(No Model.) 2 Sheets—Sheet 1.

A. A. MONTAZEAU.

SYSTEM OF PURIFYING FEED WATER FOR STEAM BOILERS.

No. 580,621. Patented Apr. 13, 1897.

FIG. 6.

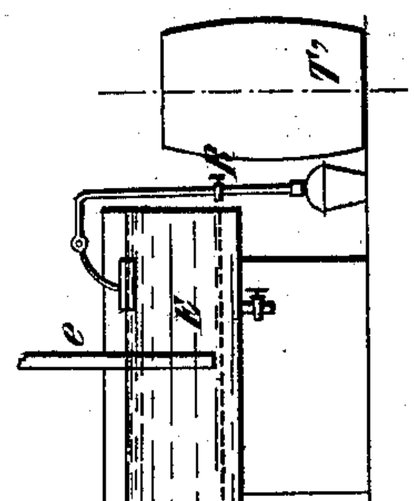


FIG. 7.

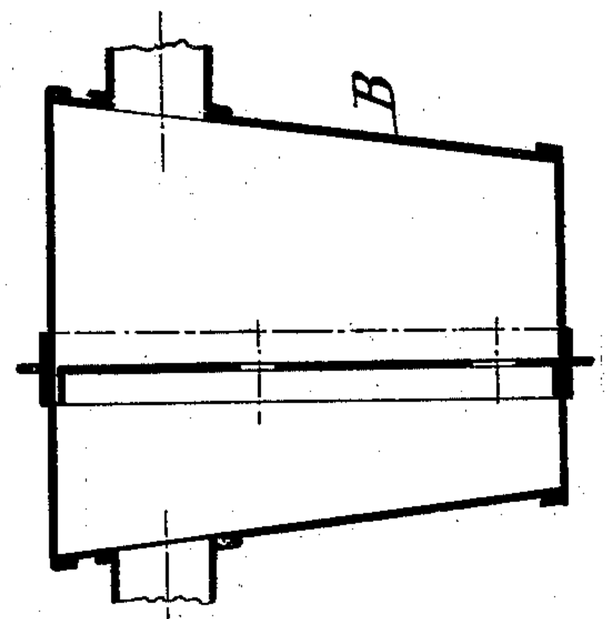


FIG. 3.

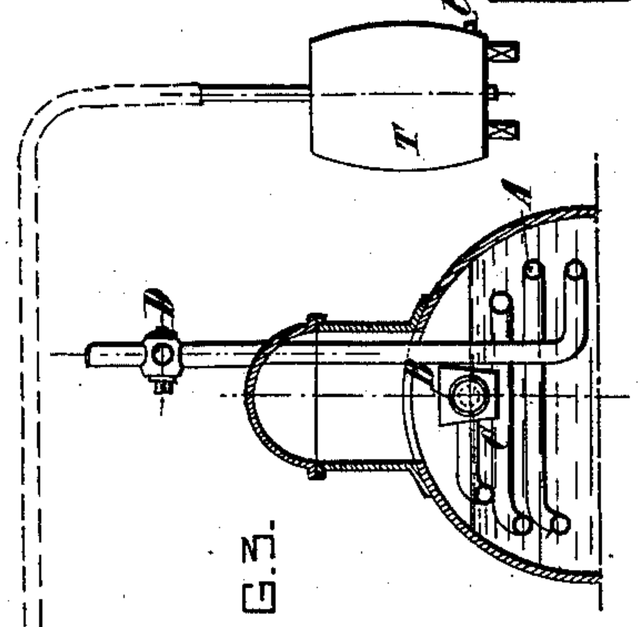


FIG. 5.

