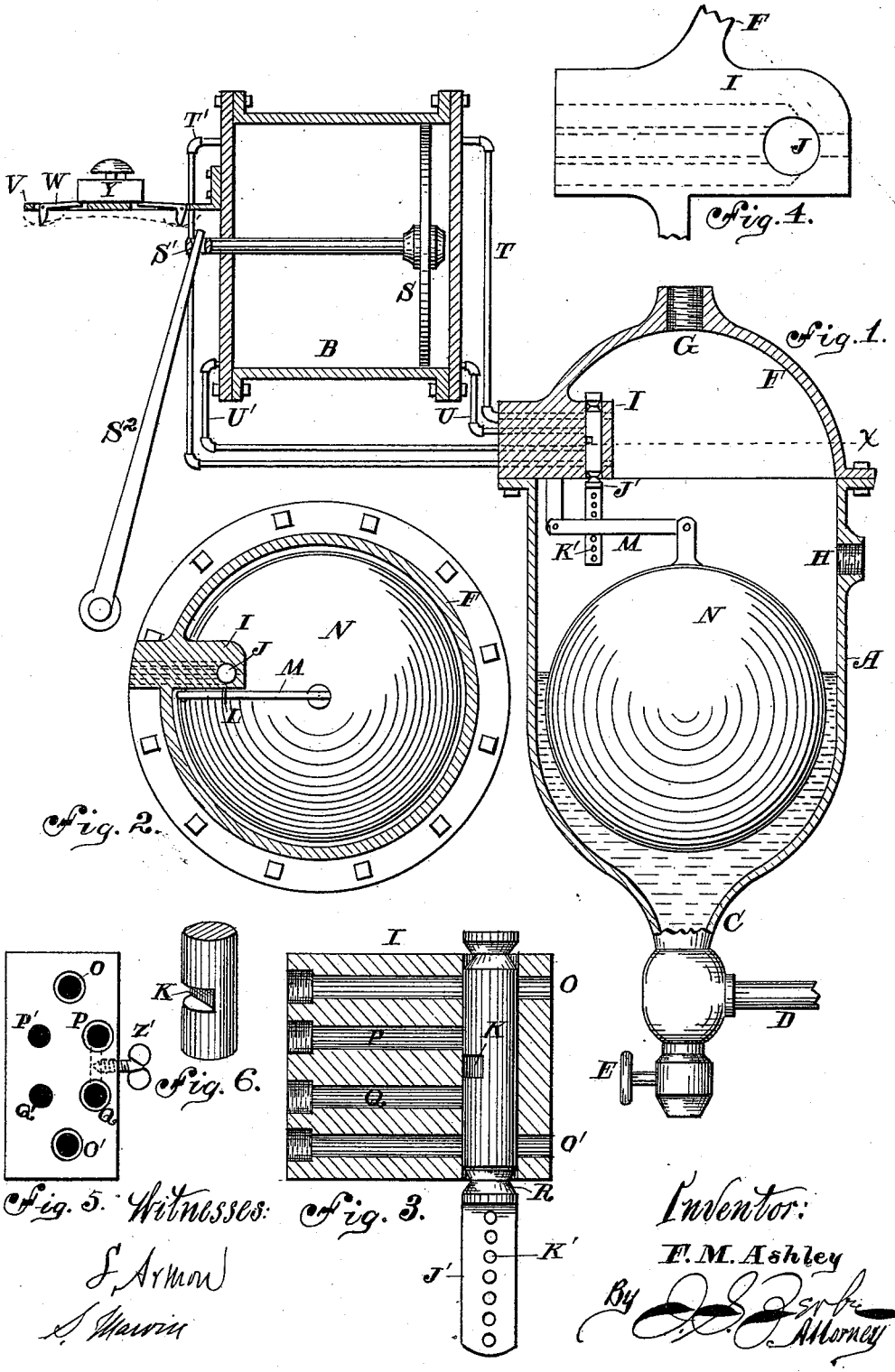
(No Model.) 2 Sheets—Sheet 1.

