

998,741.

2 SHEETS--SHEET 1.



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 FEED WATER PURIFIER, HEATER, AND CIRCULATOR.  
 APPLICATION FILED APR. 14, 1911.

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2 SHEETS—SHEET 2.

Fig. 3.

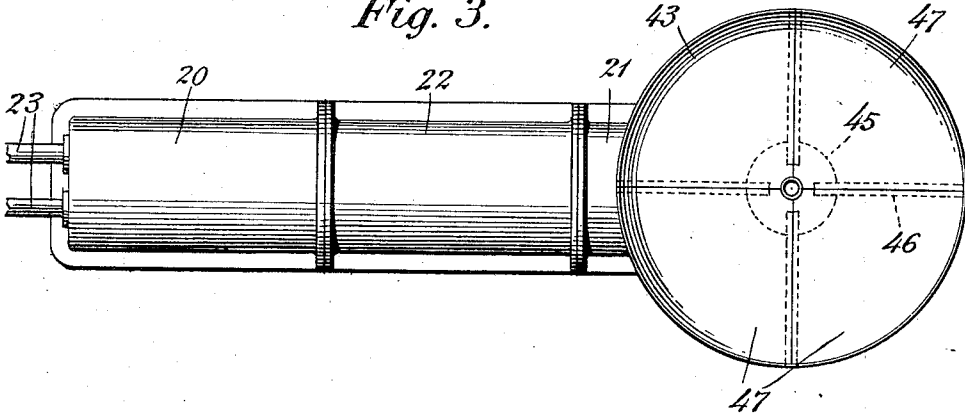


Fig. 4.

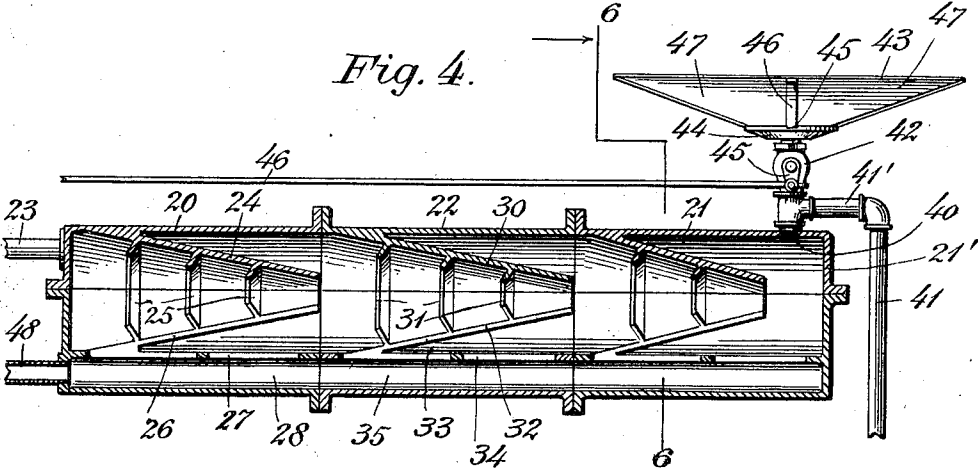


Fig. 5.

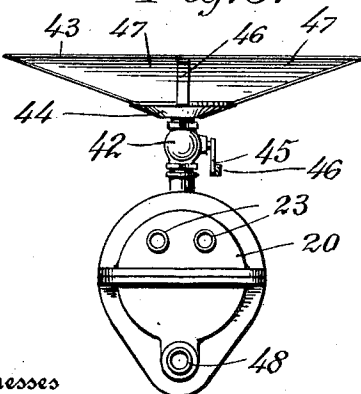
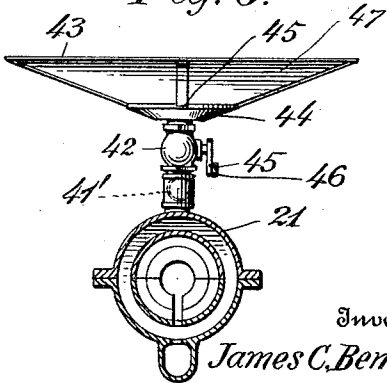


Fig. 6.



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# UNITED STATES PATENT OFFICE.

JAMES C. BENNETT, OF DETROIT, MICHIGAN.