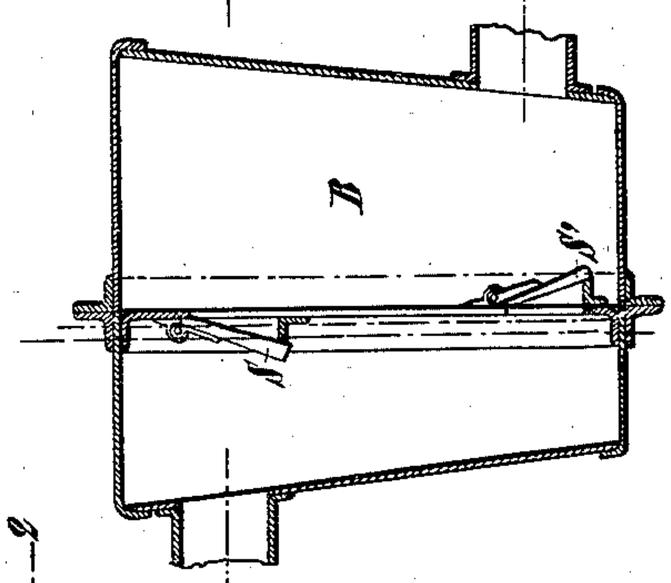


FIG. 1.

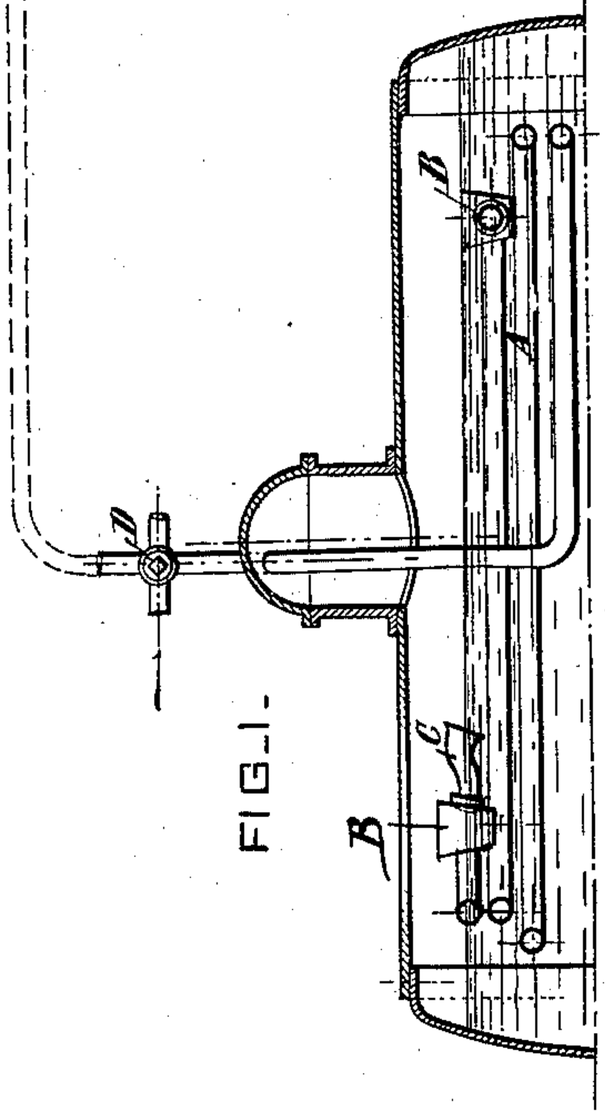


FIG. 2.

