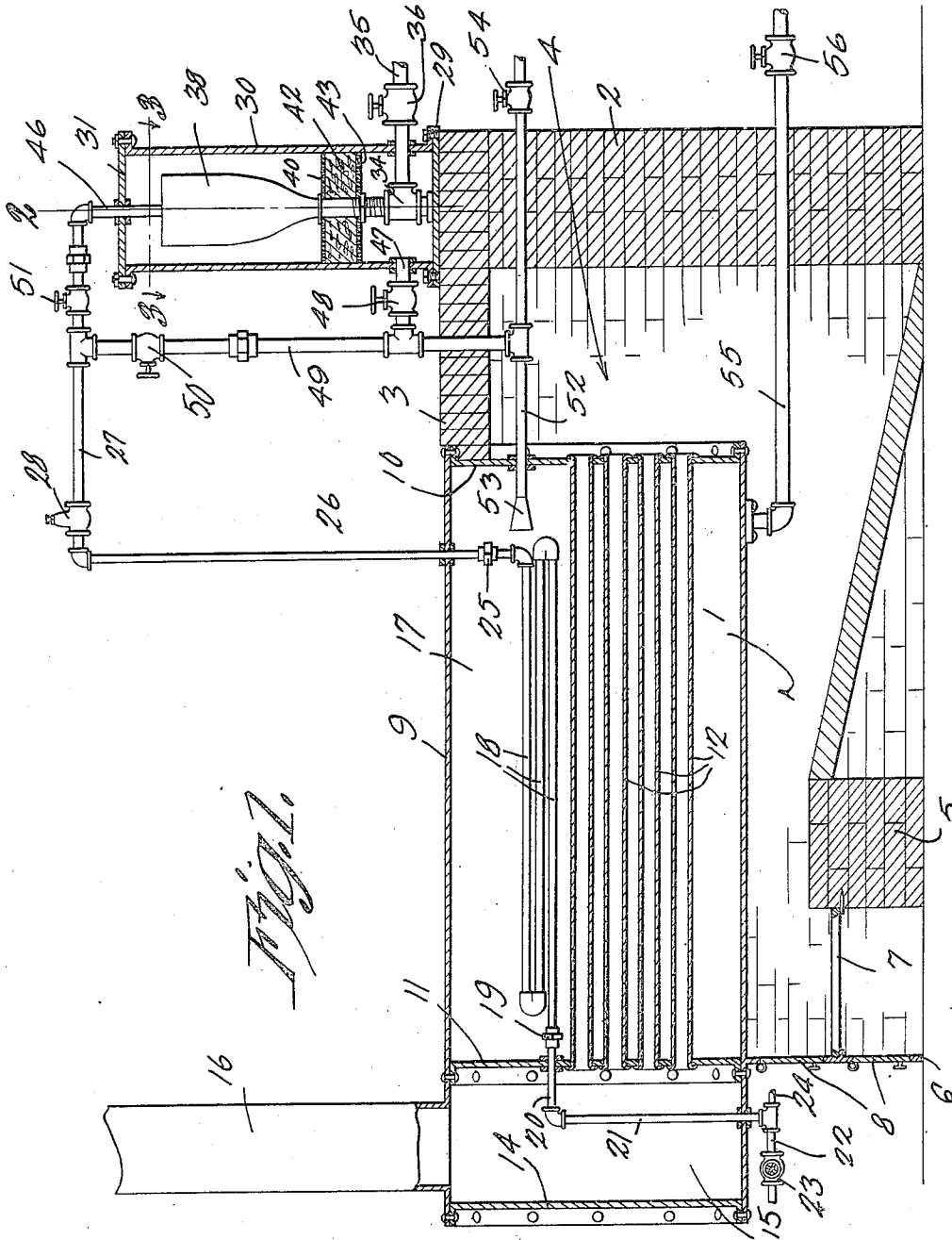


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WATER HEATER AND PURIFIER.  
APPLICATION FILED APR. 30, 1917.

1,254,058.

Patented Jan. 22, 1918.