FEED-WATER PURIFIER, HEATER, AND CIRCULATOR.

998,741.

Specification of Letters Patent.

Patented July 25, 1911.

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*To all whom it may concern:*

Be it known that I, JAMES C. BENNETT, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Feed-Water Purifiers, Heaters, and Circulators, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to feed-water purifiers for boilers, and it has for one of its objects the provision of an improved device of this character which comprises a series of sections of substantially similar construction and adapted to be individually replaced without the necessity of disassembling the entire device.

The invention has furthermore for its object the provision of what may be termed an "expansible" device which may be adapted to any length of boiler by adding the required number of "intermediate" sections to the end-sections, all of these sections being of such size that they may be readily passed through the man-hole of the boiler.

A further object of the invention resides in the particular construction of the sediment or impurity-collectors which are provided with peculiarly disposed baffles whereby the incoming feed water is successively brought into contact to deflect all foreign matter and precipitate the same into a trough at the bottom which may be readily blown out when desired.

The invention has also for its object the provision of a purifier which is adapted to act as a circulation-producer and a temperature-equalizer for the water in the boiler, as will hereinafter appear and be particularly defined in the claims.

The invention has been clearly illustrated in the accompanying drawings, in which similar characters denote similar parts, and in which—

Figure 1 shows a longitudinal section of a boiler of the "Scotch" or return-flue type equipped with my improved apparatus; Fig. 2 is a cross section thereof, on line 2, 2 of Fig. 1. Fig. 3 represents a top view of my improved apparatus, *per se*; Fig. 4 shows a central vertical section thereof; Fig. 5 is an end view of the same, and Fig. 6 illustrates a section on line 6, 6 of Fig. 4.

Referring to the drawings, 10 denotes the

cylindrical shell of the boiler which has end-heads 11, 12 and comprises a pair of combustion chambers 13, 14, provided with fire chambers 15, 16, and also with flues 17 which open at their front ends into the breech 18 of the boiler.

Disposed within the steam space of the boiler, substantially as illustrated in Figs. 1 and 2, is my improved purifier and circulator which comprises an inlet section 20, an outlet section 21, and one or more intermediate sections 22, all bolted together, end-to-end, and in communication with each other, interiorly.

Feed water is supplied from any convenient source through pipes 23 opening into the head-end of the inlet-section 20 which consists of a cylindrical shell provided with a cone-shaped baffle-member 24 through which the feed water passes, and in which it comes into contact with a series of spaced baffles 25 whereby the coarser mud or impurities are arrested and deflected through a slot 26 in the cone-member 24, and a slot 27 in the bottom of the shell into a sediment-trough 28. The adjacent "intermediate" section 22 is provided with a baffle-member 30 having baffles 31 and having in its bottom a slot 32 through which mud may pass into the surrounding chamber 33 and thence settle through a slot 34 into a trough 35 which forms a continuation of the trough 28 of the end section 20, both sections being provided with flanges secured together in any convenient manner.

According to the length of the boiler, any desired number of intermediate sections may be attached together in end-to-end relation, the last intermediate section being joined to what may be termed the "discharge" section 21, the end-wall 21' of which is closed, and which has an outlet opening 40 at its upper end.

All the sections are preferably made comparatively short, so that they may be readily passed through the man-hole of the boiler-shell, and be assembled within the latter. Furthermore, it will be understood, that by virtue of their interchangeability any of the sections may be readily replaced by others without necessitating the withdrawal or loss of the entire device, so that consequently, a great saving in the repair expense will result.

The feed water, as it passes out of the

purifier in clean condition, will be directed through a pipe 41 to the bottom of the boiler, and above the horizontal branch 41' is disposed a valve 42 which is interposed  
 5 between the discharge pipe 41 and a scum-pan 43, the latter comprising a disk 44 having recesses 45 for the reception of the inner ends of radially extending rods 46 to which the scum-pan proper is secured, this  
 10 pan consisting of a series of separable and interchangeable sections 47, the upper rims of which are submerged in the boiler-water substantially on level with the water-line thereof so that when the valve 42 is opened  
 15 all scum and other floating material may be blown off retrogradely through the end-section 21 and the sediment troughs of the several adjacent sections, and thence out through a blow-off pipe 48 which may be  
 20 provided with any suitable valve 49.

