No. 833,830. PATENTED OCT. 23, 1906.

J. W. GAMBLE.

MEANS FOR PURIFYING AND REGULATING A SUPPLY OF WATER.

APPLICATION FILED FEB. 20, 1906.

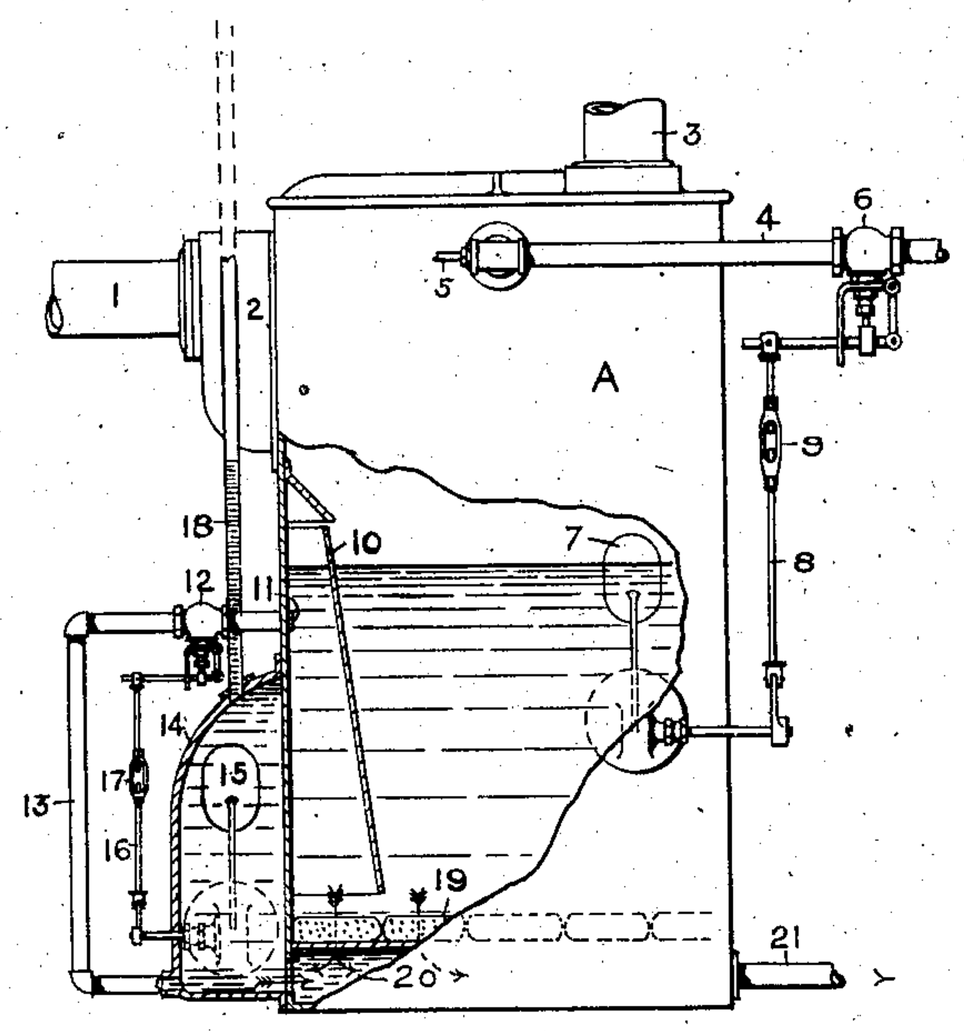

Fig. 1.

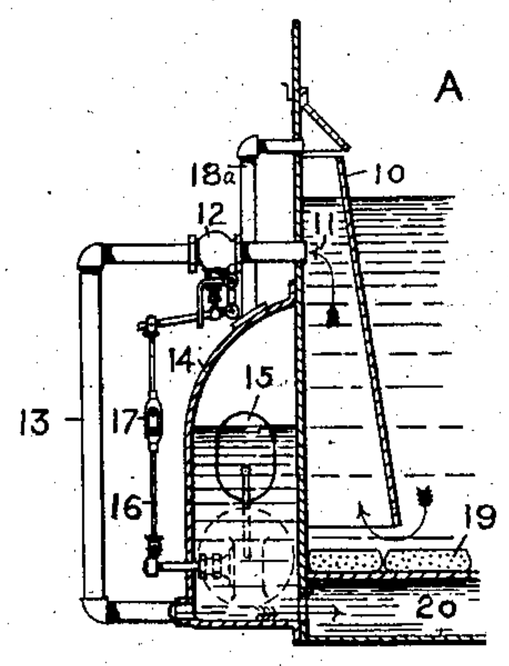

Fig. 2.

