

MUNICIPAL ENGINEERS, CONTRACTORS, AND MATERIALS.

filled with clean pebbles and then run with an asphaltic mixture, after which the surface is well rammed and covered with a layer of fine gravel. In the South of England the grouting usually consists of sand and lias lime or Portland cement. As regards the comparative advantages of lias and Portland cement as a grouting I look on lias as the best substance to use when there is a probability of the pavement having to be disturbed from time to time to relay pipes, etc. Lias should also be used when the setts are of a slippery nature; one advantage of lias grouting is that it always appears to have some setting properties.

When the paving is not liable to be disturbed, I look on Portland cement as the best grouting for Newry Aberdeen, and similar setts; the grouting and the setts wear pretty uniformly, and the stones do not work so round on the top as when a soft grout is used. When a cement grout is used the traffic should not be allowed over the surface for three or four days after the work is completed, as if the traffic is allowed soon, many of the stones will work loose, and will of course remain so unless fresh grouting be run in. Once, however, a pavement grouted with cement becomes thoroughly set, the heaviest traffic will not disturb the stones. Finally, while admitting the superiority of the "Manchester" grout with hard setts, I have a strong predilection for cement grout for the less durable setts when laid on level ground.

Laying the Pavement.—The setts should be laid touching one another. Each stone should be so firmly bedded on the packing that it has not to rely on its neighbor for support. The packing should average one inch in thickness, and there should be no pebbles in it, because if a pebble gets between the concrete and a sett it cannot be rammed, and will always rock. The rammer-men require careful supervision. To avoid the trouble of lifting badly-laid setts they often try to get an even surface by ramming the high stones extra hard, and omitting to ram the low-lying stone or stones inclined to give too much. Care should be taken when laying the pavement to see that the setts break joint. The rounding of the setts on the top is usually ascribed to the action of the wheels, but I believe it is rather due to the cogs on the horses' shoes.

In conclusion, I have to express surprise that so few experiments are being made at the present day for the purpose of ascertaining the draught over different surfaces, the comparative merits of roads formed of different materials, how surfaces are affected by velocity of motion, and kindred matters; and that so little has been attempted to ascertain mathematically the resistance to rolling over different surfaces and with different velocities, the most economical means of doing work with animal power, the effects of inclinations, the development of grades, etc.

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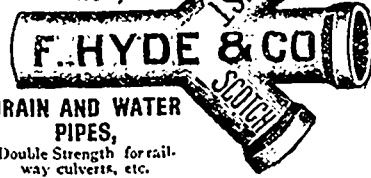
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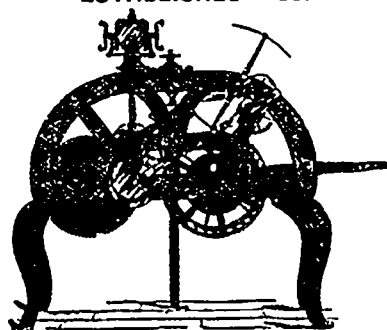
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