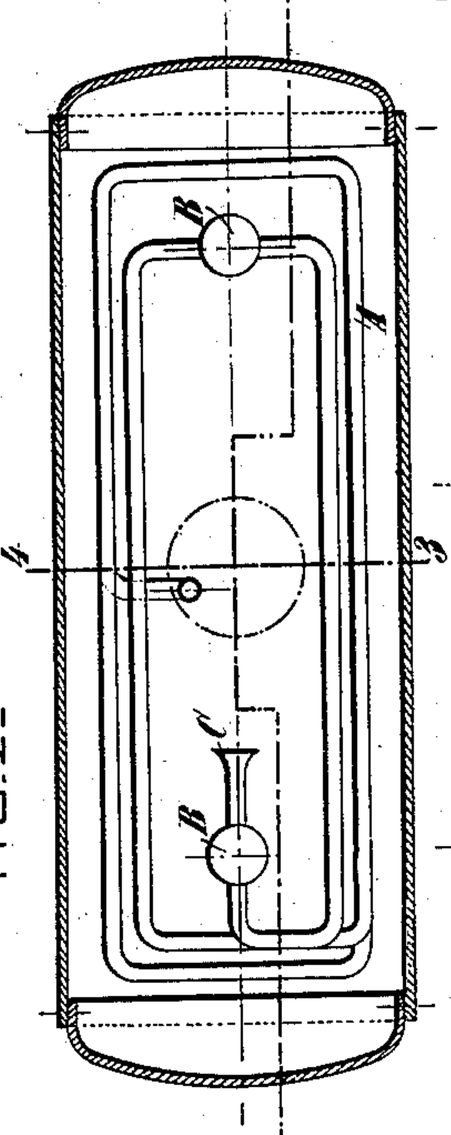
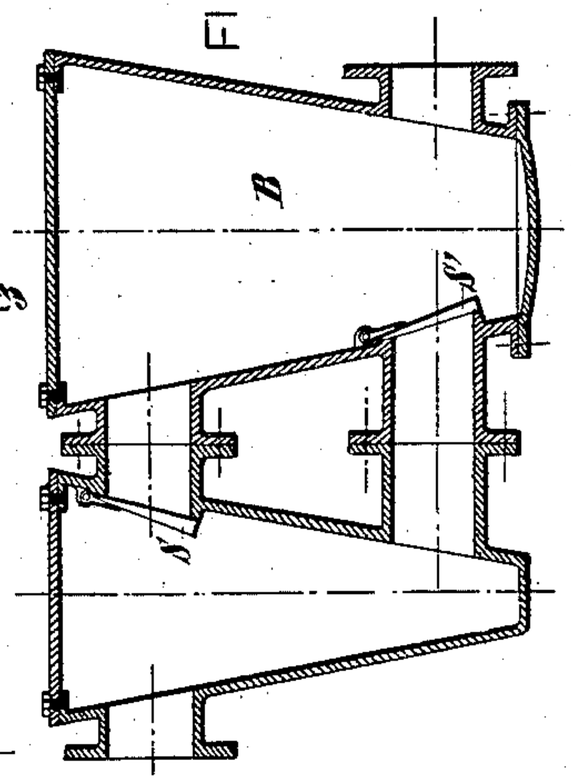


FIG. 4.



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(No Model.) 2 Sheets—Sheet 2.

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FIG. 8.