2 SHEETS—SHEET 1.



Witnesses

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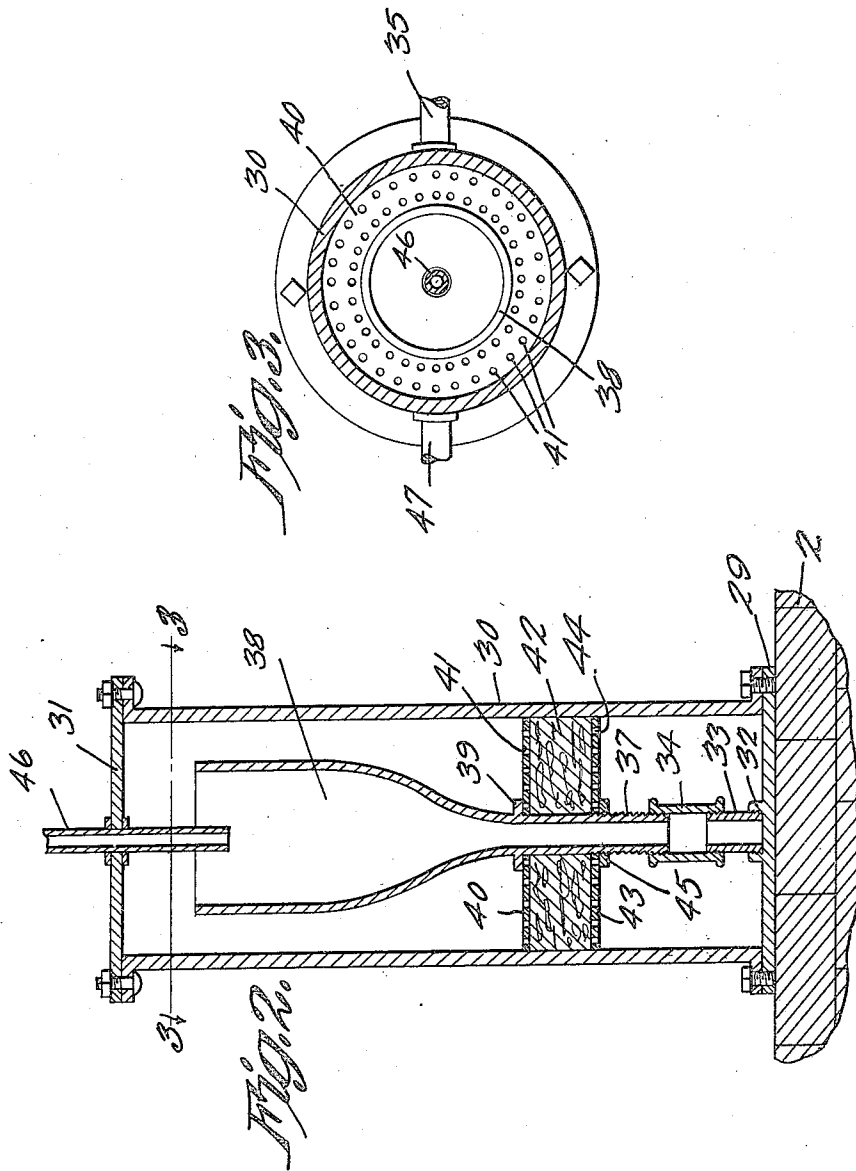
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# UNITED STATES PATENT OFFICE.

WILLIAM H. MORGAN, OF MARSEILLES, ILLINOIS.

## WATER HEATER AND PURIFIER.

1,254,058.

Specification of Letters Patent.

Patented Jan. 22, 1918.

Application filed April 30, 1917. Serial No. 165,525.

*To all whom it may concern:*

Be it known that I, WILLIAM H. MORGAN, a citizen of the United States, residing at Marseilles, in the county of La Salle and State of Illinois, have invented a new and useful Water Heater and Purifier, of which the following is a specification.

It is one object of the invention to provide a novel means whereby feed water may be heated before it is delivered to a boiler, the construction being such that it will be impossible to feed the water to the boiler before the temperature of the water is raised.

Another object of the invention is to provide novel means whereby the water may be filtered before it is delivered to the boiler, after having been heated.

A further object of the invention is to provide, in combination with means for heating and purifying the feed water, novel means whereby the flow of the water may be controlled, and whereby the necessary blow-off may be supplied.

It is within the province of the disclosure to improve generally and to enhance the utility of devices of that type to which the present invention appertains.

With the above and other objects in view which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed, without departing from the spirit of the invention.

In the accompanying drawing:—

Figure 1 shows in vertical section, a boiler and its support, the boiler being equipped with the feed water heating mechanism forming the subject matter of this application, parts appearing in elevation;

Fig. 2 is a section on the line 2—2 of Fig. 1; and

Fig. 3 is a section taken approximately on the line 3—3 of Fig. 2.

