

MUNICIPAL DEPARTMENT

WATER FILTRATION IN GERMANY.

The Water Commissioner of St. Louis, Mr. M. L. Holman, M. Am. Soc. C.E., spent some time lately in visiting the filtration plants of Germany, and on his return described them in a paper before the Engineers' Club of that city. This paper has just been printed in the "Journal" of the Association of Engineering Societies, from which the following abstract has been prepared:

The work in Germany which may be taken as typical of plain or natural sand filtration is that at Hamburg. The National Board, of Health of the German Empire requires that filtered water shall contain less than 100 bacteria per cubic centimeter. This is an arbitrary standard first selected as the result of laboratory experiments, and then adopted as the official standard, after considerable practical experience in the larger cities and works of Germany.

The Hamburg filter basins are eighteen in number, and are each about 70 meters wide and about 100 meters long. They are rectangular in plan, with rounded corners. The sides of the basins slope at an angle of about 45 degrees, and the floor and slope are formed in the manner usual in reservoir construction. The floors and the inner slopes are covered with puddle, which is protected by concrete and brick. The brick construction covers the floor and about half of the slope. The upper half of the slope is covered by a very smooth concrete, similar to what we have here in our granitoid pavements. At appropriate places in the bottom of the reservoir channels are formed in the brick for the purpose of leading off the filtered water. For a portion of their depth these channels are countersunk in the bottom of the basin, and are afterwards completed by laying brick loosely along the sides and tiling over the top. After these channels are completed the filter is built up to the top of the channels, beginning with broken stone, following with gravel, then with fine gravel, then with coarse sand, and over all is placed the working layer of sand, one meter thick and of a fineness depending somewhat upon the character of the water, although the question of fineness has not yet been given much study in Germany. A meter in depth of sand is the working body of the filter, the materials under that simply supporting the sand. The entire depth, sand and all, acts solely as a support for the blanket or film of bacterial jelly or slime, which naturally forms while the raw or foul water rests upon the filter. Of course, in building up the filter bed great care must be taken to fill the smallest crevices, so that the entire body is sound and uniform, and

so that an even surface of sand is left on the top of the filter. The filter is then set to work at its normal rate. This rate varies in different cities, the maximum rate in any city being 125 millimeters per hour, while at Hamburg the maximum rate is 100 millimeters per hour; that is, the velocity with which the water passes through the sand.

Now, it is found that after the filter has been at work for a time varying from three days to a week or more, depending upon circumstances that are not thoroughly understood, there appears upon the surface of this sand, and in the upper portion of it, a veil or film of slime. As soon as the filter is put at work the output is examined. This examination goes on for a time, and when it is found that the output contains less than 100 bacteria per cubic centimeter the filtered water is used. Until then it is wasted. The work of the filter then goes on, examinations being made daily and recorded; and as soon as the output shows an increase up to about 75 bacteria per cubic centimeter the filter is put out of work and cleaned. At times the filter has to be cleaned because the output becomes too small, although the head on the filter has not reached the maximum, and although the output of filtered water is still within the required limit of purity. The maximum head allowed for forcing the water through the filter is 0.6 meter. The total depth of water above the sand is 1.1 meters. Each separate filter is examined and kept track of very carefully. At times the filter will suddenly begin to discharge water containing a surplus of bacteria. Those engaged in the practical operation of the works in Germany and in the practical study of them, and upon whom devolves the care of furnishing the city with filtered water, are as yet unable to account for this action.

When the filter needs cleaning the water is drained off and an examination is made of the upper surface of the sand. It is then found that the slime formation has penetrated to different depths in the sand, varying with the time of the year and other conditions. The cleaning is carried down to twice the depth to which the sand shows contamination, varying from a half an inch to a good stiff spading, according to the time of year and the conditions under which the filter is worked. The labor of cleaning the filter is exceedingly heavy. It is accomplished by means of small railroad cars on a narrow-gauge

track. After the filter has been cleaned it is again set to work, and this process is repeated until only about 16 inches of sand are left, when the filter is again restored to its original condition.

SPRINKLING OF ASPHALT PAVEMENTS.

The sprinkling of asphalt pavements is causing considerable controversy in Toronto now, and the attention of the city officials who wish to have the asphalt wet down with the floods too commonly discharged from sprinkling carts is called to the following extract from an article by Mr. Samuel Whinery, M. Am. Soc. C. E.: "There will be times during dusty weather when the small amount of dust that will always remain on any pavement, however well it may be cleaned, will be raised and blown about. On such days very light sprinkling, just enough to keep the dust from flying, would be desirable. This may be best done by providing the men who do the cleaning with a reel of garden hose, say, 100 feet long, and making suitable connection with the city water pipes at distances of, say, 250 feet apart, to which the hose may be attached when required. The street can thus be sprinkled lightly as frequently as may be necessary, at little or no expense, in addition to the cleaning. Under no circumstances should the pavement be flooded by water carts. There are, it is true, sprinkling wagons fitted so that the amount of water discharged upon the street can be nicely regulated, but even then the drivers are likely to be careless and to flood the pavement. It will be found better and cheaper to keep the sprinkling wagons off of asphalt pavements altogether. Another objection to excessive sprinkling is that it greatly reduces the life of pavements of all kinds. Every one who has visited stone-working machinery has observed that, where stone is to be sawn into or ground away, a constant stream of water is kept dropping upon the part to be cut; and if one asks why this is done, he will be told that it greatly expedites the work, and that without water the process of sawing or grinding the stone would be a very slow one. So with pavements, whether of stone or other material, if they are kept constantly flooded with water their life will be greatly shortened, and for this reason alone, if for no other, sprinkling should be avoided wherever it is possible to do so."

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