F. M. ASHLEY.

AUTOMATIC BOILER FEEDER.

No. 493,237. Patented Mar. 14, 1893.



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(No Model.) 2 Sheets—Sheet 2.

F. M. ASHLEY.

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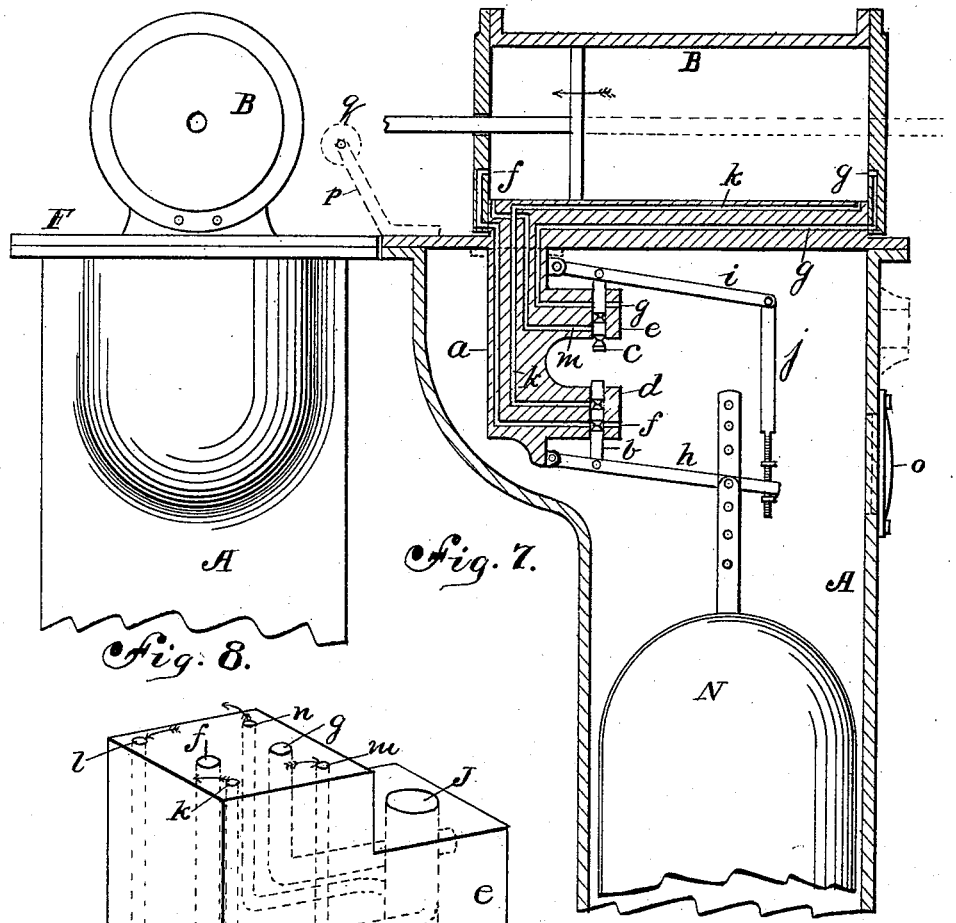

Fig. 7.

Fig. 8.

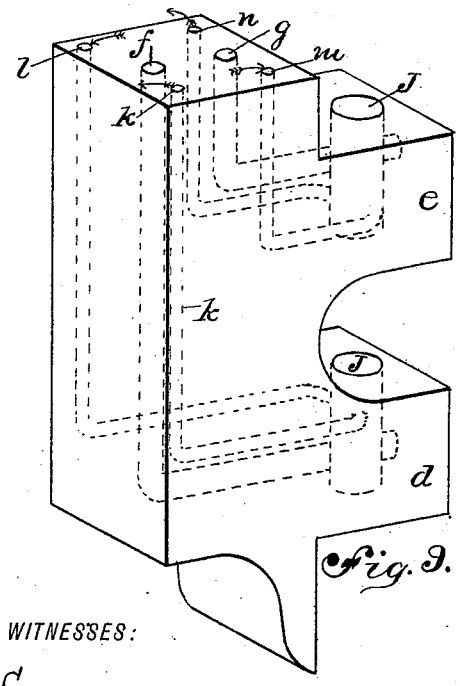

Fig. 9.