In the accompanying drawings, the numeral 1 indicates a boiler support including a rear wall 2 and a crown 3 defining a chamber 4. A fire wall appears at 5, and the numeral 6 denotes a front plate, the parts 5 and 6 supporting a grate 7, the front plate 6 having the usual doors 8.

Mounted on the support 1 is a boiler in-

cluding a shell 9, a rear flue sheet 10 and a forward flue sheet 11, the flue sheets 10 and 11 carrying flues 12. The numeral 14 denotes the head of the boiler, the head 14 coöperating with the forward flue sheet 11 to define a smoke box 15 communicating with a stack 16. The water space of the boiler is shown at 17. The construction above described embodies an ordinary boiler structure, and no novelty is claimed therefor, saving in so far as it may coöperate with elements hereinafter described. The device forming the subject matter of this application is adapted to be connected with boilers of different kinds, but the foregoing description will enable those skilled in the art to understand how the present invention is used.

A water heating conduit passes upwardly into the smoke box 15, longitudinally of the water space 17, and upwardly through the top portion of the shell 9 of the boiler. This conduit includes a plurality of connected lengths of pipe, shown at 18, and located in the water space 17 above the flues 12. By means of a coupling 19, one of the lengths 18 of pipe is united with a horizontal pipe 20, passing through the forward flue sheet 11. The pipe 20 embodies a vertical extension 21 passing downwardly into the smoke box 15 and outwardly through the bottom of the smoke box. The extension 21 includes a blow-off nozzle 22 located below the smoke box 15 and provided with a hand valve 23. The numeral 24 indicates a source of water supply which communicates with the pipe or extension 21. By means of a coupling 25, another of the lengths 18 of the pipe is united with the vertical pipe 26 passing upwardly through the top of the boiler shell 9. The pipe 26 has a horizontal extension 27 in which is located a safety valve 28.

Mounted on the rear wall 2 is a base plate 29, to which is connected the lower end of a tubular casing 30 surmounted by a removable lid 31. The base plate 29 has a socket 32 into which is threaded a stub pipe 33 supporting a T-coupling 34 with which is connected a blow-off pipe 35, passing horizontally through the casing 30, and supplied, exteriorly of the casing, with a hand valve 36. The numeral 37 denotes the reduced stem of a settling tank 38 which, roughly speaking, is of funnel shape. The stem 37 preferably is threaded into the upper end of the coupling 34. The stem 37 has an abutment 39 engaged by a plate 40 having perforations

41. Disposed below the plate 40 is a filter 42 which may be variously constructed. The filter 42 may consist of a mass of sponge if desired. The filter 42 is supported on a plate 43 having perforations 44, the plate 43 being supported by a nut 45 threaded onto the stem 37. It is to be understood that the specific means for mounting the filter 42 in place and for supporting the settling tank 38 may be altered, within the scope of the invention. The plates 40 and 43 fill the casing 30 transversely.

The horizontal extension 27 of the pipe 26 has a depending end 46 passing through the lid 31 of the casing 30 and extended downwardly into the open top of the funnel-shaped settling tank 38, so as to discharge therein. A horizontal pipe 47 opens into the casing 30 below the filter plate 43 and is provided with a hand valve 48. The pipe 47 communicates with a vertical pipe 49 carrying a valve 50 under the control of an operator, the upper end of the pipe 49 being connected to the pipe 27. Interposed in the pipe 27 between the pipe 49 and the depending end 46 of the pipe 27 is a hand valve 51. The numeral 52 denotes a horizontal pipe with which the vertical pipe 49 communicates. One end of the horizontal pipe 52 passes rearwardly through the wall 2 and is provided, exteriorly of the wall 2, with a hand valve 54. The other end of the pipe 52 passes through the rear flue sheet 10 and terminates in a discharge head 53 located in the water space 17 of the boiler. The pipe 47, the lower end of the pipe 49 and the left hand end (Fig. 1) of the pipe 52 form a discharge conduit leading from the casing 30 to the water space 17 of the boiler. A blow-off pipe 55 leads from the boiler shell 9 and passes rearwardly through the wall 2, the pipe 55 being supplied with a hand valve 56.

