(No Model.)

O. J. SCOTT.

AUTOMATIC BOILER FEEDER.

No. 577,392. Patented Feb. 16, 1897.

Fig. 1.

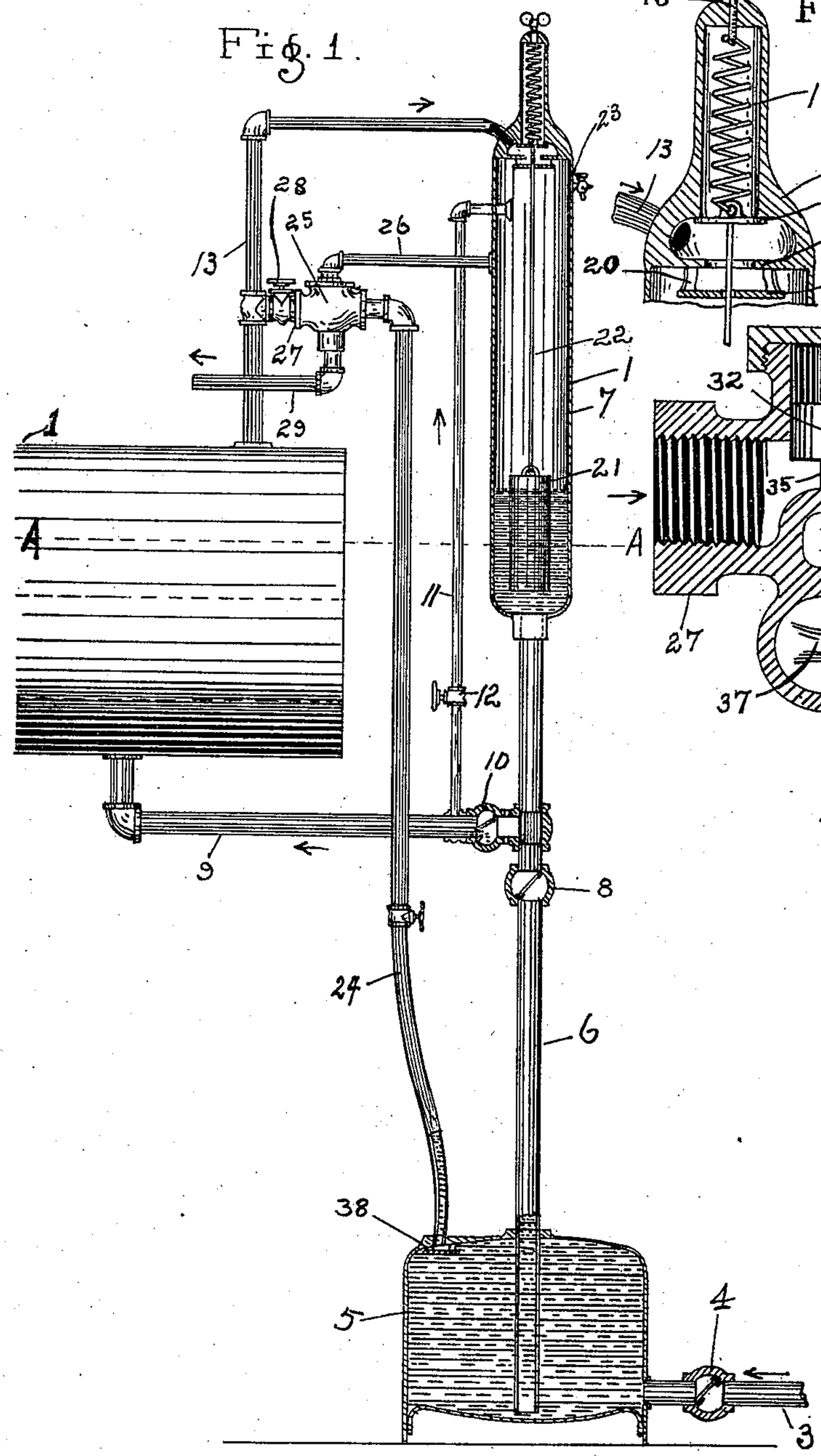
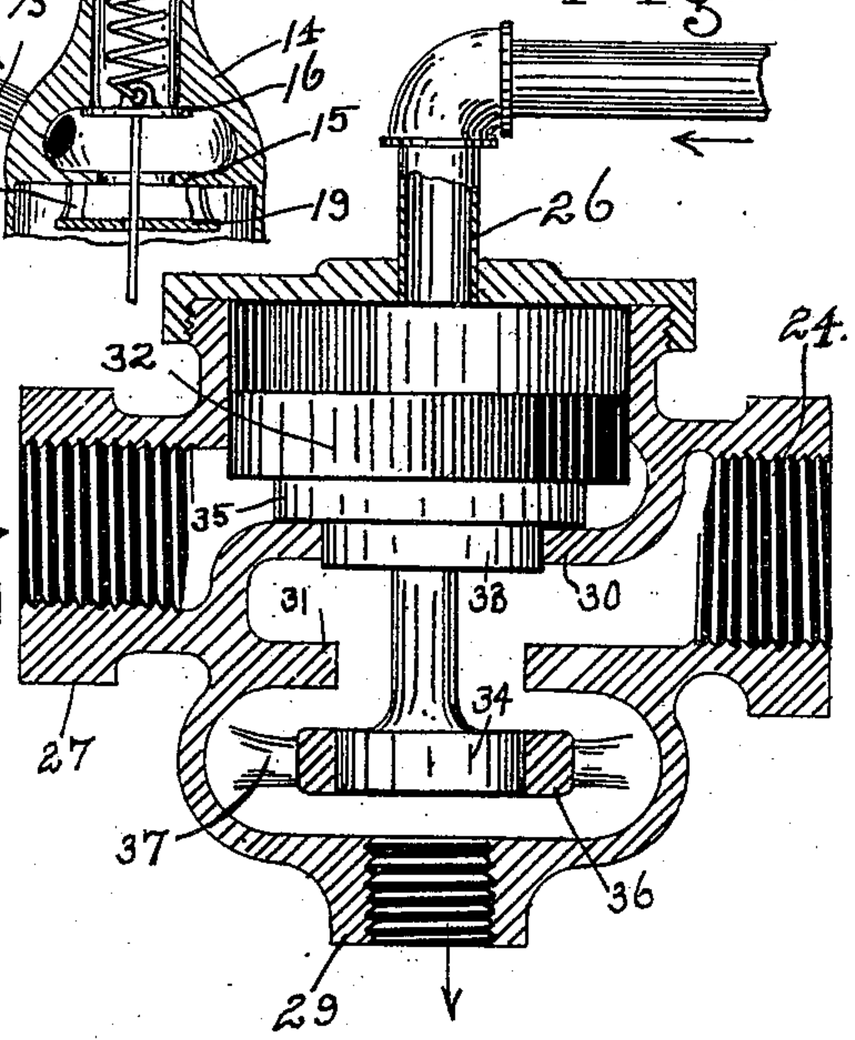


