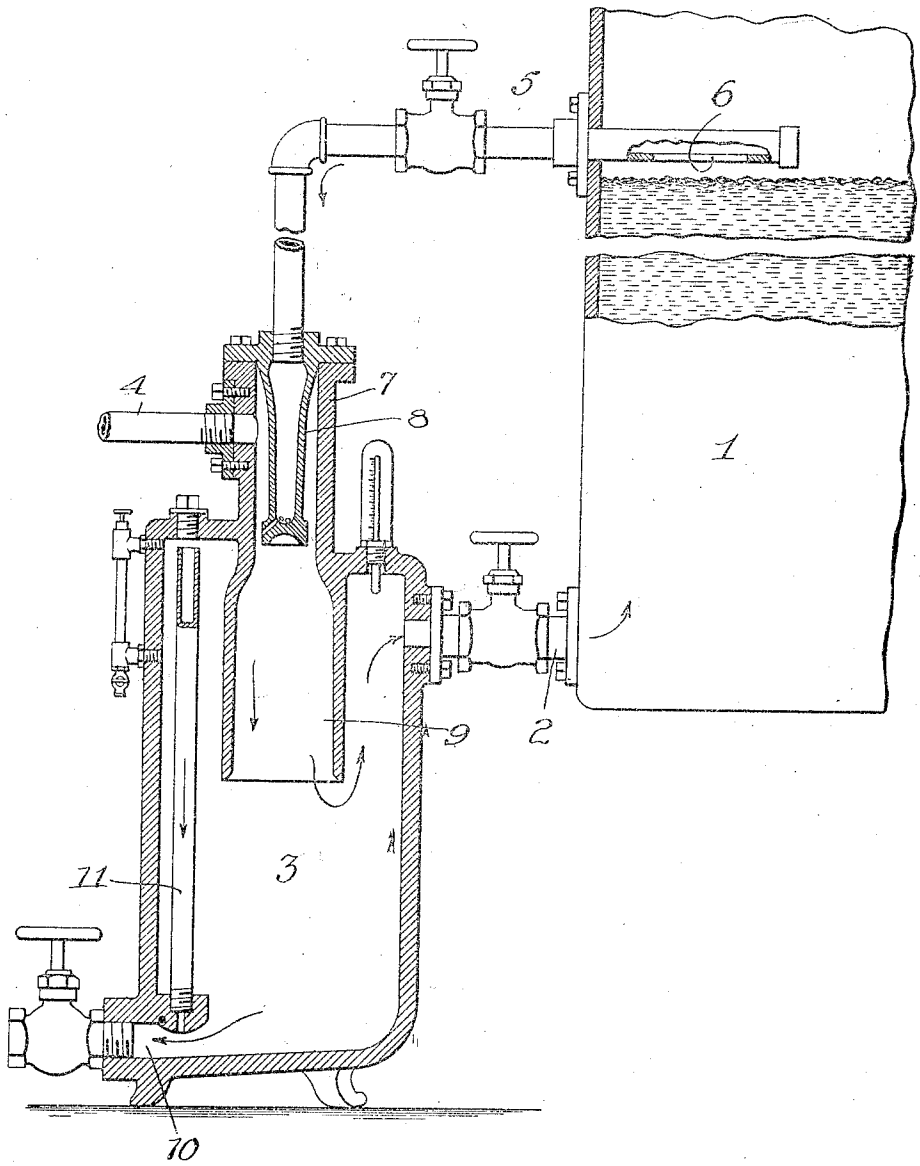
C. E. SARGENT.

BOILER FEED WATER PURIFIER.

APPLICATION FILED AUG. 9, 1919.

1,400,993. Patented Dec. 20, 1921.



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UNITED STATES PATENT OFFICE.

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BOILER FEED-WATER PURIFIER.

1,400,993. Specification of Letters Patent. Patented Dec. 20, 1921.

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To all whom it may concern:

Be it known that I, CHARLES E. SARGENT, a citizen of the United States, residing at 220 N. Delaware street, Indianapolis, in the county of Marion and State of Indiana, have invented a new and useful Improvement in Boiler Feed-Water Purifiers, of which the following is a specification.

My invention relates to certain new and useful improvements in boiler feed water purifiers and is fully described and explained in the specification and shown in the accompanying drawing which is a vertical section through my improved device.

Referring to the drawings, 1 is a boiler which is fed through a pipe 2 connected with a body 3 of the purifier. 4 is a pipe by which feed water is admitted from a suitable pump. 5 is a pipe entering the boiler at a point above the normal low-water in the boiler and having a slot 6 on its lower portion through which hot water from the boiler can pass out and into the purifier. At intervals when the level of the water in the boiler is low such scum as may occur on the top of the boiler water will also pass out through this slot into the purifier.

On the upper part of the body of the purifier there is a short cylindrical extension in the center of which is an injector nozzle having connection with the pipe 5. The extension 7 communicates with a downwardly opening bell or skirt 9 within the body of the purifier, and terminating well above the lower part thereof. 10 is a mud blow-off opening from the body of the purifier, the same having a slightly restricted entrance, and 11 is a scum blow-off pipe connected with the mud blow-off pipe at the point of its restriction, and terminating near the upper end of the body of the purifier.