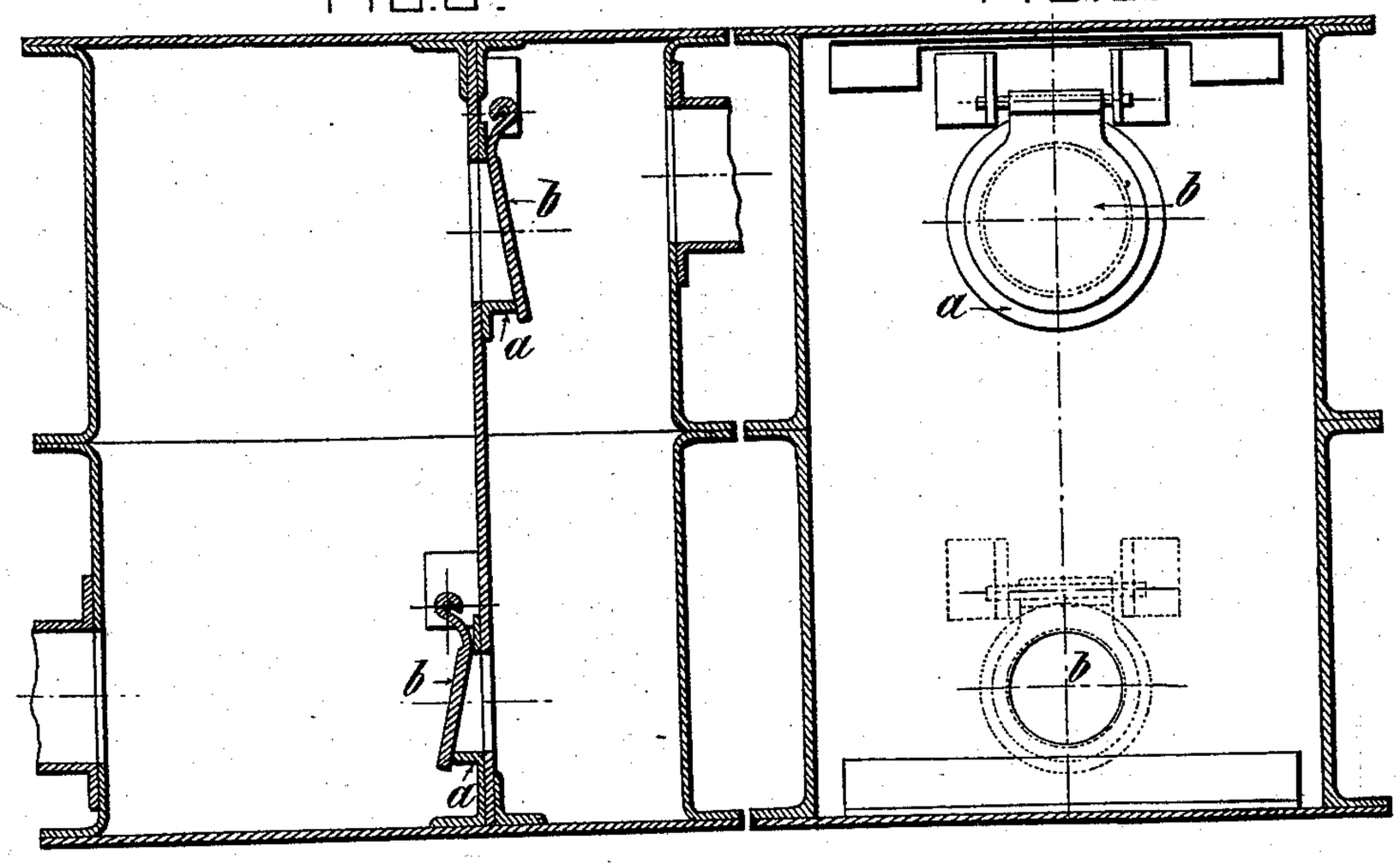


FIG. 9.

FIG. 10.

