

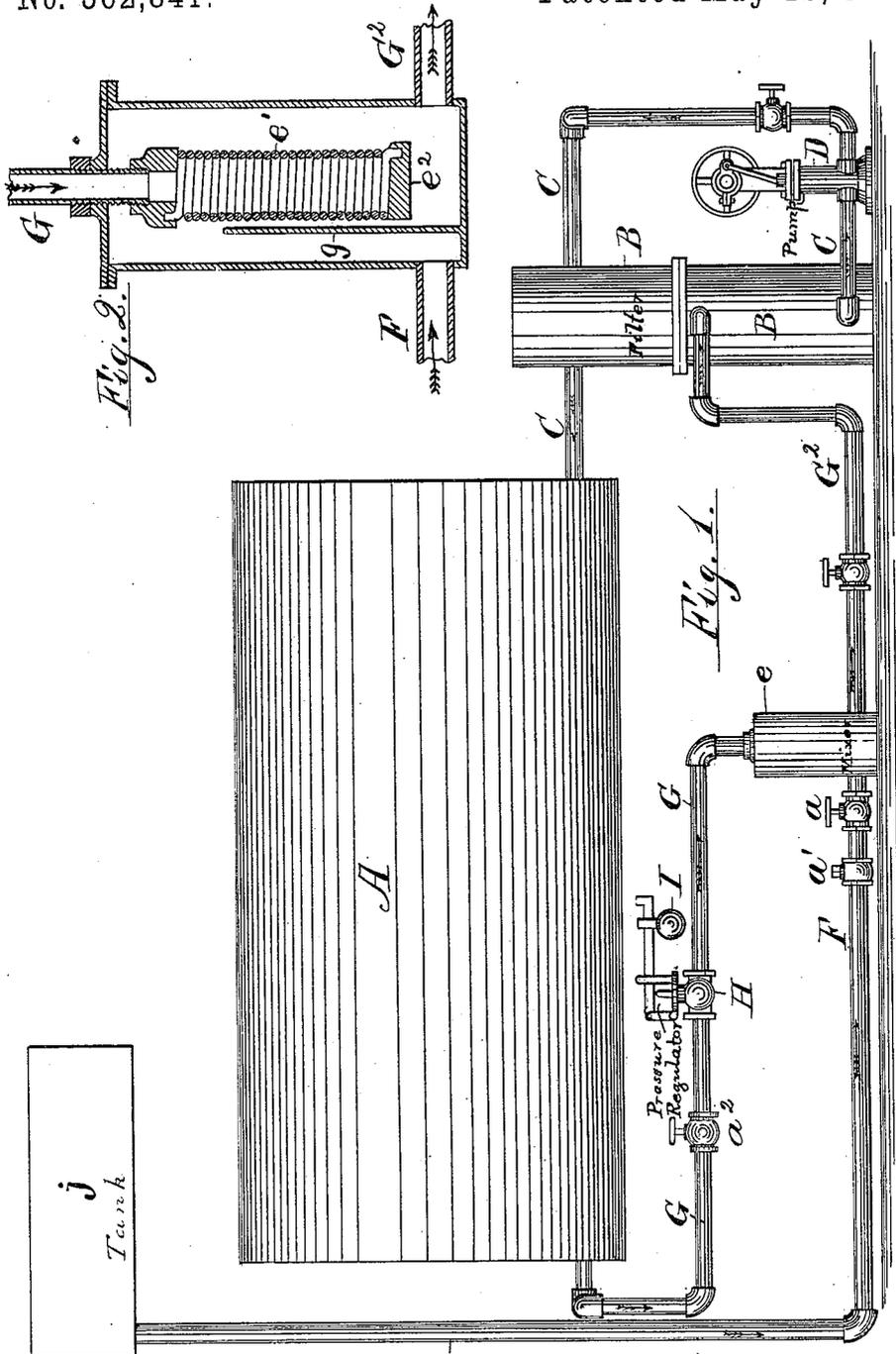
(No Model.)

J. W. HYATT.

WATER CLEANER FOR BOILERS.

No. 362,841.

Patented May 10, 1887.



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UNITED STATES PATENT OFFICE.

JOHN W. HYATT, OF NEWARK, NEW JERSEY.

WATER-CLEANER FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 362,841, dated May 10, 1887.

Application filed January 31, 1887. Serial No. 225,994. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. HYATT, a citizen of the United States, residing at Newark, Essex county, New Jersey, have invented certain new and useful Improvements in Water-Cleaners for Boilers, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of this invention is to draw water either from a feed-supply pipe or from the boiler, and force the same through a filter into the boiler in a purified state; and the invention is intended as an improvement on that claimed in my Patent No. 354,864, issued December 21, 1886.

