

(No Model.)

F. W. FISHER.  
SAFETY VALVE.

No. 458,891.

Patented Sept. 1, 1891.

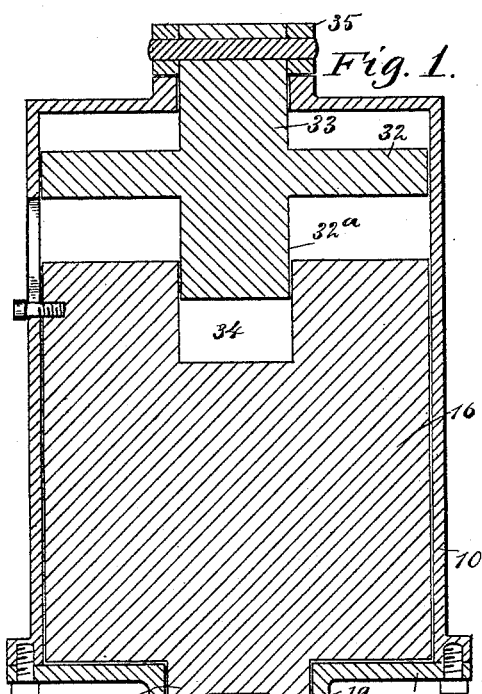


Fig. 1.

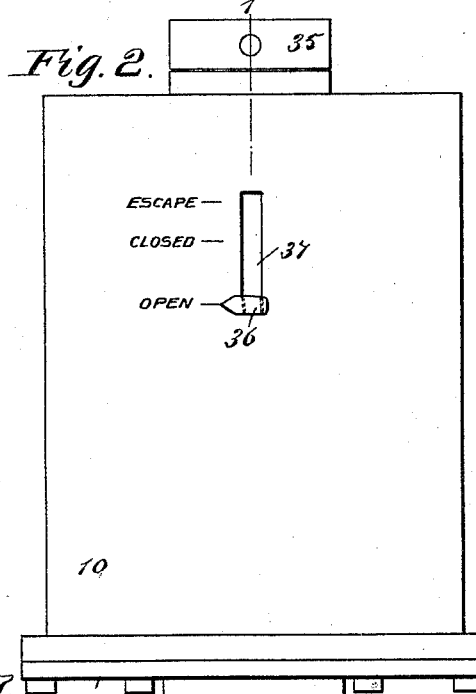


Fig. 2.

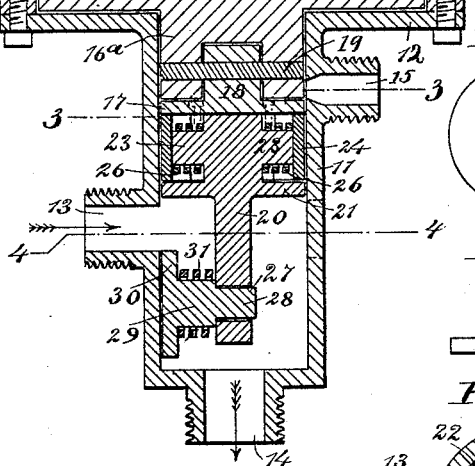


Fig. 3.

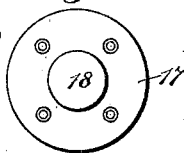


Fig. 4.

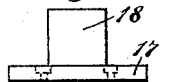


Fig. 5.

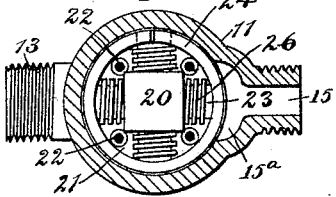


Fig. 6.

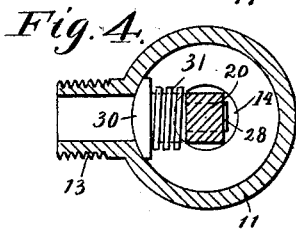


Fig. 7.

