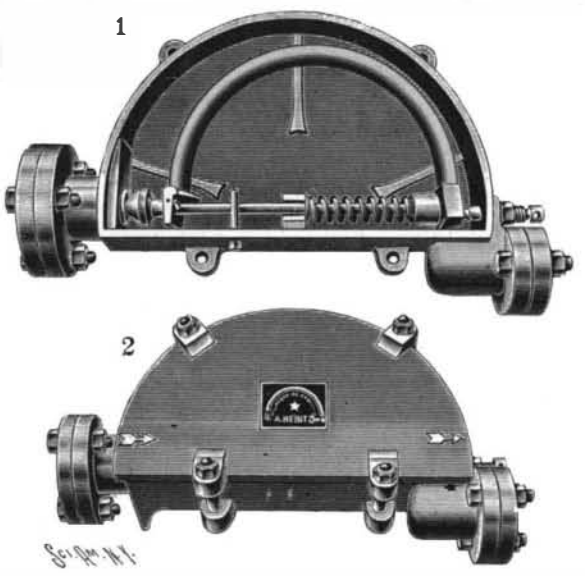
AN EFFICIENT STEAM SAVER.

The illustration represents a steam trap that works the same at all pressures, without regulating, which has no air valves or pet cocks, screws, rotating parts, etc., and which thoroughly and quickly blows out steam pipes when steam is first turned on. The Heintz steam trap has been well known for many years in Europe, where it has been used almost everywhere and has become very popular, but it is comparatively new to steam users in this country, to whom it is being introduced by William S. Haines, sole manufacturer, No. 136-S. South Fourth Street, Philadelphia, Pa. It is entirely automatic in its action, and is applicable to steam pipes, heating pipes, etc., and generally to all industrial appliances in which steam is used as a source of heat or power, being made small, light and compact, without any sacrifice of strength or efficiency. The trap is wide open when cold, and, as will be seen in Fig. 1, the valve is controlled by a curved tube spring which is partly filled with a liquid that, heated by the condensed water passing through when the trap is first put in use, completely fills the tube spring at the moment the temperature reaches 197° F. As the temperature of the water increases, the tube spring rapidly extends its extremities, and by the time a temperature of 212° is reached the valve has been forced tightly into its seat, remaining so until enough condensation has accumulated to lower the temperature 1°, when the valve opens enough to pass this condensed steam off, closing again so quickly, however, that no steam escapes. This operation is so rapid and continuous that a constant flow of water is passing off from the outlet of the trap, but no sign of steam is ever apparent. There is no pressure in the trap when at work, and the trap is blown through and cleared of deposit each time it is worked, all air and water being blown out before the trap closes. If the boiler pressure is much above 100 pounds, it may be necessary to adjust the regulating screw, but the strength of the tube spring is sufficient to close the valve and keep it tight against the pressure of 200 pounds. There is no possibility of freezing of the trap, and when the radiator size is used in steam heating systems there is no pounding or noise. No air valves are necessary, and the control of the steam in each room lies wholly with the occupant, as heat can be turned on in only one room of the entire building without its going into the radiators in other rooms, though all the radiators may be fed by the same supply pipe and drained by the same exhaust, for no steam in any radiator can get beyond the trap attached to it. The manufacturer is in the possession of many records showing material savings in establishments equipped with the Heintz traps, and a recent communication from the Massachusetts Institute of Technology testifies to its perfect working under pressures varying from 100 to 150 pounds.

WATER FILTRATION.

BY CHURCHILL HUNGERFORD, C.E.

The purification of the contaminated water supplies of many European towns and villages has long been effected by passing the water slowly through large beds of sand; and though the results attained were extremely satisfactory, both from a hygienic and an æsthetic standpoint, the manner in which the impurities were removed was but slightly understood until the comparatively recent investigations of Koch, Pasteur, and others finally demonstrated that the high efficiency of some of these filters was due mainly to at least three vegetable organisms which infested them. Two of these were found to be very similar to the nitrifying organism that exists in the soil and so ably converts the fertilizers to a form in which the plants can assimilate them. The third surrounds each grain of sand in the surface of the filter bed with a coating of a gelatinous nature, which so effectually fills the spaces between the grains of sand that the most minute particles are able to enter the filter but a slight distance indeed.



THE HEINTZ STEAM TRAP—INTERIOR AND EXTERIOR.

While the mechanical or straining office of the filter is greatly promoted by this last mentioned growth, the destruction of the dissolved organic matter, or food of the disease-producing germs, is an equally important feature and a far more complex process. Dead organic matter, whether animal or vegetable, goes through the successive stages of decay (in itself a bacterial process, the deadly ptomaines being sometimes formed) until it has reached the stages known as "albuminoid" and "free" ammonia, the first representing the organic matter on which the bacteria of decay are still working and the second the completed process. The dissolved organic matter in the water of uncovered reservoirs usually exists in both these forms, and its reduction to harmless inorganic salts is the duty of the filter.

The nitrifying organism that infests the filter bed extracts the ammonia from the water in its passage through the sand and converts it into nitrous acid. This product combines with the lime that exists in all natural waters, forming nitrites. These nitrites are again attacked by another similar organism and nitric acid is the result, which, again combining with the base, forms nitrates or the inorganic salts of nitrogen. It frequently happens that even this last product undergoes some obscure change and is entirely eliminated from the water. This, however, is not sought after, as it requires a reversal of the conditions necessary for the support of the nitrifying organism, and as the nitrates have no hygienic significance, the process is considered as having progressed sufficiently far.

In practice, the unfiltered water is maintained on the surface of the sand at a depth of from two and one-half to six feet. The bacteria that exist in the water together with the suspended impurities being unable to enter the sand, on account of gelatinous growth, form a film or slime on the surface of the filter that materially aids in the straining process, by retaining over ninety per cent of the suspended matter in the water that subsequently follows. After entering the sand, the water comes in contact with the nitrifying organism, which converts the dissolved organic matter into harmless inorganic salts and destroys any bacteria that may have penetrated the surface. The water is drawn from the bottom of the filter clear, bright, and sparkling, and practically free from bacteria.

In time the film of impurities on the surface of the sand becomes so thick that not enough water can pass through it to meet the demand, and the filters then require cleaning. This is effected by scraping the film or "blanket," as it is called, from the surface of the filter bed, care being taken to remove as little of the sand as possible; for, thanks to the gelatinous organism, the suspended impurities have been unable to penetrate the surface. The filter is then in condition to run for another period of time, ranging, under the varying conditions, from two weeks to four months. Cleaning costs from fifty cents to one dollar per thousand square feet of filtering surface. The average cost of filtering one million gallons of water in six American filter beds

METHOD OF CONSTRUCTING FILTER BED AT LAMBERTVILLE, N. J.