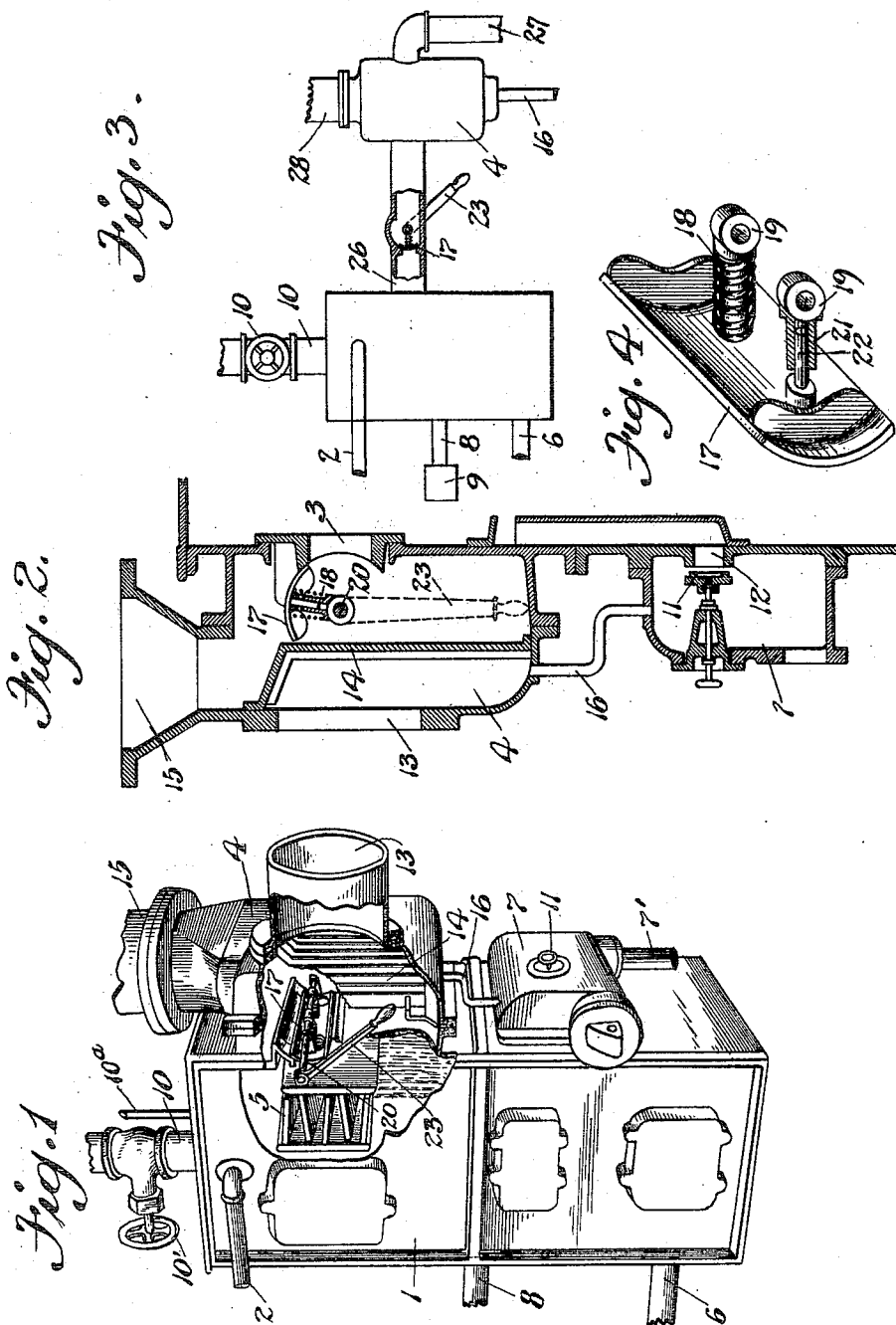


A. B. WALLEM.
 FEED WATER HEATER AND SEPARATOR.
 APPLICATION FILED JAN. 18, 1910.

979,612.

Patented Dec. 27, 1910.



Witnesses:
John L. ...
W. R. Hammond

Abner B. ... Inventor
 By *Attorney* *...*

UNITED STATES PATENT OFFICE.

AXEL BLYTT WALLEM, OF MOORES, PENNSYLVANIA, ASSIGNOR TO JOSEPH S. LOVERING WHARTON, WILLIAM S. HALLOWELL, AND JOHN C. JONES, DOING BUSINESS UNDER THE FIRM-NAME OF HARRISON SAFETY BOILER WORKS, OF PHILADELPHIA, PENNSYLVANIA.

FEED-WATER HEATER AND SEPARATOR.

979,612.

Specification of Letters Patent. Patented Dec. 27, 1910.

Application filed January 18, 1910. Serial No. 538,770.