Let it be supposed that the valves 56, 54, 36, 50 and 23 are closed, and that the valves 51 and 48 are open. Then water enters the pipe 21 by way of the water supply 24 and traverses the pipes 20, 18, 26, 27 and 46. The water, as it moves forwardly and rearwardly through the pipes 18 is heated and is delivered in a heated condition through the pipe 46 into the settling tank 38. The heavier portions of the impurities of the water move to the bottom of the settling tank 38, and the water flows over the upper edge of the settling tank 38 and passes downwardly within the casing 30, the water passing through the perforations 41 of the plate 40, through the filter 42, through the perforations 44 of the plate 43 and then into the bottom of the casing 30. The water then flows through the pipe 47, through the lower end of the pipe 49, through the left hand end (Fig. 1) of the pipe 52, and is discharged through the head 53, into the water

space 17 of the boiler, in a heated and thoroughly purified condition, the function of the filter 42 being to remove the lighter impurities, which have not gravitated to the bottom of the settling tank 38.

Should the water be superheated in the pipes 18, or should undue pressure be created from any other cause in the water supply conduit, this pressure will be relieved by the safety valve 28. The boiler may be blown off in the usual way through the pipe 55 when the valve 56 is opened. The flow of water to the settling tank 38 may be controlled by manipulating the valve 51. If the valves 54, 48 and 51 are closed, the valves 50 and 23 being open, then steam will traverse the pipe 52, the pipe 49, the left hand end of the pipe 27 (Fig. 1) the pipe 26, the pipes 18, the pipe 19, the pipe 21, and the nozzle 22, to blow out the water supply conduit, from the front of the boiler. If it is desired to clean or repair the casing 30 and filter-parts carried thereby, then the valves 51 and 48 may be closed, cutting out the filter mechanism, the valve 50 being open. Under such conditions, the water moving upwardly through the pipes 26 and 27, having been heated, will pass downwardly through the lower end of the pipe 49 and through the left hand end of the pipe 52, the water thus entering the boiler without having been filtered. If the valve 48 is closed, the valves 29, 50 and 51 being open, then the filtering mechanism can be blown off through the pipe 35. By opening the valve 54, the pipe 52 can be blown off throughout its length.

After the feed water has been heated, the scale-forming material is caught for the most part in the settling tank 38, and if any of the scale-forming material is not retained in the tank 38, such material is extracted when the water passes through the filter 42. As a consequence, the water enters the boiler free from scale-forming material, mud and the like, thereby avoiding foaming, bagging of the sheets, leaky tubes and the like.

Having thus described the invention, what is claimed is:—

1. In a device of the class described, a boiler; a casing; a settling tank in the casing and having an outlet; a valve controlling the outlet; a filter in the casing, the settling tank overflowing onto the filter; a discharge conduit leading from the casing below the filter, to the boiler; and a water heating conduit passing through the boiler, one end of the water heating conduit entering the casing and discharging into the settling tank.

2. In a device of the class described, a boiler; a filtering mechanism; a water heating conduit passing through the boiler and discharging into the filtering mechanism; a discharge conduit leading from the filtering

mechanism to the boiler; a bypass pipe connecting the conduits; a valve in the bypass pipe between the conduits; a valve in the discharge conduit between the filtering mechanism and the bypass pipe; and a valve in the water heating conduit between the bypass pipe and the filtering mechanism.

3. In a device of the class described, a boiler; a filtering mechanism; a water heating conduit passing through the boiler and discharging into the filtering mechanism; a discharge conduit leading from the filtering mechanism to the boiler and including a blow-off; a valve controlling the blow-off; a bypass pipe connecting the conduits; a valve in the bypass pipe between the conduits; a valve in the discharge conduit between the filtering mechanism and the bypass pipe; and a valve in the water-heating conduit between the bypass pipe and the filtering mechanism.

4. In a device of the class described, a boiler; a casing; a settling tank in the cas-

ing and having an outlet; a valve controlling the outlet; a filter in the casing, the settling tank overflowing onto the filter; a discharge conduit leading from the casing below the filter, to the boiler; a water-heating conduit passing through the boiler, one end of the water-heating conduit discharging into the settling tank; a bypass pipe connecting the discharge conduit with the water heating conduit; a valve in the bypass pipe, between the conduits; a valve in the water heating conduit between the bypass pipe and the casing; and a valve in the discharge conduit, between the casing and the bypass pipe.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

WILLIAM H. MORGAN.

Witnesses:

WALTER GREEN,  
CHARLES HULSEN.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."