

MUNICIPAL ENGINEERS, CONTRACTORS, AND MATERIALS.

water, and the road is constructed and ready for use.

The points claimed for this road are: First, it secures the excellence of the city paved street, and also the acknowledged beauty of the country road in its season. Second, it admits of early cleaning and repairs. Third, it is one of the most durable roads, when good material and workmanship are employed.

The estimated expense of the road completed was about forty-one dollars per lineal rod. While this expense is more than a country road can bear, yet for a heavily traveled road—which is almost a city street in the volume of travel which must be provided for—it is cheap, and can be profitably built. The part that is paved is equal to any street pavement, while the cost is less than half that usually expended. It is a question whether this kind of road may not be very profitably constructed in the streets of many of our smaller towns, where the expense of complete paved streets prevents all attempts to make their main thoroughfares any better.—C. G. Elliott, in *Drainage Journal*.

PENETRATION OF IMPURITIES INTO WATERMAINS.*

When water-mains under pressure are buried in the earth, there is generally no fear that matter will penetrate into them, even if openings occur in the pipe. On the other hand, there is everywhere a belief that if there is a hole in a pipe under pressure, and the water escapes, there will be no possible entrance for bodies from the surrounding earth. Nevertheless this may be the case, and occurs in the maintenance of modern water-works. Naturally, the attendant circumstances are then exceptional, but are easily explained by an investigation of the nature and direction of the defects in the pipe and the velocity of the water.

When there is a flow of water through a main it is impossible for foreign matter to penetrate into the pipe through openings perpendicular to, or at an obtuse angle with, the direction of the flow, provided the main is under pressure. The case is entirely different, however, when the hole is at an acute angle with the direction of flow. In such a case, if there is a very slight or no flow in the pipe, the water will be forced out as in the former instances, but it is different with a greater velocity. At a certain rate of flow, the water will begin to suck in substances through the orifice, after the principle utilized in an injector.

Such an occurrence has actually been noticed in a stop and waste cock of a service pipe in Berlin. The waste takes place through the side of seat.

Waste cocks are sometimes used in Berlin by consumers on their own premises, but are not attached by the water-works department because a waste through leakage often occurs. Such a defect occurred in the seat of the cock in question. A small channel was formed between the valve and its seat, and the leakage gradually increased until large enough to permit a suction to arise through the hole, by which sand was drawn into the cock. This sand frequently settled in the bibbs, rendering it impossible to use them, and an investigation was accordingly made to determine the source of the trouble. In this way the absorption of sand and colored liquids through the cocks into the pipes was definitely proved and the interesting fact established that under certain conditions impurities may enter a system of pipes under pressure.

*A translation of a paper by G. Oestert Chief Engineer of the Municipal Water-Works of Berlin, in the *Gesundheits-Ingenieur*.

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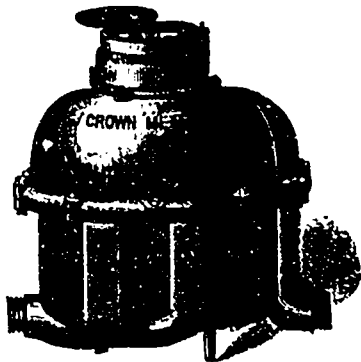
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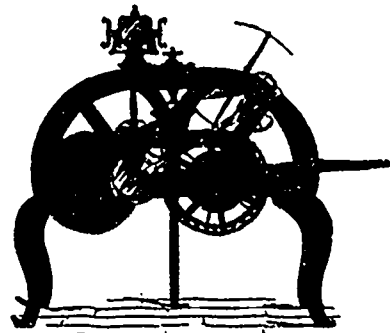
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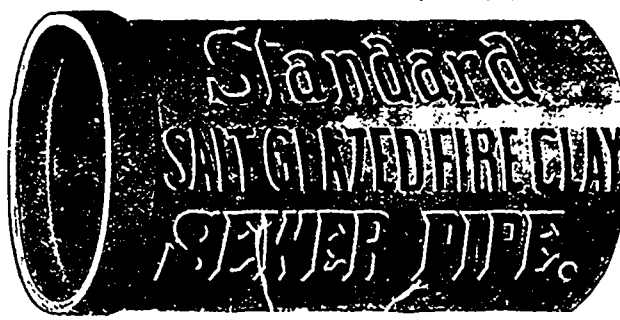
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