To all whom it may concern:

Be it known that I, AXEL BLYTT WALLEM, a citizen of the United States, and resident of and whose post-office address is Moores, Pennsylvania, have invented certain new and useful Improvements in Feed-Water Heaters and Separators, of which the following, taken in connection with the accompanying drawings, is a full and clear description thereof.

My present invention relates particularly to a certain valve construction in combination with a feed water heater constituting an improvement in a measure upon the invention described and claimed in United States Letters Patent No. 926,108, granted to Joseph Willard Gamble, June 29th, 1909.

Among the advantages of my present invention is to provide in an open feed water heater a particular form of valve control in the steam inlet thereto, the valve being resiliently held to its seat in order to permit of its opening by steam pressure to relieve an excess thereof when it rises above the normal, and thus eliminate the possibility of the heater bursting which otherwise might occur by reason of steam entering through the returns inlet to the heater in the event of the steam trap connected therewith becoming leaky or otherwise failing to perform its duty, or through other means. To the accomplishment of this, as well as other objects, I have illustrated in the accompanying drawings and described in the following specification, several preferred combinations in which my invention is involved, that I may employ to carry the same into practice. I would have it understood, however, that I am not limited in respect to the manner in which I accomplish my objects by the particular shape, proportion or arrangement of the parts throughout, since other and equivalent means may be employed without departing from the scope and tenor of my claims.

Referring to the annexed drawings in which like reference numerals indicate like parts throughout the respective views, I will proceed to describe the construction of my invention and the manner in which the same operates to perform the desired function.

Figure 1 illustrates in perspective a combined feed water heater and separator, partly broken away showing the valve con-

struction controlling the passage between the same. Fig. 2 is a sectional detailed view illustrating the valve in open position. Fig. 3 is a view illustrating the heater diagrammatically and the separator separate therefrom, and the valve mechanism in the pipe line connecting the two. Fig. 4 is an enlarged perspective view of portions of the valve mechanism.

Referring in detail to Figs. 1 and 2 I will proceed to describe my invention as embodied in a combined feed water heater and separator in which the heater and separator are integral, although not necessarily homogenous. —1— indicates a feed water heater of a well known open type provided with the usual raw water inlet —2— through which is admitted the raw water supply. —3— (Fig. 2) indicates the exhaust steam opening from a separator —4— through which the exhaust steam is admitted to the heater where it comes in contact with the usual trays —5— which are staggered as shown to provide a thorough breaking up and disintegration of the water into particles to more thoroughly and effectively heat and purify the same by abstraction and utilization of the thermal units of the admitted exhaust steam. —6— (Fig. 1), indicates a water outlet from the heater to feed pumps (not shown) or to other desired point of use, while —7— indicates the usual overflow or trap through which the overflow or surplus water passes to waste. —7'— indicates the outlet to the overflow chamber or trap. —8— indicates a condensation returns connection from the steam trap. —9— (Fig. 3) indicates the steam trap, of ordinary and well known construction. —10— indicates a steam stack having a valve —10'— therein. The heater is provided with a hand operated valve —11— in the overflow or trap controlling the outlet passage —12— (Fig. 2) therefrom. —10^a— indicates a vent pipe.

The separator —4— is provided with an exhaust steam inlet —13—, a vertically arranged ribbed baffle —14—, and may be provided with a steam stack or auxiliary outlet —15— leading to a heating system or other point or points of use (not shown). Where this auxiliary outlet —15— is employed for conveying the exhaust steam to a heating system, there may be no need of the

steam stack —10—, in which event I provide the vent pipe —10^a— to permit the escape of vapor pressure. While I have illustrated both, I may use one or the other, as desired.

5 Connecting the separator with the overflow or trap chamber —7— is drip pipe —16—, down through which the condensation and impurities extracted from the exhaust steam by the baffle —14— pass to waste.

10 Intermediate the heater and separator and controlling the passage —3— is mounted a rotatable or oscillating valve —17—. This valve comprises a curved valve plate —17— sliding in the arc of a circle upon a curved
15 valve seat to open or close the port or passage —3— as desired. The valve plate —17— is yieldingly held to its seat by suitable resilient means shown here by spiral springs —18— which are interposed between the
20 plate and collars —19— mounted or keyed to a rotatably mounted spindle —20—. Each of the collars —19— is provided with a sleeve —21— to receive and form a bearing for a supporting pin —22— of the valve
25 plate —17—, the supporting pin sliding within the bore of the sleeve to permit the valve plate —17— to move from its seat against the tension of the spring under steam pressure from within the heater.

30 —23— indicates an operating arm fixed or keyed to the spindle —17— for the purpose of operating the valve mechanism.

In the construction illustrated in Fig. 3, the separator —4— is separate from the
35 heater proper, but connected therewith by exhaust steam pipe —26— in which I have located the valve mechanism as shown. —27— indicates the exhaust line connected to the separator and —28— an outlet from
40 the separator to a heating system or other point of use.