Fig. 2.

Fig. 3.



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AUTOMATIC BOILER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 577,392, dated February 16, 1897.

Application filed November 18, 1895. Serial No. 569,360. (No model.) Patented in England January 21, 1896, No. 1,442, and in France January 21, 1896, No. 253,339.

To all whom it may concern:

Be it known that I, ORLA J. SCOTT, of Fairmount, county of Grant, and State of Indiana, have invented a certain new and useful Automatic Boiler-Feeder, (for which I have obtained the following foreign patents, viz: English Patent No. 1,442, dated January 21, 1896, and French Patent No. 253,339, dated January 21, 1896;) and I do hereby declare that the following is a full clear, and exact description thereof, reference being had to the accompanying drawings, in which like letters and numerals refer to like parts.

My invention relates to an automatic boiler-feeding device.

My object is to simplify the construction of boiler-feeders, to make them wholly automatic, and certain and positive in the performance of their work. The device herein shown can be used when the water-supply comes from a heater or when cold water is used, as will hereinafter be more fully explained. The back pressure of the water in the boiler in this device is utilized to actuate the spray in the receiver and also to equalize the pressure in the boiler and receiver.

The full nature of my invention will appear from the accompanying drawings and the description following.

In the drawings, Figure 1 is a side elevation of my device with all portions, excepting the pipes and valves, shown in cross-section. Fig. 2 is an enlarged view in cross-section of the steam-valve mechanism at the upper end of the receiver. Fig. 3 is an enlarged view in cross-section of the differential valve which controls the supply of steam in the hot-water tank.

