Richmond in Surrey, when the pipes were taken up belonging to a London Water Company a whole brick, a large square piece of flint and an inkstand were found rolling about in a pipe which supplied the water for watering the streets in a very large district. In the same place a 3-inch pipe on being taken up was found to contain a large leg bone of beef, and the water had had to

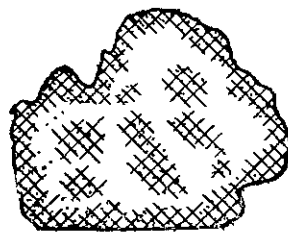


CARBUNCLE (LIFE SIZE) WAINUI MAIN

pass through the hollow of the bone! The result was that what was supposed to be an 8 inch main or a 6-inch main proved, from the obstruction at one point, to be perhaps only a 4-inch or even a 3-inch main. Cases have occurred where a service had been stopped most mysteriously, and had become free again, simply through a plank floating in front of the service and afterwards getting away clear!

Although the coating of pipes is not an absolute preventive, too much stress cannot be laid upon their proper coating, as the character of the deposit is very different from that of a pipe uncoated. It should not be overlooked that it is not corrosion alone which forms the carbuncles. Analysis shows that there is both corrosion, and also the deposition of solid matter, from the water. If the carbuncle is taken off carefully, especially in the case of coated pipes, it will be found that the area of corrosion is very small indeed; sometimes not larger than a pin's head and consequently easily removed. This is not the case in pipes which are uncoated; the carbuncles being very hard to remove. In time, however, those formed in a coated pipe will coalesce, and it will be then in the same condition as if it had never been coated.

A most interesting description of "The internal Corrosion of Cast Iron Pipes" is given in the paper by Mr. M. B. Jamieson, M.I.C.E., of Aberdeen, printed in volume 65, pages 323-336, in the minutes of the proceedings of the Institution of Civil Engineers in 1881. He shows in this paper that the carbun-



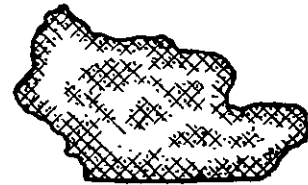
CARBUNCLE (LIFE SIZE) WAINUI MAIN

cles round a pipe coated with asphalt usually have a cavity in the under surface, being attached by their edges only; caused probably by the blistering of the asphalt coating through the collection of air and other gases, thereby preventing the central portion of the carbuncle from touching the iron. He also

shows that the amount of corrosion is proportional to the volume of water passing along a pipe and the commotion existing therein. For example, at the junction with a trunk main, the pipes, where water was constantly flowing, were found to be nearly filled with rust; whereas the hydrant branches through which the water seldom flowed, and at the dead end of the main, where the flow was practically nil, the pipes were comparatively clean, free from corrosion or incrustation, although no doubt full of sediment and deposit.

An interesting paper on "The action of water upon metal pipes, and the injurious effect of lead pipes upon water," appeared in volume 85, page 472 of the minutes of proceedings of Civil Engineers, which is as follows:—

"Widely different opinions have been published on these subjects by experts and even the official regulations with reference to the employment of various kinds of water pipes are greatly at variance. Thus in Germany, Switzerland, and in other places, galvanized iron piping is used without hesitation, while by government decree, the use of pipes of this kind is forbidden in Austria, and in one instance their employment in Saxony was objected to. Some recent investigations of Mr. Lory, of Grenoble, have shown that water containing organic matter in solution attacks iron pipes very speedily, and after many analyses of water conveyed to Grenoble from different sources in iron pipes, and also of water known to have attacked pipes and to have led to the formation of scabs or carbuncles of oxide of iron in other places, Mr. Lory had invariably found that the scabs—consisting mainly of hydrated oxide of iron—contained from 5 to 10



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per cent. of organic matter. He has been led, therefore, to conclude that the destructive action upon such pipes is due in the first instance to substances of organic origin. This may to some extent explain the reason why in some places cast-iron pipes remain quite free from corrosion, whereas in other cases, even after six months, as happened at Grenoble, they become covered with rust carbuncles."

The influence of soft water on lead pipes is considered in the light of a recent report of Dr. White, Medical Officer of Health at Sheffield, and some experiments conducted last year at the Hygienic Institute of Pesth, are quoted in which the water passing through a pipe 39 metres in length, was found to contain from 0.085 to 4.7 milligrams per litre of lead: the latter high percentage only occurred, it is true, after the water had remained in contact with the lead for one month. In view of the destructive action of some kinds of water on cast-iron pipes, information is sought concerning the protection afforded by covering the pipes internally with a coating of magnetic oxide, and the result of any experiments bearing upon this question.

The evil effects of corrosion are: 1st, the loss of water carrying space; secondly, loss of pressure. The space occupied by the carbuncles, etc., is found by filling the pipe full of water, noting the quantity, and