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UNITED STATES PATENT OFFICE.

FRANK M. ASHLEY, OF BROOKLYN, NEW YORK.

AUTOMATIC BOILER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 493,237, dated March 14, 1893.

Application filed January 13, 1891. Serial No. 377,614. (No model.)

To all whom it may concern:

Be it known that I, FRANK M. ASHLEY, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Apparatus and Systems for Feeding Boilers Automatically, of which the following is a specification.

The object of the present invention is to construct a combined water column alarm and apparatus for automatically throwing in and out of operation a pump or injector for boilers; and it consists of a water column having within one or more floats and valve mechanism provided with suitable ways and connecting pipes, leading to a cylinder having a piston rod attached to the pump or injector lever, whereby the stage of the water in the boiler will cause the steam to enter the cylinder and move the lever back and forth in the proper direction; and it also provides for constructing the column and pump operating mechanism together in one device so that the whole can be made complete at the factory and adjusted preparatory to shipment.

Referring to the drawings, Figure 1 is a central vertical section of the combination safety water column, and apparatus for manipulating the pump. Fig. 2 a horizontal section of the cap or top of the safety column, through line *x* of Fig. 1. Fig. 3 a vertical section of the casting which contains the valve and connecting parts. Fig. 4 a horizontal section of the casting, Fig. 5 an end view of the same, Fig. 6 a perspective view of a portion of the valve. Fig. 7 a vertical section of the cylinder for operating the pump lever and the water column attached together. Fig. 8 a front view of the same. Fig. 9 an enlarged perspective view of the ports for the duplex valves.

In the construction of my invention I have the safety water column and the apparatus for manipulating the pump lever made separately, when they are to be located at different places, in case that plan is found most convenient and in that case they are suitably connected by pipes. Such construction is found in Fig. 1. When it is desirable and convenient, however, I can have the two parts formed together or cast in one piece, as shown in Fig. 7, and in that case I connect the pump, or injector lever to the piston rod by means of connecting rod or by wire ropes. In the former case I show the body A, Fig. 1 which forms the safety water column, formed separately from the cylinder B, which latter cylinder is designed to manipulate the pump lever. The water column is composed of the vertically disposed shell having a tapering lower end C, provided on one side with the pipe D for connecting with the boiler below low water stage, and the cock E below this pipe. The cap is a dome shaped shell F, with a central aperture G, for a pipe; or, if desired, connection may be made with the boiler above high water stage at H instead of through the cap.

At one side within the cap or dome F, is an enlargement I cast therewith, and this projects into the dome a short distance. Near its inner end is a vertical hole J, which receives a round rod J′ that acts as the valve for controlling the flow of the steam. The lower end of the rod has a series of holes K to receive therein the forwardly projecting pins L. A horizontally disposed lever M hinged at its outer end to the side of the enlargement I, passes between the pins L, and has its inner end attached to the shank of the float N. When, therefore, the float moves up and down the valve stem J′ is carried therewith, and as the stem J′ is nearer the fulcrum than the float shank, considerable purchase is given to the float in the process of moving the valve.

Through the enlargement I drill six holes from the outside, two of which, the upper one O and the lower one O′ intersect the vertical valve hole J, these holes both passing entirely through the enlargement, while two of the intermediate holes P, Q, terminate at the hole J and pass in slightly to one side of it. The two other holes P′ Q′ on the same plane as the holes P, Q, terminate at the hole J on the other side. The valve stem J′, has midway a notch K, so that normally the notch rests midway between the holes P, Q. When the valve is in this position an annular V-shaped groove R is formed around the same at a point above the hole or passage O, and a similar groove below the passage O′, so that when for instance, the float moves downward, the upper annular groove in the valve stem is at the intersecting channel O. At the same

time the notch K is in line with the channel Q Q′, so that a way is formed from the channel Q through the notch K, and thence out the channel Q′ on the other side, while steam can pass through the channel O from the water column A, to the cylinder B, as will now be shown.