It also consists in an improved means for mingling the hot and cold water together without noise from the condensation of the vapor present.

In such patent I have claimed a steam-boiler, a filter, and a pump with two pipes connected, respectively, with a feed-water supply and with the water-space in the boiler, and each pipe being provided with a stop cock to regulate the amount of fluid drawn from said pipe by the pump.

I have found in practice that when the pressure in the feed-supply pipe is uniform, the cock in the boiler-fluid pipe may be regulated in such manner that the pump will draw its supply simultaneously from the boiler and from the feed-supply pipe, as desired, but that if the pressure in the feed-supply pipe is then diminished, the pressure of the boiler-fluid will close the check-valve in such supply-pipe, and the feed-water will not be able to open it again. I have therefore discovered that some automatic device is required in the boiler-fluid pipe to reduce the pressure of the fluid to that of the water-supply pipe, so that the water from either pipe may flow to the pump with the same facility. In my present invention I have therefore devised a construction in which a regulating-cock in the boiler-fluid pipe is not necessary; but by means of a reducing-valve inserted in such pipe the flow of the fluid from the boiler is rendered entirely automatic and dependent solely upon the opening afforded to the cock in the feed-water-supply pipe. I therefore insert a pressure-reducing valve in the pipe, which conducts the water from the

boiler to the pump and filter to be cleansed, and adjust the valve to a pressure equal to or below that in the feed-supply pipe, by which means the operator may draw water from the boiler and from the feed-pump simultaneously to pass through the filter.

My invention will be understood by reference to the annexed drawings, in which—

Figure 1 is a side elevation of a steam-boiler, filter, and pump connected with suitable pipes; and Fig. 2 is a vertical section of the water-mixing device.

In Fig. 1, A represents a steam-boiler of any construction and dimensions, and B a filter located in any suitable place and having its outlet connected with the boiler by means of the pipe C.

F is a feed-water-supply pipe connected with a tank, an aqueduct, or other source of supply, and G is a pipe connected with the boiler to draw the boiler-fluid therefrom, and the pipes F and G are shown connected together in a mixer, *e*, and a cock, *a*, is inserted in the pipe F, and a cock, *a*², is shown inserted in the pipe G to shut off the reducing-valve from the boiler in case repairs are required.

*a*¹ is a check-valve in the supply-pipe; but the use of such check-valve is optional. In my former patent, No. 354,864, the water from the said pipes is conducted to a pump and is thence forced through the filter B into the boiler through the pipe C.

It is obvious that in my former invention the water could have been conducted directly to the filter and the pump inserted in the pipe C to draw the water through the filter by suction, instead of forcing it as shown in the said patent. Such a construction would be an exact equivalent, and I have therefore shown such arrangement in my present specification, the pipe G², through which the water passes from whichever pipe, F or G, it is drawn, being connected herein to the inlet of the filter B, and the pump D being inserted in the filter-outlet pipe C, which conducts the purified water directly to the boiler.

H is the reducing-valve inserted in the pipe G, and provided with an adjustable ball, I, or other suitable means for regulating the pressure which is transmitted from the boiler through the pipe F.

The operation of the entire device is as fol-

lows: The pump being set in operation, water is drawn from either one of the pipes, F or G, or from both, if desired, and is forced into the boiler by the pump, leaving its impurities in the filter B. By properly regulating the valve H and manipulating the cock *a*, I find that the pump may be supplied simultaneously from both the pipes F and G, or exclusively from either one. Thus, when the cock *a* is fully opened, the feed-water wholly supplies the capacity of the pump, and the boiler is continuously fed with fresh water at such rate; but when the cock *a* is partially closed, the pump draws upon the boiler-fluid furnished through the reducing-valve and then supplies the boiler with water from both the pipes F and G. When the cock *a* is wholly closed, the pump draws its entire supply from the boiler-fluid, and operates simply to circulate such fluid continuously through the filter to continuously cleanse the fluid.

The regulation of the feed in any greater or less degree, as may be required to maintain the boiler-fluid at the proper level within the boiler, is thus effected wholly by manipulating the cock *a* without having, as in my former invention, to also regulate a cock in the pipe G, which requires the exertion of considerable skill upon the part of the operator to adjust it in agreement with the cock *a*.

With my former construction I have found that when water was drawn from a tap upon the feed-supply pipe adjacent to the cock *a* the pressure in such pipe was diminished, so that the boiler-fluid admitted through the cock *a* would operate to close the check-valve *a'*.

