the upstand and is 15 in. diameter through the dam, below which it is reduced to 12 in. diameter.

In order to facilitate construction, a timber gantry 30 ft. wide was built on the downstream side of the dam, the rail level on the gantry being 15 ft. below the crest level of the dam. On the side of the gantry near the dam a 7-ft. crane road was placed and on the farther side two lines of rails of 2-ft. gauge, one for conveying the concrete from the mixer and the other for returning the empty trucks.

Cistern and Double Row of Cascades

The raw water from the reservoir passes through the draw-off main to a concrete cistern 10 by 9 by 6 ft., the flow into which is regulated by means of a ball valve fitted on the end of the pipe and capable of passing 750,000 gals. in 24 hours when fully open. There are two 6-in. outlets from this cistern, feeding a double row of cascades, 10 in number, introduced for the purpose of aerating the water, which are used to regulate the flow to the filters in accordance with the varying seasonable demands. A 6-in. overflow pipe is provided in the lowest basin of the cascades and is fitted with a valve, this pipe being used for washing out when required. From this basin the water passes along a channel running across the top of all the filters and supplying them through feeding chambers in the form of cascades.

There are five filters each 80 by 35 ft. by 8 ft. 6 in. deep (see Fig 2), which for the greater part of their area are founded direct on rock, but, where the rock falls away, concrete walls are built up from the rock and the spaces between them filled with rubble stone to form the foundation. These supporting walls are 1: 7.4 concrete, while the main

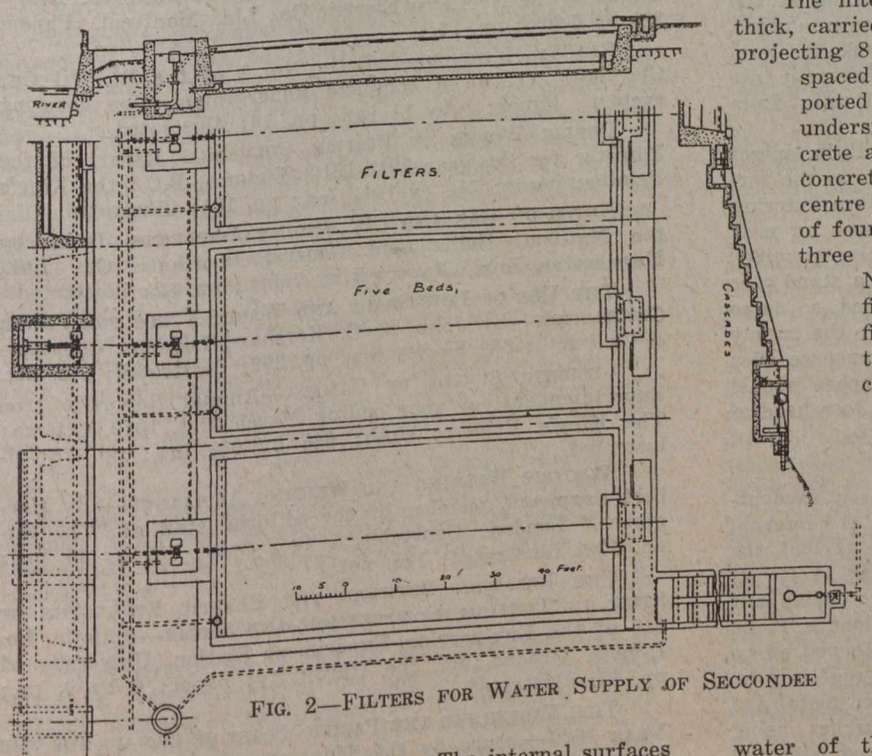

FIG. 2—FILTERS FOR WATER SUPPLY OF SECCONDEE

body of the filters is of 1: 6 concrete. The internal surfaces of the filters and filtered water wells are rendered with 1: 2 cement mortar.