It will be observed that the piston head S, has a yoke S′ on its rod, through which the pump or injector lever S^2 passes, and in the position shown the pump or injector has been cut off. The upper channel O, is connected with one end of the cylinder B, by means of the pipe T, and the lower channel O′ with the other end of the cylinder by a pipe T′. The upper intermediate channel P is connected by pipe U with the same end of the cylinder that the upper channel O is connected with, and the lower intermediate channel is connected by pipe U′ with the other end of the cylinder. The conditions, therefore are, that when the valve stem J′ moves down so that the steam is admitted from the dome F through the channel or passage O, the piston head S moves to the left, carrying with it the lever S^2, thus throwing on the pump. When the valve stem is down the notch K, as stated, connects the inner ends of the channels Q, Q′, so that there is no resistance in the cylinder B. As soon as the pump raises the water in the boiler and the float moves upwardly to the position shown in Fig. 3, the discharge ports or channels P′ Q′ as well as both supply channels O O′ are cut off, and as soon as the float has raised the valve stem, so that the lower annular groove R opens the channel O′, steam flows through the pipe T′ and moves back the piston head S thus automatically throwing the pump on and off as required by the stage of the water in the boiler. I particularly call attention to the location of the cylinder B, which is placed above the valve mechanism in the dome F, so that any condensation which takes place in the cylinder will flow out through the pipes U U′ into the enlargement I and thence into the discharge ports P′ Q′.

In order to provide a signaling apparatus in connection with the movement of the piston I attach a bracket V to the end of the cylinder B, directly above the end of the lever S^2, and place two oppositely disposed bell crank levers thereon, which engage with the lever S^2. One limb of each lever W engages with the mechanism in the bell or signal box Y, so that when the piston rod starts to move in either direction, to throw on or off the pump, the lever S^2 will cause the bell to ring. This bell may be purely mechanical in its operation, or it may be an electric bell or signaling device, and it can be located on the end of the cylinder as shown, or at any other suitable point.

Various modifications may be made in the form of the valve and its connections, without materially altering the character of my invention, the main feature being to furnish suitable induction and eduction tubes for channels from one end of the cylinder to the other as the water in the boiler raises or lowers, and to cut off these channels during any intermediate point, by which means the pump is kept in or out of operation until the stage of the water is such as to produce the action of the cylinder. Should it be desired, however, at any any time to move back the lever S^2, by hand, it would be necessary to provide an exhaust for the cylinder, and I accomplish this by connecting the channels P Q, as shown at Z, Fig. 5, and in placing through the side a cock Z′, so that by turning the same the air or steam will pass through the pipes U U′, from one end of the cylinder to the other.

In the foregoing part of my specification special reference is made to that form of construction wherein the cylinder B, is made independent of the column which contains the floats and no reference has been made to the immediate attachment of these two parts, nor to the employment of duplex valve stems, and double floats. Wherever it is practicable I furnish the combined mechanism for this purpose in one piece, and then run a cord or wire from the piston rod to the pump lever. Thus, in Fig. 7, the float column has the cylinder B cast with the cap and the block *a* containing the ports, ways and the valves, depends from the under side of the cap. Two vertically disposed valves *b c*, are placed through the branch arms *d*, *e* of this block, the lower valve being designed to control low water and the upper valve high water. Each branch has a port which admits live steam, and both pass centrally through the valve apertures. The lower port *f* leads to the right hand end of the cylinder B, and the upper port *g*, to the left hand end of the cylinder. The position of the parts in Fig. 7 is supposed to represent live steam passing through the port *f*, and driving the piston to the left, thus throwing on the pump. The lever *h* connected with the valve *b*, and to which the float is attached, is also connected, adjustably to the upper lever *i* by means of a link *j*, the lower end of which passes through the lever *h* and is screw-threaded and provided with a nut above and below the lever, *h*, so that the downward motion of the lever will not affect the lever *i*, nor will a limited upward motion affect it, but should the water rise above its normal line the lever *i* would be raised and steam permitted to flow through the port *g*, to the cylinder thereby drawing back the piston, and cutting off the action of the pump.