WITNESSES:

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JOSEPH WILLARD GAMBLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO JOSEPH S. LOVERING WHARTON, WILLIAM S. HALLOWELL, AND JOHN C. JONES, DOING BUSINESS AS HARRISON SAFETY BOILER WORKS, OF PHILADELPHIA, PENNSYLVANIA, A FIRM.

MEANS FOR PURIFYING AND REGULATING A SUPPLY OF WATER.

No. 833,830. Specification of Letters Patent. Patented Oct. 23, 1906.

Application filed February 20, 1906. Serial No. 301,997.

To all whom it may concern:

Be it known that I, JOSEPH WILLARD GAMBLE, a citizen of the United States, and a resident of and whose post-office address is No. 2602 North Thirtieth street, Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Means for Purifying and Regulating a Supply of Water, of which the following is a specification.

My invention relates to improvements in devices for regulating and controlling a supply of water, and especially to devices employed in feed-water heaters and purifiers where a filter-bed is a part of the apparatus and where chemical solution is supplied to the water before filtration.

The objects of my invention are to provide means for insuring an adequate supply of heated and treated water irrespective of the condition of the filter; to provide means simple, positive, efficient, and automatic in operation.

I accomplish the desired ends by the apparatus herein described, and illustrated in the accompanying drawings.

Figure 1 is an elevation of a feed-water heater and purifier embodying my invention, showing part broken away, the disclosed interior being partly in section. Fig. 2 shows a modification of my invention.

A is the body of the heater, &c.

1 is the steam-inlet; 2, a separator; 3, the steam-outlet; 4, the feed-water inlet; 5, chemical-feed-pipe inlet; 6, feed-water-regulating valve; 7, float operating regulating-valve by means of intermediate connections 8 8; 9, adjusting turnbuckle or equivalent; 10, shield or hood covering inlet to by-pass and opening in lower water strata; 11, orifice of by-pass, preferably below the normal water-line in heater; 12, regulating-valve in by-pass; 13, piping constituting by-pass; 14, float-chamber, preferably outside of heater; 15, float for operating regulating-valve 12; 16, intermediate connections; 17, adjusting turnbuckle or equivalent; 18, vent, preferably to atmosphere; 19, filter-bed; 20, outlet-chamber beyond filter; 21, outlet-pipe to pump or other destination.

In Fig. 2 the vent-pipe 18[a] is returned into the heater instead of opening into the atmosphere.

The necessity for providing a means for maintaining an adequate supply of feed-water irrespective of the clogging of the filter-bed in a feed-water heater has been clearly indicated, and certain means for attaining the desired result havie already been fully set forth in an application heretofore filed by me on the 18th day of April, 1905, Serial No. 256,262. I therefore will not now repeat them further than is necessary to explain the operation of the improved means for attaining the same result as herein set forth.

This operation is as follows: Referring to the figure, the float 7 and valve 6 are adjusted so as to admit the requisite amount of water to meet the requirements and maintain a determined water-level. When the filter 19 is clear and an adequate supply is passing therethrough, then all the water passes through the filter into 20 and out through 21. Under such normal conditions the float-chamber 14 is full, since it is entirely below the water-level of the heater and is vented at the top by the pipe 18 and the float 15 is keeping the valve 12 closed. (The pipe 18, it should be noted, is carried up a sufficient height to balance any back pressure maintained in the heater, allowing about two feet above the water-level of the heater for every pound of back pressure maintained therein.) If, however, the filter clogs, so that the passage of water therethrough is prevented or diminished, so as to become inadequate, then when the force tending to cause the discharge through the outlet 21 is constant and uniform the water in the chamber 14 is drawn on, the water-level therein falls, and the float 15 with it, thus opening the valve 12, when the water passes through the by-pass 13 about the filter into the outlet-chamber 20, and thus the amount adapted to be discharged through 21 is irrespective of the condition of the filter undiminished, the water-level in the heater itself remains substantially constant, and the head in 20 practically uniform. It will also be evident that as soon as the obstruction in the filter-bed 19 is removed the flow will recommence therethrough, because it is the line of least resistance and because the pres-