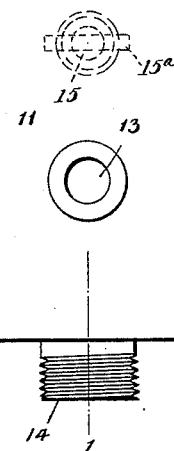


Fig. 8.

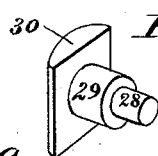


Fig. 9.

WITNESSES:

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# UNITED STATES PATENT OFFICE.

FREDERICK W. FISHER, OF WALTON, LIVERPOOL, ENGLAND.

## SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 458,891, dated September 1, 1891.

Application filed April 14, 1891. Serial No. 388,882. (No model.)

### *To all whom it may concern:*

Be it known that I, FREDERICK W. FISHER, of Walton, Liverpool, England, have invented a new and Improved Safety-Valve, of which the following is a full, clear, and exact description.

My invention relates to improvements in safety-valves; and the object of my invention is to produce a valve which is especially applicable to kitchen-boilers which have a continuous circulation and which may also be applied to other kinds of boilers which are supplied by water under pressure.

To this end my invention consists in certain features of construction and combinations of parts, which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a vertical cross-section of the valve embodying my invention on the line 1 1 in Fig. 2. Fig. 2 is a front elevation of the same. Fig. 3 is a horizontal cross-section on the line 3 3 in Fig. 1. Fig. 4 is a horizontal section on the line 4 4 in Fig. 1. Fig. 5 is a detail side elevation of the piston. Fig. 6 is a detail perspective view of the valve which is applied to the inlet. Fig. 7 is a plan view of the junk-ring, which is secured to the upper portion of the piston. Fig. 8 is a side elevation of the same, and Fig. 9 is a detail side elevation showing the manner in which the packing-ring is mounted on the lugs of the piston.

The valve is provided with a main case or cylinder 10, on the under side of which is a pipe 11, which is provided at the top with a flange 12 to facilitate its attachment to the main case, and this pipe is provided on one side with an inlet 13, which connects with the main water-supply, at the bottom with an outlet 14, which connects with the boiler, and on the side opposite the inlet and higher up with a safety port or escape 15. This latter port is made substantially like the steam-port of an engine-cylinder, the inner portion of the port being elongated, as shown in dotted lines at 15<sup>a</sup> in Fig. 2 and also in Fig. 3.

Within the main cylinder 10 is a weight 16, which connects with the pistons and slide-

valves below and the heft of which corresponds with the normal working pressure of the boiler. The weight 16 has a depending portion 16<sup>a</sup> at its lower end, which enters the upper portion of the pipe 11, and on the lower end of this depending portion is a junk-ring 17, which fits closely within the pipe 11 and which is provided on the upper side with a tongue 18, which projects into a corresponding recess in the lower portion of the weight 16, and is secured to the weight by a key 19. This junk-ring is provided with screw-holes extending vertically through it, and through these holes it is screwed to the posts 22, which extend vertically from a collar 21 on the piston 20. This piston is arranged to move vertically in unison with the weight 16, and is provided at a point a little above the collar 21 with radially-extending arms or lugs 23, and supported upon the outer ends of the lugs and upon the outer portion of the collar 21 is a packing-ring 24, which is split, as shown at 25, at points adjacent to the end of one of the lugs 23, and the split portion comes directly above the lug, the middle portion of the ring being cut away to receive the lug, as best shown in Fig. 9. This prevents any water from being forced up through the split in the ring, as the pressure will first come against the lug which is immediately below the split. The packing-ring 24 is held against the wall of the pipe 11 by means of spiral springs 26, which springs are coiled around the lugs 23, and thus press outward on the packing-ring.

The piston 20 is provided in its lower end with a transverse hole 27, which receives the reduced end 28 of a lug 29, and this lug terminates at its outer end in a slide-valve 30, which has a convex outer portion corresponding to the curvature of the pipe 11, so that when the valve is brought opposite the inlet 13 it will tightly close the same. The valve 30 is held against the wall of the pipe 11 by means of a spiral spring 31, which is coiled around the lug 29 between the valve and the piston 20.