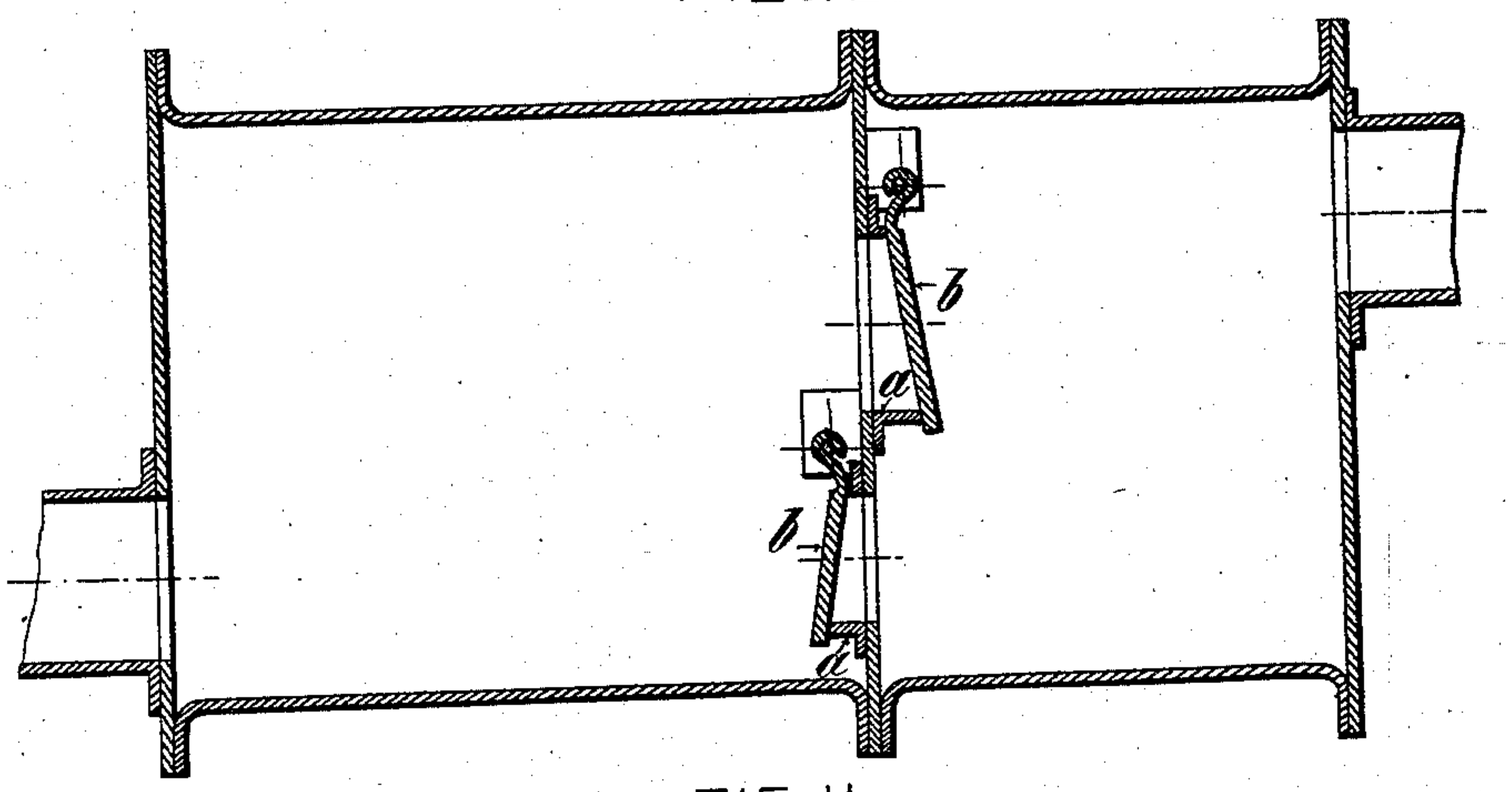
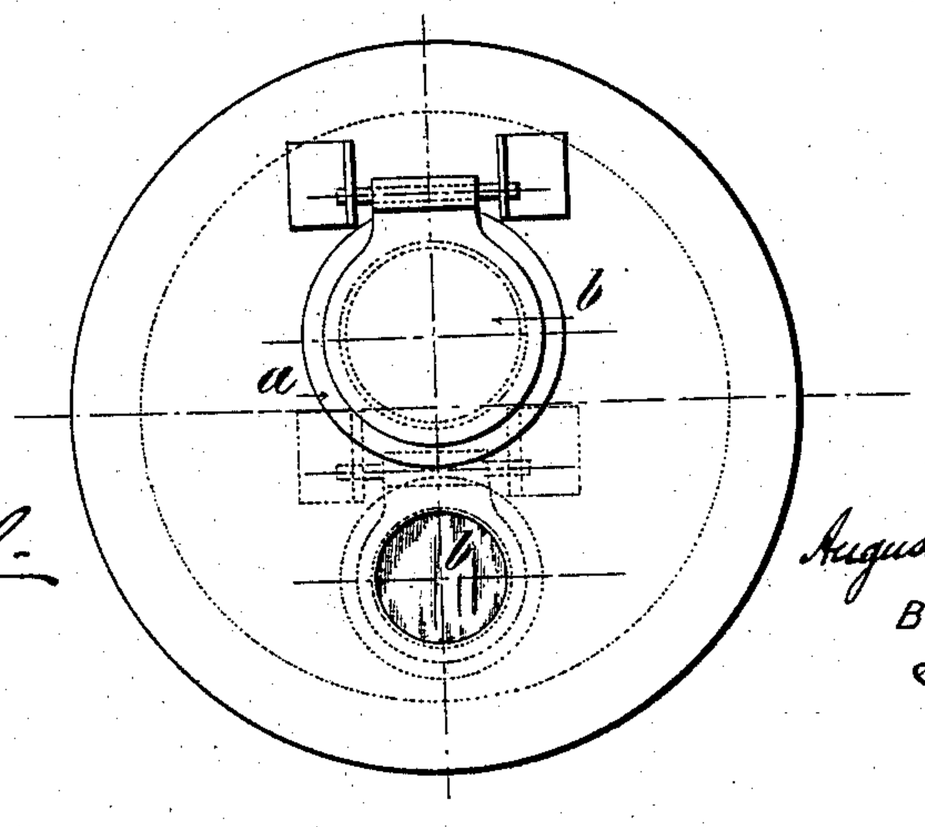


FIG. 11.