Particular attention is invited to the valve 42 above described, at least as far as its relation to the other parts of the device is concerned, because by its use I am enabled  
 25 to obtain several results which are not generally found in devices of this character, to-wit: It being borne in mind that this valve 42 cannot at any time, interfere with the free entrance of feed-water into the boiler  
 30 through the pipe 41, it will be noted that if the valve 42 is partially open during the feeding-in period, a portion of the feed-water will enter the boiler through the scum pan and therefore reach the hottest  
 35 part of the boiler-water direct. On the other hand, the closure of the valve will direct all of the entering feed-water into the bottom of the boiler. When it is desired to blow-off the impurities, and the valve 42 is maintained  
 40 closed, any sediment in the bottom of the boiler will be ejected upward through the feed-discharge pipe 41, back through the purifier section 21 and thence through the trough and blow-off pipe 48. Again, if the  
 45 blow-off valve 49 is open, and no feed-water enters the boiler, and the valve 42 is opened the scum pan will be immediately blown off, so that as far as just mentioned, both the top of the water and the sediment  
 50 in the bottom of the boiler as well as that in the troughs, may be blown out as desired.

Now, when no feeding action takes place, and the blow off valve 49 is closed, the feed discharge pipe 41 may be converted into a  
 55 circulation-producing pipe by merely opening the valve 42, thereby establishing unobstructed passage through the pipe 41, valve 42, and scum pan 43, from the bottom of the boiler then between the fire chamber  
 60 15, 16, and the two sets of flues where the feed pipe 41 will be exposed almost directly to the heat of the fire transmitted through the metal of the flues, and the water in this pipe will therefore be converted into steam  
 65 which, when rising and passing out at the

top will cause water to flow into the lower end of the pipe from the bottom part of the boiler. This action naturally produces a circulation which tends to equalize the temperature of the boiler water, and thus  
 70 equalizes the expansion-strains in the entire apparatus.

In brief, the present device possesses a number of advantages as to economy in construction, expansibility to conform to various sizes and types of boilers, interchangeability of parts, and multiplicity of functions without any additional or special appliances therefor, excepting the valve 42, the plug of which has an arm 45 operable  
 80 by a rod 46 extending forward and packed in the front end of the boiler.

Many changes may be made in the particular construction and organization of some of the elements of my improved device  
 85 without departing from the spirit of the invention, especially in the assemblage of the several sections of the purifier casing, the number of such sections depending entirely upon the length and capacity of the boiler.  
 90

I claim:

1. A feed-water purifier comprising a pair of abutting sections, each having in its bottom a trough, a water supply connected with one section, a discharge pipe connected  
 95 with the other section, a baffle-member in each section and having an aperture in its bottom opening into said trough, a blow-off pipe connected with said trough, and a valve in said blow-off pipe.  
 100

2. A feed-water purifier comprising a series of separable abutting sections, a water-supply entering the first section, a discharge pipe connected with the last section, a bottom trough connecting all of said sections, a  
 105 blow-off pipe connected with said trough, and a valve in the blow-off pipe.

3. The combination with a purifier-casing, a water supply entering one end thereof, a discharge pipe at the other end thereof, and  
 110 a scum-pan connected with said discharge pipe, of a valve between the scum-pan and said discharge pipe.

4. In a device of the character described, the combination with a casing comprising a  
 115 conical baffle-member, a water supply connected with the larger end thereof, a discharge pipe connected with the smaller end thereof, a trough in the bottom of said casing and opening upward thereto, and a blow-off  
 120 pipe connected with said trough.

5. A feed-water purifier comprising a horizontal closed cylindrical casing, baffles therein, a pan open at its top and disposed above said casing, a pipe connecting said pan  
 125 and one end of said casing, a water-supply at the other end of the casing, a blow-off pipe connected with the bottom of said casing, and a valve in said connecting pipe.

6. A feed-water purifier comprising a  
 130

horizontal closed cylindrical casing, baffles  
therein, a water supply at one end of the  
casing, a discharge pipe at its other end and  
terminating in the bottom of the boiler, a  
5 blow-off pipe connected with the bottom of  
said casing, and a valve for opening the up-  
per end of said discharge pipe.

In testimony whereof I affix my signature  
in presence of two witnesses.

JAMES C. BENNETT.

Witnesses:

OTTO F. BARTHEL,  
LEWIS E. FLANDERS.

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

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