sure in the heater is greater than in the chamber 14. The pressure in the outlet-chamber 20, due to the pressure in the heater plus the head of water therein acting through the filter, then raises the water in the chamber 14 and vent-pipe 18 to the level in the heater, thus raising the float 15 and shutting off the supply through the valve 12 and by-pass 13. All the water will then pass through the filter 19 as at first. When the filter is so clogged that the withdrawal of water from the chamber 14 commences, the pressure on the water in that chamber is only equal to the pressure of the atmosphere through the vent 18 plus the head in the vent 18. When the filter is clear, the pressure on the water in 14 is equal to the pressure in the heater itself, and if this pressure is greater than the atmospheric pressure it will raise the water in the pipe 18 to a height equivalent thereto, since when the filter is clogged the pressure is lowered and the float falls, thus opening valve 12, and when the filter is clear the pressure increases and the float rises, thus closing valve 12. Therefore it may be said that the operation of the valve 12 varies according to the pressure of the water actuating the float 15.

In the modification shown in Fig. 2 the operation is slightly different. Here the pressure is always balanced, since it acts on the water in the by-pass 13 and chamber 14, tending to fill the said chamber and also through the vent 18ª tending to empty it. In this case, therefore, the operation of the float 15 is dependent upon the mere difference of water-level in the chamber 14 and the heater A, irrespective of the pressure in the chamber, this difference in turn depending upon the amount discharged through 20 21. Therefore the operation of this modification may be said to depend upon the variation in water-level in the float-chamber 14. Moreover, the operation of the device is not deferred until the filter is entirely clogged, nor, conversely, does the apparatus continue to pass the water entirely through the by-pass after the filter is partly clear, but the by-pass automatically supplements the quantity passing through the filter by a quantity varying inversely, as that passing through the filter, and by this I do not mean that the quantity which passes through the by-pass varies inversely in actual measurement or proportion to that passing through the filter—as, for example, in any fixed ratio, as three parts to one part; but I mean that the flow through the by-pass increases or diminishes in general directly as the flow through the filter diminishes or increases and inversely as said flow through the filter increases or diminishes, the actual ratio being immaterial so long as the supplement is sufficient to make up any deficiency in the quantity passing through the filter.

I do not limit myself to any particular purpose, form, or design of apparatus, material, or substance; but

What I claim is—

1. A filter; a by-pass about the filter; a float-actuated valve in the by-pass; and means for operating it according to the variation in pressure of the water actuating the float.

2. A filter; a by-pass about the filter; a valve in the by-pass; a water-chamber and means therein for automatically operating the valve according as the filter is clogged or free.

3. A heater, a filter; a by-pass about the filter; a valve in the by-pass; a vented float-chamber below the normal water-level of the heater and opening at the bottom into a space beyond the filter; a float in the chamber adapted to operate the by-pass valve according as the water therein rises or falls.

4. In a heater, a filter; a by-pass about the filter; a valve in the by-pass; a float-chamber opening into the heater beyond the filter; a float in said chamber adapted to operate the by-pass valve.

5. A tank; a filter therein; means for automatically regulating the supply to the tank; a by-pass about the filter containing a valve; a water-chamber adapted to fill or empty according as the filter is clear or clogged, and means for automatically operating the by-pass valve according to the height of the water in the chamber.

6. A tank, a filter therein; means for automatically regulating the supply to the tank; a by-pass about the filter containing a valve; a water-chamber opening into the space beyond the filter; and means for operating the by-pass valve according to the height of water in the supplemental chamber.

7. A filter; a valved by-pass about the same; a float and intermediate means for operating the valve according as the filter is clear or clogged.

Signed at Philadelphia, in the county of Philadelphia and State of Pennsylvania, this 5th day of February, A. D. 1906.

JOSEPH WILLARD GAMBLE.

Witnesses:

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