My device is connected up with any ordinary boiler, (represented here by 1 with the dotted line A A as the water-line.) To automatically fill this boiler, the water is taken from any suitable source of supply through the pipe 3, having the check-valve 4. The water is first received, especially when water is used from a water-heater, in the warm-water tank 5, which is practically a primary receiver. From near the bottom of this warm-water tank 5 the pipe 6 extends vertically to the main receiver 7. The main receiver 7 is preferably one whose height exceeds its diameter at least two and a half ($2\frac{1}{2}$) times, so as to obtain, first, a weight of column for quick feed or rapid operation; second, to reduce to a minimum the amount of water which remains in the receiver, and, third, to obtain the maximum of condensing-surface. The pipe 6 has a check-valve 8, and the pipe 9 extends from the pipe 6 at a point above the check-valve 8 to the boiler and enters at any point below the water-line. The pipe 9 is provided with a check-valve 10, and behind it, from a point between the check-valve 10 and the boiler, a spray-pipe 11 extends upward and enters the receiver 7, preferably near its upper end. The spray-pipe 11 has a valve 12 to shut off the passage of water or steam through it.

From the steam-supply in the boiler the pipe 13 leads and enters the receiver at its upper end. The upper portion or top of the receiver consists of a casting or cap 14, provided with a valve-seat 15. The pipe 13 enters above such valve-seat.

16 is a valve that is held upward by the spiral spring 17, whose upper end is supported by the adjusting-screw 18. Just beneath the valve-seat 15 I place a diaphragm or deflecting-plate 19, which is supported from the valve-seat by the lugs 20. The purpose of this deflecting-plate is to distribute the incoming steam. The valve 16 is drawn down in engagement with the seat 15 by the weight 21, suspended from the valve by the link 22. When the receiver 7 is filled with water, the specific gravity of the weight 21 is lessened, so that the spring 17 overcomes it and elevates the valve 16. When the water leaves the receiver 7, the specific gravity of the weight 21 is so great as to overcome the action of the spring 17 and draw the valve 16 down into engagement with the seat 15.

The portion of the apparatus which I have above described is sufficient when cold water is used.

Assuming that the receiver 7 is empty and steam is up in the boiler, the air-cock 23 in the receiver 7 is opened and the valve 12 in the spray-pipe 11 is opened, whereby the receiver is filled with hot water, forcing the air out

until the water reaches the air-cock. The air-cock is then closed. Before this process the valve 16 is closed by the weight 21 and is kept closed by the pressure of steam above the valve through the pipe 13. After the air-cock is closed the water will continue to flow through the spray-pipe 11 until the remaining air at the upper end of the receiver is compressed until its pressure and that of the steam in the boiler is equalized. When the pressure on each side of the valve 16 thus becomes equalized or nearly so, the valve 16 is lifted by the spring 17, whereupon the water in the receiver passes out through the pipe 9 to the boiler by reason of gravity until the receiver has become so far emptied that the weight 21 closes the valve 16. At this point the receiver is full of steam, which, by reason of the lower temperature of the sides of the receiver that causes a portion of it to condense, is less dense than the steam in the boiler, which causes the steam in the boiler to force some water back through the pipes 9 and 11 into the receiver, thus causing the spray that condenses the steam which remains in the receiver. The vacuum thus created draws the water from the source of supply through the pipe 3, chamber 5, pipe 6, into the receiver 7. If desired, when cold water is used the chamber 5 and valve 4 may be omitted and the pipes 3 and 6 directly connected. The foregoing process is repeated automatically. The back pressure from the boiler, it is seen, actuates the spray. The valve 10, being located where it is, prevents the back pressure from driving the water into the lower instead of the upper portion of the receiver. When the receiver 7 is emptying, it is obvious that the valve 8 closes the pipe 6 at a point below the junction of the pipe 9, that enters the boiler.

When hot water is used, I extend a pipe 24 from the tank 5 to a differential valve 25. From the valve 25 a pipe 26 enters the receiver 7, thus establishing a connection between the main receiver and differential valve, whereby the valve is governed by the pressure in the main receiver, and by means of another pipe 27 the differential valve 25 is connected up with the steam-pipe 13 and is capable of being shut off by the valve 28. Also an exhaust-pipe 29 leads from such valve.

The valve 25 is provided with an upper seat 30 and a lower seat 31, which are engaged by the sliding piston-valve 32, which has a head 33 to fit in the seat 30 and another head 34 to fit in the seat 31. The heads of this valve are arranged so that when one port is closed the other will be opened.

35 is a collar that rests upon the seat 30 to prevent the valve from dropping down too far. 36 is also a collar in which the lower head 34 of the valve rests to prevent the lime which may be in the water from collecting on the periphery of the valve-head. The collar 36 is supported by arms 37. At the point where the pipe 24 enters the chamber 5 I provide a distributer 38 similar to the distributer 19 and for the same purpose.

