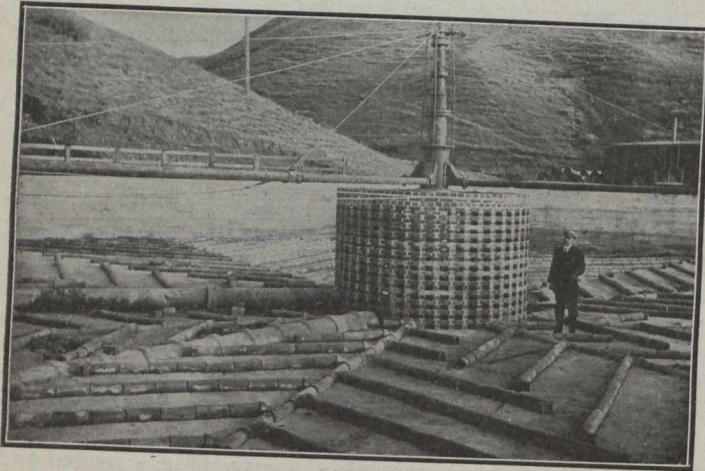


with two copper clips 3 inches wide secured to the wood. Thus, each sheet was supported entirely independent of the other.

In building the circular walls of the filters, templates, convex and concave, cut to the proper circle, were placed on top of the foundation, which had been run in trenches. The boxing of placed boards bent horizontally and attached to upright studs was kept in position by the templates at the bottom, and at the top by distance pieces, and securely wired through the thickness of the wall. The boxing was braced from the inside only by means of



**Sprinkling Filter Drain System and Central Post of Distributing Mechanism.**

perpendicular pieces of 2 in. x 6 in. placed at a distance of about 7 ft. from the cribbing opposite every second stud and tied into the studding at the top and bottom, and one diagonal brace to each. This method of construction fulfilled the double duty of efficient bracing and also of providing bents for the gangways from which to pour the concrete walls.

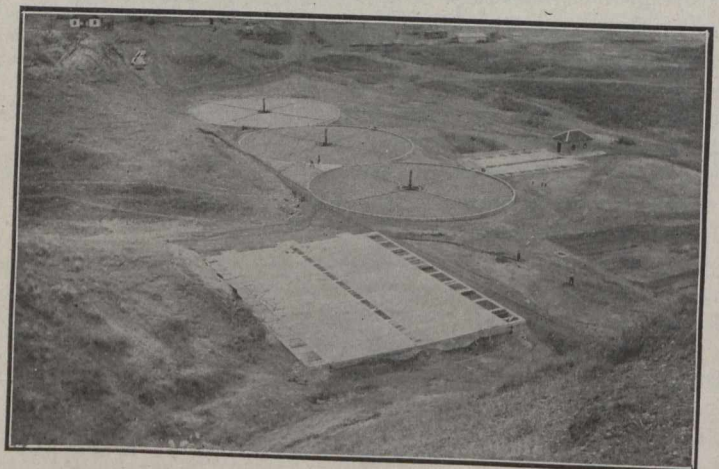
The machines mixing the concrete for the filter walls and floors were placed on a staging erected on the same level as the top of the walls. Three mixers were worked, one at the centre of each filter. A gangway ten feet wide and on the same level, and 330 feet long, ran down the centre for the complete length of the three filters, connecting up the three machine stagings, and permitting the teams hauling gravel and sand to enter at one end and drive off at the other. From the mixing stage radial runways were placed out to the edge of the filters, in order that the concrete hand-dump-carts might travel in a circle. The proportions of materials composing the concrete for the floors and walls were the same as for the tanks, the floor being lightly tamped and screeded off. In each filter eight lines of 4-inch vitrified open jointed branch pipes were embedded half their depth in the concrete. These lines ran from the circumference to the centre, and had a fall of 6 inches. The portion of the floor lying between the lines of branches was built with a slight cross fall and drained with 4-inch butt-jointed field pipes.

In placing the medium, the overhead gangway, and especially constructed wagons were used. The medium for filters No. 1 and No. 2 was first broken to the required sizes, selected and shaken free from dust and small particles by means of coke forks, and carefully placed in the wagons. The bottoms of the wagons were of an inverted "V" shape, and projected beyond the sides and over the wheels. The sides were hinged at the top to the two

ends, allowing the cart to be dumped on to chutes at each side of the gangway. Each chute terminated on a portable platform from which the medium was taken and spread by means of wheelbarrows. Any medium smashed in dumping was shovelled off the platform back to the gangway. The medium for filter No. 3 consisted entirely of screened gravel, and was carted from the borrow pit directly into the filter.

**Operation and Maintenance.**—Operation of the plant was commenced in the month of October, 1912, and the apparatus was given a fair trial before heavy frosts set in. Some difficulty was encountered in obtaining a proper seal in the drums of the rotating filters, and it required a considerable length of time to find out the exact cause of the defect. After careful examination it was found that the upper portion of the drum had developed a very small leak which allowed the air gradually to escape, with an ultimate loss of the seal. This was easily repaired and continuous running of the filter units was then possible.

After a month or two, however, it was noticed that a very considerable amount of colloidal matter was accumulating in the revolving arms of the filters, and it was found necessary to employ a man for a large portion of the day to keep the small holes in the filter arms from choking. After several endeavors to find the cause of this trouble, it was observed that when the accumulation in the detritus tank increased the accumulation in the filter arms became more objectionable. Since no adequate means were provided for removing the detritus from the bottom of the tanks, it was decided to flush the accumulating sludge out into one of the sludge beds. This process was then adopted at regular intervals. It appeared, however, that if the detritus tanks were sufficiently shallow to cause practically all the matter which would not pass through the screens to go over into the sedimentation tanks and there be deposited as sludge, the liquid reaching the tanks would be more uniform in consistency, and



**General View of Plant Completed and in Operation, Showing Sedimentation Tanks in Foreground, Sprinkling Filters in Centre, Humus Tanks and Chlorine House to Right of Filters, Sludge Beds at Extreme Right.**

the process of treatment improved. An alteration of the shape of the chambers was then considered, providing for the filling up of the lower portion of the detritus tanks with stone or gravel, and the building in of a concrete floor, the screens being sloped sufficiently to give the proper area for the capacity of the plant. By doing this