AN AUTOMATIC HOUSEHOLD FILTER.

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Owing to the water supply of Brisbane being delivered in an unfiltered state, and to its being at times of drought or flood undrinkable and exceedingly dirty, an attempt was made at the house of one of us (Mr. Henderson), to establish an automatic filter for the filtration of the water, which is delivered there from the Brisbane River supply. A similar filter had been found to give very good results with the "soft" Enoggera supply at the Reservoir, but this was the first attempt to treat the "hard" Brisbane River water by this method.

A corrugated galvanized-iron tank was made as in the diagrammatic sketch, with outlet pipe for the filtered water, wash out pipe with cock at the bottom, draw-off pipe with cock at the centre to run off water when cleaning top sand, and overflow, in case of flooding, at the top, the three latter openings being connected to the waste discharge. A perforated galvanized-iron pipe, three inches in diameter, was put down for the underdrain, and over this there was carefully packed washed gravel and sand as per sketch, to constitute the filter. The sand reached up to the level of the draw-off cock. A float in this filter was connected by a cord running over two pulleys to a swing arm attached to the outlet pipe, and to the storage tank pipes by barrel unions, as shown in sketch. To prevent syphon action,

a small pipe is let in at the top bend of the swing arm to admit air. By this means a rise of level of water inside the filter lowers the outlet, so that each inch increase of rise in water level gives virtually two inches more pressure on the filter, thus practically doubling the head of water that can be obtained in the filter. The fall of the swing arm also calls attention to the fact that the filter is choking, but the fall is so gradual that a month can elapse after the arm starts to fall ere cleaning is necessary. Before the filtered water pipe enters the storage tank, there is a draw-off pipe with cock connected to the waste discharge, so that the filtered water can be run to waste for two days after cleaning off the top sand, and thus save the contamination of the clean water already in the storage tank. As the filtered water is always found to be absolutely devoid of oxygen, it is run over an aerator before going into the storage tank. The stored filtered water in the tank is always saturated with oxygen. The pipe from the water main passes close up beside the storage tank, and a floating ball connected through a slot in the tank with a ball cock on the pipe, controls the supply to the filter. The drawing off of water from the storage tank lowers the ball, opens the cock, and water is delivered on the filter until the filtered water again rises sufficiently to close the cock. To regulate the supply to the filter, a small cistern, just large enough for a ball cock, is placed over the filter. In our case, nine inches of water was the depth obtained in this cistern. In the bottom of this cistern there is a standard orifice, with about quarter of an inch of pipe around it to ensure the water dropping straight down and not running along the under side of the cistern. The diameter of the orifice is so adjusted that with the head of water obtainable in the cistern, it delivers water on to the filter at the standard rate of three million gallons per acre of sand surface per twenty-four hours, and cannot possibly deliver faster than this. As the ball cock in the cistern of course delivers at a much greater rate than this, the cistern is nearly always full when the filter is working. The water delivered from the main is practically devoid of oxygen, so we ærate the water by running it down a ripple on to the side of the tank, and find by that means that the water on top of the filter

is saturated with oxygen. By this arrangement of controlling the supply first from the storage tank as to quantity, and secondly, from the cistern as to rate, we have found that the filter works quite automatically. It has been in use for over twelve months with no attention, save that on one occasion, after running nine months, the top quarter-inch of sand on the filter was removed and thrown away. The storage tank, filter and cistern were covered, and made mosquito proof, and the inside of each painted with " bitumen " paint.

The chemical analysis of the filtered water shows that there is always a large decrease in the albuminoid ammonia and in the " oxygen consumed," and the color is almost entirely removed Saprophytic bacteria only are found in the filtered water, averaging from 50 to 100 per c.c. The intestinal bacilli, especially coli communis, are always present in the main supply, but have never been found in the filtered water On one occasion, when the Brisbane River was in high flood, and dark brown, muddy water was being supplied, the filtered water was slightly opalescent, and had a yellowish colour, but that disappeared in a week.

As a result of the use of this filter, there is always on hand a supply of 600 gallons (the capacity of the storage tank) of pure, clear filtered water, which is used for drinking, cooking, and the bath. The advantages of a pure, clear water supply need not be pointed out—they have been well-known for many years. By the use of a filter of this kind, which only costs comparatively a few pounds, such a supply is always assured, while none of the small domestic filters generally in use, although requiring constant attention, can give a supply for the kitchen and bath room, very few of them remove the bacilli present, and a large proportion of them serve as breeding grounds for objectionable microbes.