The mode of operation where hot water is used is substantially the same as when cold water is used, excepting the initial charge of the receiver with water is from the chamber 5 instead of the boiler, but in both cases it is caused by the pressure of the steam in the boiler. When the valve 28 is opened, the steam from the boiler passes through the pipe 13, the valve 25, and pipe 24, down to the chamber 5 and forces the water from such chamber up into the receiver.

The uncondensed steam remaining in the chamber 5 after the receiver 7 is filled passes back up through the pipe 24, the valve 25, and out of the pipe 29. In order to provide for the escape of the steam, I provide in such valve a passage-way from the pipe 24 to the pipe 29. The piston-valve is operated by the pressure of the water or steam in the receiver 7 transmitted through the pipe 26. The valve 16 opens, as has been heretofore described. As soon as the pressure of the incoming water in the receiver 7 is great enough to force down the valve 32 the pressure of steam from the boiler to the chamber 5 is shut off and the same movement opens the exhaust for the steam in the chamber 5, as has been described.

As soon as the steam is exhausted from the chamber 5 it refills with water, and at the same time the receiver 7 is emptying. When the pressure of steam in the receiver becomes less than the pressure in the boiler, as has been heretofore described, the steam from the boiler will elevate the piston-valve 32, permitting the steam to pass through the pipe 24 to the chamber 5 to force the water therefrom up into the receiver, as has been heretofore described, and this process is automatically repeated.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a boiler-feeder, the combination of a primary and a main receiver, suitable pipe connections between the receivers and to the boiler, a steam-induction pipe leading to the primary receiver, a differential valve therefor, and a connection between the main receiver and differential valve, whereby the said valve is governed by the pressure in the main receiver, substantially as and for the purposes specified.

2. In a boiler-feeder, a receiver whose upper end is provided with a port surrounded by a valve-seat, a pipe leading from the boiler and entering a small chamber immediately above such port, a spring-supported valve to close such port, and a weight in the lower end of the receiver to actuate such valve when the receiver has discharged its contents.

3. In a boiler-feeder, a receiver, an outlet-pipe leading to the boiler with a check-valve in it, a spray-pipe leading from the boiler-pipe behind the check-valve to the receiver, a steam-port entering the upper end of the receiver, a spring-withheld valve to close the

port, and a weight in the bottom of the receiver suspended from the valve, substantially as set forth.

4. In a boiler-feeder, a primary receiving-tank, a pipe leading thereto from a suitable water-supply and having a check-valve in it, a main receiver, a pipe leading from the lower portion of the primary receiving-tank to such main receiver and having a check-valve in it, a boiler-pipe leading from the lower end of the main receiver to the boiler, a steam-pipe leading from the boiler to the upper end of the main receiver for conveying steam, a pipe leading from the steam-pipe to the primary receiving-tank provided with a differential valve, a pipe leading from the receiver to such valve to actuate the same, and an exhaust leading from such valve, the valve so arranged that when in one position there will be a passage-way from the boiler to the primary receiving-tank and when in the other position there will be a passage-way from the primary receiving-tank to the exhaust, substantially as set forth.

5. A boiler-feeder comprising a primary receiving-tank, a pipe leading from a suitable water-supply to such tank and having a check-valve in it, a main receiver, a pipe leading from the primary receiving-tank to such main receiver and having a check-valve in it, a pipe leading from the lower end of such main receiver to the boiler and having a check-valve in it, a spray-pipe leading from such boiler-pipe behind its check-valve to the receiver, a steam-pipe leading from the boiler to the upper end of the receiver, an automatic valve for regulating the entrance of steam into the receiver from such steam-pipe, a pipe leading from such steam-pipe to the primary receiving-tank having in it a differential valve, a pipe leading from the receiver to such valve to actuate it, and an exhaust from such valve, such valve being so arranged that when it is in one position there will be a passage-way from the boiler to the primary receiving-tank and when in the other position there will be a passage-way from the primary receiving-tank to the exhaust, substantially as set forth.

6. In a boiler-feeder, the combination of a primary and a main receiver, a steam-induction pipe leading to the primary receiver, and a differential valve therefor, a connection between the main receiver and differential valve whereby the valve is governed by the pressure in the main receiver, a feed-water pipe leading from the main receiver, and a return-pipe leading from said feed-water pipe to the upper part of the main receiver, substantially as and for the purposes specified.

In witness whereof I have hereunto set my hand this 13th day of November, 1895.

ORLA J. SCOTT.

Witnesses:
V. H. LOCKWOOD,
ZULA GREEN.