In the normal operation of the present device, assuming that no water is being fed in by the pump, and that the mud blow-off is closed, there is a slow thermo-siphon circulation from the boiler through the pipe 5, the bell or skirt 7, the large lower part or body of the purifier back to the boiler through the pipe 2. The purifier being relatively cooler than the boiler there is no opportunity for any impurities to bake on to the surfaces of the purifier, and an opportunity is afforded in the quiescent body of the purifier for the heavy impurities like mud to settle to the bottom, and for the lighter impurities like scum, to accumulate in the top while the purified water passes out from the center. The provision of the enlarged bell or skirt 9 greatly reduces the velocity of the water entering the purifier so that the body of water within the purifier is very quiescent, and there is the greatest opportunity afforded for separation.

When water is being fed in through the pipe 4 the operation is in general as that described excepting that the entering water is first heated by being brought in immediate contact with the outside of the nozzle 8 beside which it moves until thoroughly heated up, and thereupon it is mixed in the mouth of the skirt or bell 9 with the incoming hot water from the boiler; the two move together down the skirt where their velocity drops very greatly. By this arrangement the incoming feed water from the pipe 4 is thoroughly heated and thus discharged of soluble matter which can be precipitated by heat, which precipitated matter is kept within the purifier as already stated and does not pass on into the boiler.

From time to time in the operation of the device it will be desirable to blow off the mud which had accumulated in the bottom, and this can be done by opening the valve controlling the mud blow-off opening 10. The rush of material within this opening sets up a suction in the scum blow-off pipe so that simultaneously with the removal of the mud from the bottom the liquid from the extreme upper part of the device, including the scum which is there held, is removed. In this manner it is possible to remove the heavy mud from the bottom and the light scum from the top while still preserving a quiescent and clear intermediate portion.

I realize that considerable variation is possible in the details of the construction herein shown, and I do not intend to limit myself thereto, except as pointed out in the following claims, in which it is my intention to claim all the novelty inherent in the device as broadly as is permitted by the state of the art.

What I claim as new and desire to secure by Letters Patent is:

1. A feed water heater and purifier for boilers comprising a hollow body having at its lower end a blow-off opening, means for connection with the lower part of a boiler, a downwardly opening vertical nozzle and means for connecting same with the upper

part of a boiler, an annular feed water heating chamber surrounding the nozzle and means to supply feed water thereto above the discharge end of the nozzle, and around the body thereof and an enlarged relatively short bell in the body in which the feed water and water from the nozzle mix and through which they move at low velocity, whereby to reduce the disturbance caused by the entering of such body of water to that within the purifier to the minimum.

2. A feed water heater and purifier for boilers comprising a hollow body having at its lower end a blow-off opening and means for connection with the lower part of a boiler, a downwardly opening vertical nozzle receiving water from the upper part of a boiler and from a point above the low water level therein, an annular feed water heating chamber surrounding the nozzle and means to supply feed water thereto above the discharge end of the nozzle and around the body thereof and an enlarged relatively short bell in the body in which the feed water and water from the nozzle mix and through which they move at low velocity, whereby to reduce the disturbance caused by the entering of such body of water to that within the purifier to the minimum.

3. A feed water heater and purifier comprising a hollow body having at its lower end a blow-off opening and having means below its upper end for communicating with the lower part of a boiler, a downwardly opening vertical nozzle communicating with the upper part of a boiler, an annular feed water heating chamber surrounding the nozzle and means to supply feed water thereto above the discharge end of the nozzle, and an enlarged relatively short bell in the body in which the feed water and water from the nozzle mix and through which they move at low velocity, and means to remove floating impurities from the upper end of the body.

4. A fed water heater and purifier comprising a hollow body having at its lower end a blow-off opening and means for connecting its upper end with the lower part of a boiler, a downwardly opening vertical nozzle receiving water from the upper part of a boiler, an annular feed water heating chamber surrounding the nozzle and means to supply feed water thereto above the discharge end of the nozzle, an enlarged relatively short bell in the body in which the feed water and the water from the nozzle mix and through which they move at low velocity, a restriction in the blow-off opening and a scum blow-off rising therefrom to the upper end of the body.

5. A feed water heater and purifier comprising a hollow body having at its lower end a blow-off opening and having also a means below its upper end for connection with the lower part of a boiler, a downwardly opening vertical nozzle communicating with the upper part of a boiler to receive water therefrom, the communication being above the low water level in the boiler, an annular feed water heating chamber surrounding the nozzle and means to supply feed water thereto above the discharge end of the nozzle, an enlarged relatively short bell in the body in which the feed water and the water from the nozzle mix and through which they move at low velocity, a restriction in the blow-off opening, and a scum blow-off arising therefrom to the upper end of the body.

CHARLES E. SARGENT.