

The upper one is the raw water supply conduit from the filtration pumping station and the lower is the pre-filter effluent conduit leading to the final filters. These two conduits are connected to the pre-filters by cast-iron piping with hydraulic controlling valves. All these valves and also the valves for wash water, air and drainage are controlled from sixteen operating tables on the gallery floor, each table being located in front of its corresponding filter.

For controlling the rate of filtration, rate controllers of the "Earl" type are provided. These are so connected to a master controller that the discharge from the pre-filters is automatically adjusted to the discharge from the final filters, which in turn is similarly controlled automatically by

leaving the sand bed clean and uniform, and pump away to the drains all dirt and other foreign matters which may have accumulated since the previous washing. All this is accomplished at one operation and by one operator. Among the advantages of this method of cleaning the filters, says Fred E. Field, assistant superintendent of water works of city of Montreal, are that the length of time the filter is out of service is a minimum, being from 6 to 8 hours only; the removal of the dirt from the sand is more complete than can be done by hand cleaning, as the cleaning process extends to any desired depth below the surface of the sand; the sand bed is left more uniform and without the compacting which accompanies walking over the sand by work-

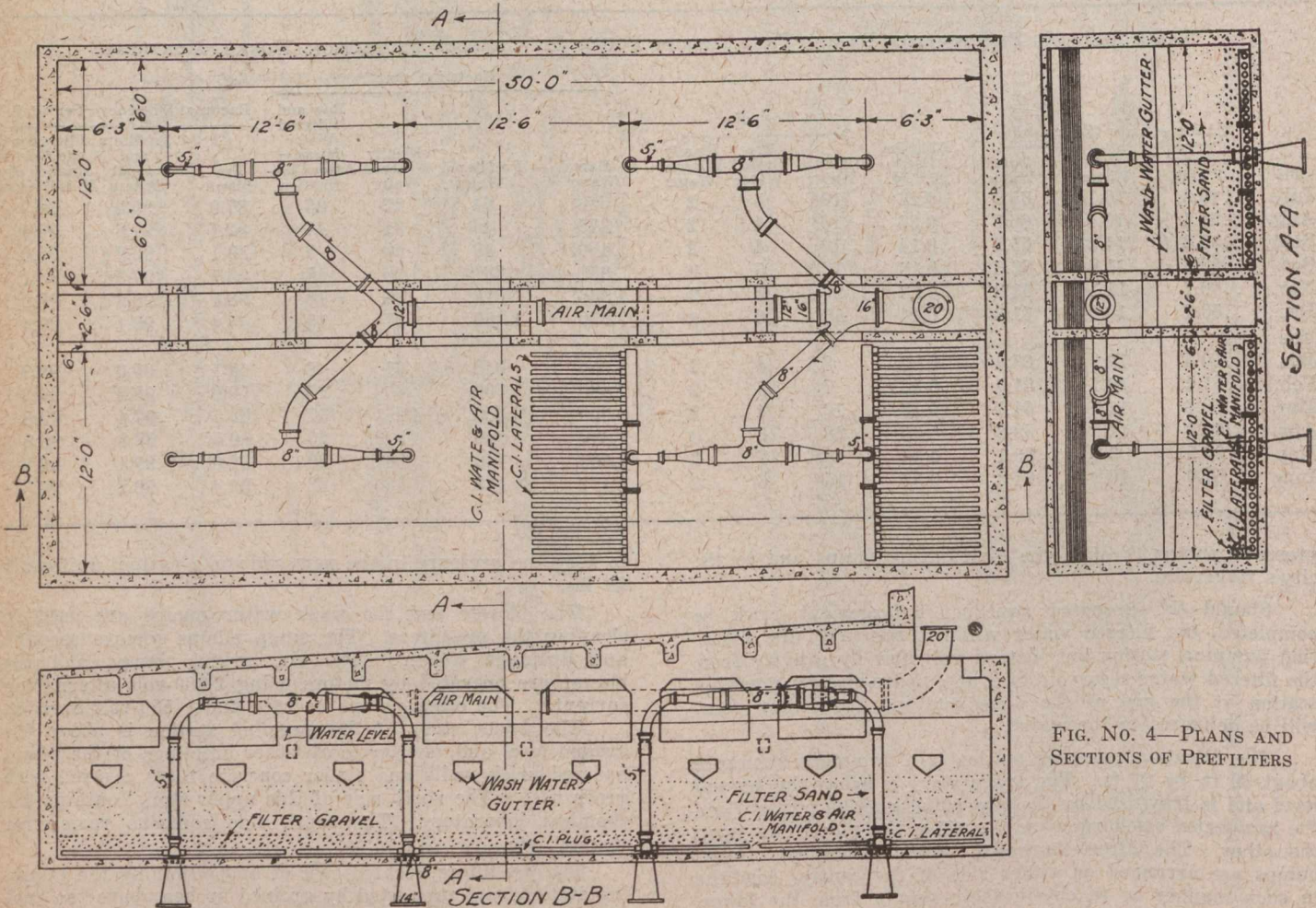


FIG. NO. 4—PLANS AND SECTIONS OF PREFILTERS

the amount of water being drawn from the filtered water reservoir. In other words, the plant as a whole delivers filtered water at the same rate as it is used in the city, without manual operation of the many controlling valves.

The final filters are sixteen in number and, similarly to the pre-filters, are arranged eight on each side of the operating gallery. The filters are covered by groined arches supported by piers spaced at 19 ft. centres. The pier load is carried on foundation blocks independently of the rest of the floor, which is flat and but 5 ins. thick. The filters are each 55 by 340 ft., inside measurements, with the short dimension adjoining the gallery to accommodate the use of Blaisdell washing machines for the filter cleaning.

The underdrainage system consists of two half-round 8 in. tile laterals in each bay, which discharge into a central main collector, 2½ ft. in diameter, extending the entire length of the filter below the floor level. The filter material includes 12 ins. of graded gravel, placed in four layers, and 27 ins. of sand. The conduits and piping connections in the gallery, including the Earl rate controllers, are similar to those of the pre-filters.

The Blaisdell washing machines travel on tracks supported by the piers. They wash the upper layers of sand,

men; there is no break in the routine of the work during the winter and no decrease in the effective filtering area.

A heating and ventilating system is provided to prevent skim ice forming during the winter months and interfering with the free movement of the washing machines, and also to make the plant more healthful and comfortable for the workmen. This system consists of a fan and air ducts so arranged that heated air can be blown uniformly over the entire area of the filters. It was not found necessary, however, to use this system during the past winter.

The filtered water reservoir is of concrete, with groined arches for the roof and inverted groined arches for the floor. It is about 430 by 232 ft., and has a capacity of 6¼ million Imperial gallons. With the exception of its use to control the output of the plant, as has previously been described, there is nothing unusual in its design or method of operation. It was found necessary, however, in June, 1918, to place a bulkhead of stop-logs in gate-house No. 3, for its entire depth, to force the filtered water coming from the final filters through the east side of the reservoir, through a series of baffles, to the suctions of the pumps on the west side, thus eliminating the dead water which was found on the east side of the reservoir.