The operation is as follows: The raw water entering through pipe connection —2— and the exhaust steam entering
45 through pipe connection —13— and passage —3— commingle within the heater, the temperature of the water being raised thereby. The purified water is drawn off through the outlet —6— to feed pumps or other point
50 of use. When the valve plate —17— is in closed position, as shown in Fig. 1, the exhaust steam passes up through the steam stack or auxiliary outlet —15— and circulates through the heating system (not
55 shown). The condensation from the steam trap —9— is admitted through pipe connection —8— to the heater for utilization. In this position of the valve —17— the heater is cut out of service. Now should the steam
60 trap —9— become inoperative through any cause, and fail to serve its intended purpose, there would be a liability of the steam entering with the condensation through the trap and returns inlet —8— to the heater,
65 such pressure accumulating therein and pos-

sibly reaching a dangerous degree, where it might result in bursting the heater if the valve mechanism heretofore described were not situated in and controlling the exhaust steam inlet —3— to the heater. It will be
70 apparent that in the event of this contingency happening the spring pressed valve plate —17— would move laterally from its seat under abnormal pressure against the tension of the springs —18— and permit the
75 excess pressure to be relieved by exhausting the steam up through the auxiliary separator outlet —15—.

With regard to the construction shown in Fig. 3, the same contingency herein out-
80 lined would be possible to occur provided ordinary gate valves were employed in both the exhaust steam inlet —26— and the exhaust steam outlet —10—, and such valves were closed. But with my improved form
85 of valve mechanism controlling the exhaust inlet to the heater, this, of course, would be impossible. It will also be understood that in this figure the exhaust line
90 —28— from the separator may lead to a heating system or the like. Another advantage of the form of valve mechanism shown, is that by reason of its resilient or spring pressed mounting against its seat,
95 there will result always a close sliding fit, any wear due to friction being compensated for by the resilient bearing or tendency of the springs to press the valve plate against its valve seat.

Where I have used the terms "combined
100 heater and separator," and "unitary structure," I mean that the component parts, such, for instance, as the heater and separator, form part of the same structural
105 unit.

Having thus described my invention, what I claim and desire to protect by Letters Patent, is:

1. The combination of a heater and separator having a communicating passage
110 therebetween and a relief valve in the passage controlling the same.

2. The combination of a heater and separator having a valve controlled passage
115 therebetween, and means for holding the valve resiliently to its seat.

3. The combination of a heater and a separator having a passage therebetween; a spring pressed relief valve intermediate the
120 heater and separator controlling said passageway.

4. The combination of a heater and a separator having a passage therebetween; an auxiliary outlet for said separator; a valve resiliently held to its seat between
125 the heater and separator, said valve adapted to oscillate upon its mounting to control the passage between the heater and separator.

5. The combination of a heater and a
130

separator having a valve controlled passage therebetween; an oscillating valve in said passage and means for holding the same resiliently to its seat.

5 6. The combination of a heater and separator having communication therewith; a valve controlling the communication; means in said valve for relieving the steam pressure within the heater when the same
10 exceeds the normal.

7. The combination of a feed water heater provided with a steam inlet; a valve situated in said inlet controlling the same; and
15 its seat.

8. The combination of a feed water heater provided with an exhaust steam inlet and outlet; a raw water inlet; a return inlet; a water outlet; a valve in the exhaust steam
20 inlet; and means for holding the exhaust steam inlet valve resiliently to its seat.

9. The combination of a feed water heater provided with an exhaust steam inlet; a valve controlling said inlet; means for oscillating said valve; and means for holding the
25 same resiliently to its seat.

10. The combination of a heater provided with an exhaust steam inlet; a separator; a valve resiliently held to its seat between the
30 heater and separator controlling said exhaust steam inlet.

11. The combination of a heater; a separator provided with two steam outlets; a valve controlling one of said outlets; and means for holding said valve resiliently to
35 its seat.

12. The combination of a heater; a separator provided with a steam outlet to the heater; an auxiliary steam outlet; means for oscillating said valve; and means for re-
40 siliently holding the same to its seat.

13. A feed water heater provided with an exhaust steam inlet and a valve controlled steam outlet; a raw water inlet; a return inlet; a water outlet; a separator; a valve in
45 the exhaust steam inlet intermediate the heater and separator and means for holding said valve resiliently to its seat, said valve automatically operating under steam pressure from within the heater to relieve the
50 same when it exceeds the normal.

14. The combination of a feed water heater provided with a steam inlet, a sliding valve in said inlet controlling the same, and resilient means for holding said valve to
55 its seat, said resilient means re-acting against the valve support.

AXEL BLYTT WALLEM.

In presence of—

ROBERT G. CLIFTON,
W. ATWOOD MEHARG.