The means for leading the steam and condensation from the right end of the cylinder B, are shown by the port *k* which extends down to the valve opening in the lower branch *d* and on the other side of valve opening is a port *l* which opens out through the end of the cylinder for discharging the steam. The upper branch *e* has a similar port *m* leading from

the left end of the cylinder to the valve opening and from the other side of the opening a discharge port *n*. Each of these valves *b*, *c*, has two annular grooves, as heretofore described in connection with the other figures, so that when the stem is moved so that one of the grooves admits steam to the cylinder the other groove will be in line with the discharge ports of the other end of the cylinder. It will thus be seen that by means of the adjustable link *j* the range of the low or high water line can be limited or varied at will; and to still further facilitate the means for making this adjustment, I provide the wall of the column with a man-hole *o*, so that the hand can be admitted to adjust the nuts on the link *j*.

It must be obvious that when the cylinder is permanently attached to the column, means should be provided for connecting the piston rod with the pump. As direct connection cannot, frequently be made, I have supplied the cap with a bracket *p*, on which is a grooved pulley *q*, and if desired or necessary a cord may be attached to the piston rod and, passing over the pulley *q*, extend thence to the pump. As a matter of convenience the piston rod passes through both heads of the cylinder so that a ready connection may be made at either end without difficulty.

The double valve mechanism with slight modifications may be employed in connection with a steam whistle, without using the automatic pump operating mechanism. Such a device is shown in Fig. 10, and when so employed I prefer to use a float with each valve. The high and low water lines by the use of this construction are necessarily much farther apart as the water in order to reach the upper float will entirely submerge the lower float, but it is designed to blow the whistle at both low and high water thus warning the engineer who turns the pump on or off. The mechanism for doing this has already been described in detail and need not therefore be repeated.

What I claim as new is—

1. In a boiler feeder, the combination of a water column having a portion of its casing thickened or enlarged and projecting into the interior of the water column, in which projection are steam passages opening at one end in the inner surface of the casing and at the other end in the outer surface of the casing, and a valve way opening at both ends within the column and intersecting the steam passages, with a grooved cylindrical valve sliding in the valve-way, a float, and operative connections between the valve and the float, substantially as described.

2. In a boiler feeder, the combination of a water column having a portion of its casing thickened or enlarged and projecting into the interior of the water column, in which projection are steam passages opening at one end in the inner surface of the casing and at the other end in the outer surface of the casing, a valve way opening at both ends within the column, and intersecting the steam passages, and other steam passages opening at one end in the valve way and at the other end in the outer surface of the casing, with a float and a grooved cylindrical valve sliding in the valve way and arranged to rise and fall with the float, substantially as described.

3. In a boiler feeder, the combination of a water column having a portion of its casing thickened or enlarged and projecting into the interior of the water column, in which projection are steam passages opening at one end in the inner surface of the casing and at the other end in the outer surface of the casing, and a valve way opening at both ends within the column and intersecting the steam passages, with a grooved cylindrical valve sliding in the valve way, a float, operative connections between the boiler and the float, a steam cylinder having steam connections with the valve block of the water column, and a signaling device arranged to be operated by the piston head of said cylinder, substantially as described.

4. In a boiler feeder, the combination of a water column, steam passages through the casing thereof, a valve way intersecting said passages, a float, a lever actuated thereby, and a valve having a stem provided with a series of holes for the adjustment of the point of application of said lever to said stem, substantially as described.

5. In a boiler feeder, the combination with a steam cylinder, of a casing, a valve block therein, ports through said block connected to the opposite chambers of said cylinder, a passage connecting said ports, and a cock controlling said passage, whereby the chambers of said cylinder may be simultaneously exhausted, substantially as described.

Signed at Brooklyn, in the county of Kings and State of New York, this 22d day of October, A. D. 1890.

FRANK M. ASHLEY.

Witnesses:
J. S. ZERBE,
I. S. ELKINS.