In the upper portion of the main cylinder or case 10 above the weight 16 is a supplemental weight 32, which has on the under side a depending square tongue 32<sup>a</sup> and on the upper side a similar tongue 33. The

tongue 32<sup>a</sup> enters a corresponding recess 34 in the top of the weight 16 and the tongue 33 extends through the top of the cylinder and is keyed to a collar 35, which abuts with  
 5 a similar collar formed on the cylinder-top, and thus limits the downward movement of the supplemental weight.

On the front side of the weight 16 is secured an indicating-hand 36, which projects outward  
 10 through and moves vertically in a slot 37 in the cylinder 10, and the cylinder is marked at intervals opposite the slot, as shown in Fig. 2, to indicate whether the valve is open or closed, or whether the escape is open. When  
 15 the valve is in its normal position, the hand will be in the lower portion of the slot and opposite the word "Open;" but if the valve is raised to close the inlet the hand will be brought opposite the word "Closed," and if it  
 20 is raised still higher to open the escape the hand will be brought opposite the word "Escape," so that it will always indicate the position of the valve.

The operation of the valve is as follows:  
 25 The weight 16 is such that it will normally descend to the bottom of the cylinder 10, and when in this position the inlet 13 will be open, so that the water may flow freely through it and through the outlet 14 to the boiler. If  
 30 the pressure in the boiler becomes too heavy, however, the water will press upward in the pipe 11 and raise the weight 16, so that the valve 30 will close the inlet 13. This will ordinarily relieve the pressure and will raise  
 35 the weight 16, so that the top of it will abut with the supplemental weight 32, and the lower portion of the packing-ring 24 and the collar 21 will be about opposite the escape-port 15. If the pressure continues to in-  
 40 crease, the weight 16 and the supplemental weight 32 will be raised, and the piston will also be raised, thus lifting the packing-ring 24 and collar 21 above the port 15 and allowing the pressure to be relieved through this  
 45 escape-port. This valve may be used as a reducing-valve by dispensing with the supplemental weight and the outlet 14 and placing an outlet opposite the inlet 13, as indicated by dotted lines in Fig. 1. In this case  
 50 the weight corresponds to the desired pressure, and the operation is as follows: We will suppose that the steam enters the inlet at one hundred pounds pressure and it is desired to

use it at a pressure of sixty pounds. The weight is made so as to balance the sixty- 55 pounds pressure, and when the high-pressure steam enters the inlet it raises the weight and the valve 30, thus closing or partly closing the inlet, and the steam-pressure will hold the weight and valve, so that only sixty pounds 60 of steam will flow through the inlet.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A device of the character described, comprising a case having a side inlet and escape- 65 port and an outlet in the lower portion and weight-operated valves adapted to successively close the inlet and open the escape-port, substantially as described. 70

2. A device of the character described, comprising a case having an inlet on one side, an escape-port arranged above the inlet, and an outlet in the lower end, a main weight held to slide in the case, a supplemental sliding 75 weight arranged above the main weight, and valves secured to the lower end of the main weight and adapted to successively close the inlet and open the escape-port, substantially as described. 80

3. A device of the character described, comprising a main case, a depending pipe secured to the lower end of the same, said pipe having a side inlet, an escape-port arranged above the inlet and an outlet in the lower end, a 85 weight held to slide in the main case and having a depending end to enter the pipe, a piston secured to the lower end of the weight and arranged vertically in the pipe, a slide-valve secured to the piston and adapted to 90 close the inlet, and a spring-pressed packing-ring arranged upon the upper portion of the piston and adapted to normally close the escape-port, substantially as described.

4. The combination of the main case, the 95 pipe secured thereto and provided with a side escape-port, the weight held to slide in the case, the piston secured to the lower end of the weight and provided with a collar and laterally-extending lugs, and the spring- 100 pressed packing-ring mounted upon the collar and lugs, substantially as described.

FREDERICK W. FISHER.

Witnesses:

WARREN B. HUTCHINSON,  
 E. M. CLARK.