THE "HARRIS-ANDERSON" PATENT FEED-WATER PURIFIER.

In modern power installations the importance of the complete removal of oil from the condensed steam that has to be used over again as feed-water is fully recognized by engineers who have any regard for the safe and economical working of their boilers, and efforts have for long been made, with varying success, to effect this much-desired result.

Steam separators and mechanical filters, while they are a step in the right direction, have not of themselves been found to completely overcome the difficulty of extracting the finest particles of oil from the water.

It is claimed for the Harris-Anderson apparatus, which we illustrate, that it affords a complete solution of the problem in a very simple and ingenious way, and working automatically, it effects the removal of all oil, whether free or emulsified, and leaves the feed-water brilliantly clear and in every way fit for boiler use.

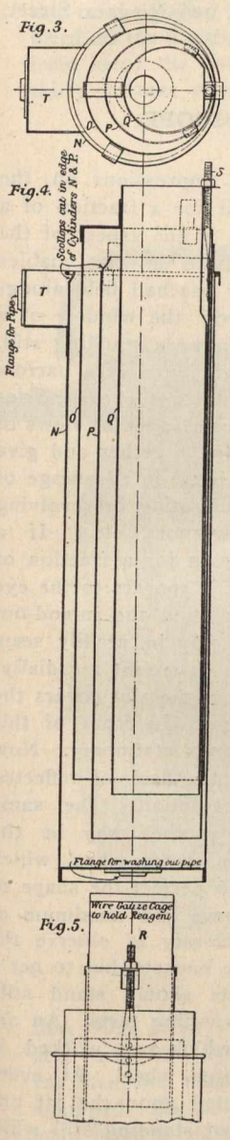
The removal of the free oil in feed-water can be more or less effected by many filtering devices: it is the extraction of the finely-divided or emulsified particles, too small to be retained by any filtering medium, which has hitherto presented an insuperable difficulty. The difficulty has, however, been overcome at last by the Harris-Anderson system, which, speaking broadly, consists in the formation of a precipitate in the water, which envelops the particles of oil, rendering them capable of removal by filtration.

The formation of this precipitate is effected by the addition to the water of minute quantities of two mutually interacting reagents, quite innocuous to the boiler plates or fittings. The reagents are supplied to the machine in a solid form, and in any convenient quantity, while the machine supplies them to the water in the exact proportion desired, independently of any variation in the quantity of water passing through the apparatus. Thus, all need for weighing out, dissolving, and regulating the reagents on the part of an attendant is dispensed with. The principle upon which the machine supplies the reagents to the water in the required proportions, and independently of any change in the rate of flow, is as follows:

Two small equal fractions, usually 1 per cent., are taken from the total quantity of water, and are passed to two cylinders called "solutioners," where they are charged respectively with the reagents, and are converted into solutions of any desired strength. These solutions are then returned to the main body of the water.

The apparatus for parting off these fractions from the water is called the distributor, and is shown in Fig. 1. It consists of a Turbine B, into the upper part of which the water from the condenser is led, and from which it is discharged by the nozzles E into an annular trough formed between F and A. As the turbine revolves, the stream of water from each nozzle is delivered uniformly over the annular trough, and therefore the total water is evenly distributed over its surface.

In order to divide the fractional parts from the total water in the desired proportions, radial partitions are provided in the annular trough, forming the compartments H and J, each of which measures at the circumference 1 per cent. of the total circumference of the annular space. It is evident, therefore, that these radial compartments will each withdraw 1 per cent. of the total amount of water passing from the turbine, no matter what the quantity flowing may be.



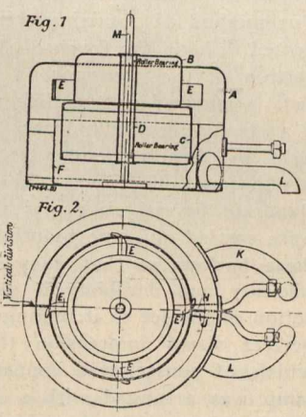


Fig. 6.

The construction of the turbine is very simple, and the means adopted to reduce friction are ingenious and effective. As will be seen on reference to the figure, the revolving part B C of the distributor works round a central vertical spindle M, and is guided on ball-bearings on top and bottom. It also floats in the water contained in the vessel F, so that any friction there may be is reduced; indeed, it is so slight that a very small flow of water is sufficient to keep the apparatus working. The water, which is divided off from the main body by the two radial pockets H and I, is led away by pipes to the two solutioners, while the remainder of the water passes away through the pipes K and L to a mixing vessel mentioned hereafter.

The solutioners are fed, as before stated, with the solid reagents, which are dissolved up by the water led from the small pockets of the distributor. The two reagents—sulphate of alumina and carbonate of soda—are placed separately in a gauge container at the top of each solutioner, as shown at R, Fig. 5. The bottoms of these containers dip about two inches in the water, and as the reagent is gradually dissolved away at the bottom, that above takes its place until the whole is dissolved. The water taken from each pocket of the distributor is made into a solution of any desired strength by a very simple automatic arrangement, depending upon the balancing of a column of solution by a definite and adjustable column of water. The strength of the solution is independent, both of the amount of water passing through the apparatus, and of the amount of solid