A restoration of the pressure in the feed-supply pipe would not thereafter operate to open the check-valve, whereas by my present construction an entirely automatic supply of the boiler-fluid is effected in the exact proportion not furnished by the feed-water. Such result is produced by adjusting the regulating-valve H to deliver the boiler-fluid at a pressure slightly below that of the feed-water supply, or that to which the feed-water supply is liable to fall if its pressure be effected by any means whatever.

The cock *a'* in my present construction is wholly unnecessary to the operation of the device, and need not be inserted in the pipe G except to close the latter for repairs to the pressure-reducing valve.

The supply of fluid to the pipe F may be regulated by any other convenient means, as from a tank filled at certain intervals, as indicated at *j* in Fig. 1.

The water-mixing device consists in a mixing vessel or tank to which the cold water is admitted, and from which the mixed fluids are conducted, and having an inlet provided with a spiral-spring mouth-piece for the introduction of the hot water.

The device is shown in Fig. 2, *e* being the mixer, F the water-pipe admitted thereto, and G² the pipe leading therefrom for the

mixed fluids. The pipe G is inserted through the top of the mixer, and its inner end is provided with a closely-wound spiral spring; *e'*, having its farther end closed, so that the fluid entering through said pipe is discharged from the interior of the spring only by pressing its coils apart in a degree to produce the required vent. A plate, *e''*, is shown as the means of closing one end of the spiral spring; but the spring might be wound to a tapering point to produce the same result.

A partition, *g*, is provided within the mixer to direct the fluid from the pipe F toward the top, so that it may be distributed over the spring and mix with the fluid escaping from its coils before reaching the outlet G². Such partition would not be required if the pipe F were applied at that end of the mixer remote from the pipe G². The escape of the hot fluid or its vapor in thin films from between the coils of the spring *e'* secures its immediate mixing or condensation with the colder fluid in the mixer without the formation of vacuum spaces within the cold fluid, as is occasioned when hot vapor is thrown into contact with such fluid and condensed in large volumes. The snapping noise and jarring of the apparatus from the condensation of the steam vapor when mingled with the cold feed-water is thus wholly prevented.

The pipe F is shown herein connected with the tank *j* to illustrate the facility with which the boiler-fluid may be mingled with the feed-water when the latter is supplied at a very low pressure, as from an adjacent tank.

It is obvious that the reducing-valve *h* may be adjusted to deliver the hot fluid to the filter or pump at atmospheric pressure, and under such circumstances, when the boiler-temperature is 300° and that of the feed 60°, the temperature resulting from an equal mixture of the two would be only 180° Fahrenheit, which would feed to the pump with certainty at any low pressure, as that of a slightly-elevated tank.

I have thus made it obvious how the introduction of an automatic pressure-reducing valve in the boiler-fluid pipe renders the manipulation of a cock in such pipe wholly unnecessary, and makes the volume of boiler-fluid which is drawn to the filter entirely dependent on the regulation of the cock in the feed-water pipe. Such dependence is caused by maintaining a lower pressure in the pipe *g* than that which the feed-water supplies, so that the latter will always force its way into the pump or filter in preference to the former in any degree that the opening of the feed-cock *a* will permit, while any deficiency in the supply to the pump is immediately made up by the automatic opening of the valve H and the flow of boiler-fluid into the pipe G².

It is obvious that the parts may be differently arranged, and that any preferred style of pump or filter or reducing-valve may be

employed, and that the pump may be placed in the inlet-pipe to the filter instead of its outlet-pipe, which I should consider as an entire equivalent to the arrangement shown.

5 Having thus set forth the nature of my invention, I claim the same as an improvement upon my aforesaid patent, No. 354,864, in the following terms:

1. The combination, with the steam-boiler
10 A, the filter B, and a pump arranged to circulate water through the filter and to deliver it to the boiler, of the pipes F and G, connected, respectively, with the feed-water supply and with the boiler-fluid, the pipe G being
15 provided with a pressure-reducing valve, as set forth, and the pipe F being provided with means for regulating the supply of feed-water, as required, and both the pipes being

connected with an inlet to the boiler through the pump and filter, substantially as herein
20 set forth.

2. The means for mixing the boiler-fluid and feed-water, which consists in a mixer or vessel having an inlet-pipe for the feed-water, an outlet-pipe for the mixed fluids, and an inlet-pipe
25 for the hot water or steam, provided at its inner end with a closely-coiled spiral spring, arranged and operated as and for the purpose set forth.

In testimony whereof I have hereunto set my
30 hand in the presence of two subscribing witnesses.

JOHN W. HYATT.

Witnesses:

FRANK L. MONTON,
THOS. S. CRANE.