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UNITED STATES PATENT OFFICE.

AUGUSTE AUGUSTIN MONTAZEAU, OF PARIS, FRANCE.

SYSTEM OF PURIFYING FEED-WATER FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 580,621, dated April 13, 1897.

Application filed June 11, 1896. Serial No. 595,123. (No model.)

To all whom it may concern:

Be it known that I, AUGUSTE AUGUSTIN MONTAZEAU, a citizen of the Republic of France, residing at Paris, (Seine,) France, have invented certain new and useful Improvements in a System of Purifying Feed-Water for Steam-Boilers, of which the following is a specification.

This invention relates to an improved feed-water purifier for steam-boilers by which the water supplied to the same is purified and the formation of scale at the inner surface of the boilers effectively prevented; and the invention consists of a feed-water-purifying apparatus, through which the feed-water is introduced into the boiler, constructed as will be fully described hereinafter and finally pointed out in the claim.

In the accompanying drawings, Figures 1, 2, and 3 represent, respectively, a vertical longitudinal section on line 1 2, Fig. 2, a plan, and a vertical transverse section on line 3 4, Fig. 2, of my improved feed-water purifier, shown as arranged in the upper part of a steam-boiler. Figs. 4, 5, and 7 are vertical sections, drawn on a larger scale, of different forms of baffle-boxes arranged in the supply-coil of the feed-water, said baffle-boxes serving for retaining the impurities collected in the same. Fig. 6 represents a diagram showing the means employed for avoiding any loss of water and heat in blowing off steam. Figs. 8 and 9 are two vertical sections taken at right angles with each other of a baffle-box used for a steam-boiler of larger size. Fig. 10 is a vertical section of a baffle-box as used in a steam-boiler of smaller size; and Fig. 11 is a front elevation of the interior baffle-plate, showing the arrangement of the valves on the same.

Similar letters of reference indicate corresponding parts.

It is well known that water usually holds in solution a number of different substances, notably the bicarbonates and sulfates of lime and the sulfates and chlorates of magnesium. It was believed heretofore that when water was raised to a high temperature it would lose its impurities. For this purpose it was conducted through a coil that was subjected to the heating action of the steam and water of the boiler. Experiments, however, have shown that under ordinary conditions, especially at a pressure of from five to six atmospheres, the bicarbonates of lime are decomposed and form a deposit on the inner surface of the coil. The sulfates, however, which are not decomposed pass into the boiler and form there the well-known scale.

It has been shown by analysis that scale is much harder the greater the quantity of sulfate of lime contained in the same. As the sulfate, however, is mixed with the carbonate it tends to produce sediments. When, therefore, a coil alone is used for heating the feed-water, the boilers instead of being free of scale show, on the contrary, deposits of scale on their interior surfaces.

According to a number of analyses which have been made at intervals of two months with a semitubular steam-boiler the proportion of sulfate deposited on the tubes was 0.434 and later on 0.539. According to the last analysis the proportion of sulfate in the sediment on the tubes was 0.607 and 0.737 in the superheaters. The proportion of sulfate of lime which was present was constantly increasing. The problem which had to be solved was therefore as follows: first, to convert the impurities in the water in such a manner that a medium temperature of 110° to 120°, for example, is sufficient for precipitating the salts; second, to retain the sediments in suitable baffle-boxes of comparatively large size, which, by their change of cross-sections, collect the sediments. This result is obtained by subjecting the feed-water in suitable vessels to the action of a scale-preventer, the special composition of which is changed according to the nature of the water. When, for example, two waters of different composition are used, one of good quality, the other hardly useful for the purpose, such as, for instance, water containing