The filtering material is supported on two layers of concrete bars 3 ft. by 4½ in. by 3 in. The bars in the lower of the two layers are laid on the flat, in rows 4½ in. apart. The bars in the upper layer are laid at right angles to those below, but closer together, only a small open joint being left, by which the filtered water drains to the ducts in the lower layer and is led to the outlet wells. In order to keep the bars in place notches are made in the under side of the upper ones into which the lower bars fit. The filtering material consists of 6 in. thickness of broken stone ⅞ in. to 1¼ in., laid on the concrete bars, then 6 in. of stone ⅜-in. to ¾-in., then 2 ft. of sand in two 1-ft. layers of different grades. There is a discharge well 8 ft. square at the bottom end of each filter, the water entering through a 6-in. inlet valve. Each of these wells also contains a Glenfield-Jones regulating valve to ensure uniform delivery within the limits of head allowed in the filter. These valves discharge the water through 6-in. pipes into a 9-in. filtered water main leading to the clear water tank.

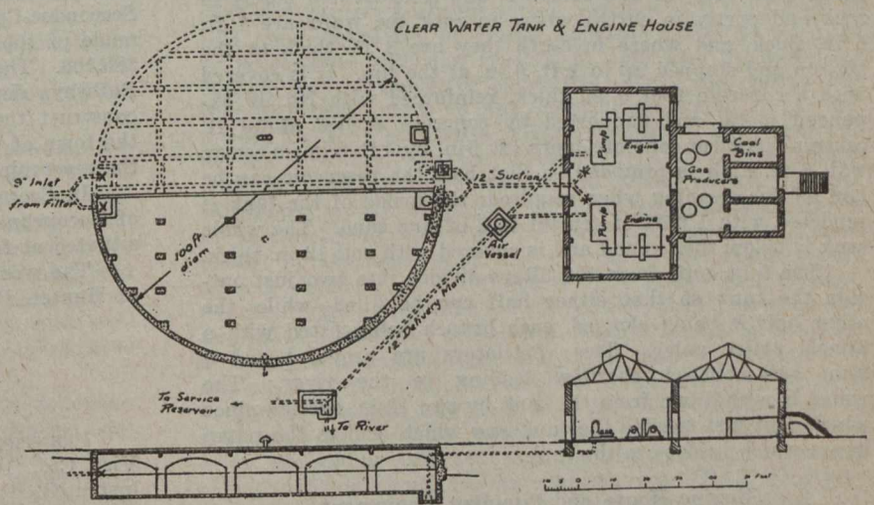

FIG. 3—CLEAR WATER TANK AND ENGINE HOUSE, SECCONDEE WATER SUPPLY

The filters are roofed with reinforced concrete 4 in. thick, carried on reinforced concrete beams 6 in. wide and projecting 8 in. below the underside of the roof slab, and spaced at 8-ft. centres, the ends of these being supported by beams 12 in. wide and 1 ft. 8 in. deep below underside of roof. These are, in turn, carried on concrete arched walls situated between the filters and by concrete columns 1 ft. 6 in. by 1 ft. situated on the centre lines of the filters. The reinforcement consists of four 1-in. square indented bars in the main beams, three ⅝-in. round bars in the cross beams and No. 8 expanded metal in the roof slab. Each filter is provided with five pairs of doors. The filters being situated on the river bank are protected on three sides by a training wall of 1: 6 concrete founded on the rock.

Excess Lime Treatment for Bacteria and Algal Growths

As already indicated, the water of these tropical countries is organically highly impure, chiefly through decaying vegetable matter. The problem of filtration was, therefore, a difficult one. At the Accra works it was hoped that by the adoption of multiple filtration a pure filtrate would be obtained without the use of chemicals. While the system succeeded in materially reducing the impurities, it did not afford a water of the standard desired. It was at one time intended to add the iron process, but there were objections to it. Ultimately, on the advice of Sir Alexander Houston, it was decided to adopt the excess lime process, the character of the water being suitable. It was stated by Sir Alexander Houston that the lime would destroy practically all bacteria, and also algal growths which were very troublesome in the reservoirs. It has been reported from the Colony