Carbonate of lime.....	0.1158
Sulfate of lime.....	0.0315
Magnesium carbonate	0.0088
Together	0.1561

and another water containing

Carbonate of lime.....	0.183
Sulfate of lime.....	0.196
Magnesium carbonate	0.111
Together	0.490

and supposing that the boiler burns fifteen

hundred kilograms of coal per day, which corresponds to a consumption of about ten thousand liters of water per day, then a scale-preventer consisting of sodium sulfate, three hundred and fifty kilograms; sodium carbonate, five hundred kilograms; potassium carbonate, one hundred and fifty kilograms, would have to be used for water corresponding to the first quality. As the water required for two months would be equal to five hundred cubic meters it requires about fifty grams of the scale-preventer for every cubic meter. In other words, it takes about twenty-five kilograms of the scale-preventer for preventing the formation of seventy-eight kilograms of scale.

For water of the second quality a scale-preventing composition would have to be employed which contains sodium sulfate, fifty kilograms; sodium carbonate, eight hundred and thirty-five kilograms; potassium carbonate, one hundred and fifteen kilograms.

For the water-supply for two months it would require $500 \times 0.2040 = 120$ kilograms of scale-preventer, which would prevent the formation of two hundred and forty-five kilograms of scale.

The water thus treated is supplied to the boiler from the feed-tanks by an injector or pump and is caused to traverse the coil A until it arrives at the lower part of the same. The coil A is provided at certain points of its length with baffle-boxes B, which are intended to retard the velocity of the water and to facilitate the deposit and retain the sediments. During the movement of the water through the coil the heaviest impurities are deposited and collected in the baffle-boxes B, in which the precipitation of the sediments is produced. The water is finally delivered through the gooseneck end C of the pipe into the boiler and is emitted at about the same temperature as the water which is already in the same. The water being thus supplied to the boiler, the interior of the same is placed in communication with the atmosphere by the three-way cock D. (Shown in Figs. 1 and 3.) The back pressure of the steam closes the valves S′ as soon as the pipe is open to the air, opens the valves S, clears the bottom of the baffle-boxes B, and throws sediments in the latter, with some of the water, into the barrel T. The sediments which have been collected in the coil and baffle-boxes under the influence of the heat are quickly precipitated at the bottom of the barrel. The boiling water thus collected in the barrel is quite pure. This is then drawn off into the tank E through the pipe *t* for utilizing the heat and the ejected and purified water, which would otherwise be lost. To the tank E a bucketful of the scale-preventer contained in the barrel T′ is transferred, after which the stop-cock R is opened. The feed-water can then assume its proper level in the tank E. As soon as the feed-water rises to the proper level the stop-cock R is closed, and when the barrel T is empty the stop-cock *t* is closed. The tank containing the feed-water is connected with the tank E by the pipe *e*. In larger boilers having a manhole of the ordinary size a baffle-box of the construction shown in Figs. 8 and 9 is used in place of the box shown in Fig. 5. The box is made in two parts, which are introduced into the boiler. The connection of the parts is made after they are placed in position, the openings through which the water passes being arranged before the parts are assembled. In smaller boilers the baffle-box shown in Figs. 10 and 11 can be used. It is made in cylindrical form, its diameter being less than the small axis of the manhole, so that it can be readily introduced through the manhole into the boiler.

For larger sizes of coils the required number of segments is provided, they being connected at their ends by suitable elbows. In certain cases I desire to reserve the right for obtaining the same result. The segments are made oval in cross-section, so as to correspond to the shape of the manhole. The different baffle-boxes are preferably made entirely of sheet-iron, and the seats *a* of the valves *b* instead of being made of bronze are formed of iron tubes, of which one side is cut away, while the opposite side is suitably beveled.

It is obvious that the various constructions described are merely given for purposes of explanation and can be readily changed in shape and adapted for the boilers with which they are to be used.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

In a feed-water purifier, a baffle-box provided with a baffle-plate or partition provided with openings arranged one above the other, the edges of said openings forming valve-seats and hinged valves opening respectively in opposite directions and arranged at opposite sides of said baffle-plate for controlling the openings, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

AUGUSTE AUGUSTIN MONTAZEAU.

Witnesses:

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EDOUARD BARBARY.