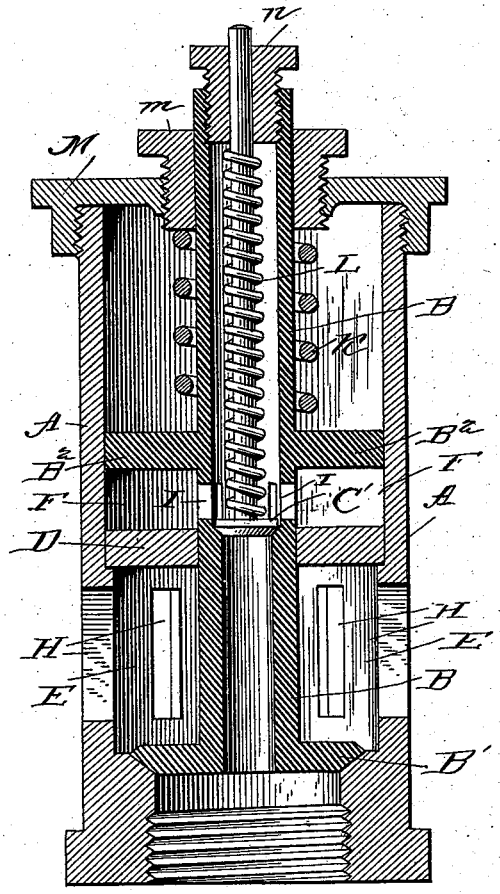
(No Model.)

W. R. FOX.

SAFETY VALVE.

No. 382,643. Patented May 8, 1888.



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UNITED STATES PATENT OFFICE.

WILLIAM R. FOX, OF GRAND RAPIDS, MICHIGAN.

SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 382,643, dated May 8, 1888.

Application filed September 20, 1887. Serial No. 250,236. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM R. FOX, of Grand Rapids, in the county of Kent and State of Michigan, have invented a new and useful Improvement in Safety-Valves; and I do hereby declare that the following is a full, clear, and exact description of the same.

It is the object of my invention to provide a safety-valve composed of a main and a supplemental valve, and to adapt both valves to be kept to their seats wholly by regulated pressure against the pressure of the steam, the supplemental valve being adapted to operate before the main valve, the steam-pressure operating to open both valves.

The accompanying drawing, which illustrates the best embodiment of my invention, represents a central longitudinal section of the valve.

In this drawing, the main valve B′ is seated in the lower end of a tubular casing, A, which is threaded for making the proper steam-connection. The valve has a hollow stem, B, which extends up through a screw-plug, *m*, in the cap M of the case. It passes, also, through a diaphragm, D, fitted tightly within the case and resting on a shoulder, so as to prevent steam from passing from the space above the diaphragm into the lower part of the case. Above this diaphragm the stem of the valve carries a piston, B^2, fitting closely within the case, and larger in diameter than the diameter of the valve. Within this hollow stem is a supplemental valve, C′, seated within the stem at a point just above the position of the diaphragm D when the valve B′ is on its seat. The stem of this valve passes up through a threaded plug, *n*, which bears on a spring, L, coiled about the stem with its lower end resting on the valve C′. Another spring, K, is coiled about the hollow stem, with its lower end bearing upon the piston B^2 and its upper end against the plug *m*. These two plugs serve to adjust the tension of the springs. In the casing are openings H from the chamber E to the atmosphere, the chamber E being between the valve-seat and the diaphragm D; so that when the valve B′ is raised the steam escapes freely through the openings H. There are also ports I in the hollow stem B, opening into the chamber F, which is between the diaphragm D and the piston B^2.

Supposing now it be desired to set the valve to blow off at fifty pounds' pressure, the spring K, which directly controls the main valve, is set at, say fifty-five pounds, or some point above the pressure which is desired. The spring L of the supplemental valve is set at fifty. When, therefore, the pressure rises above fifty, it lifts the valve C′, which allows the steam to escape in the chamber F and to act upon the piston B^2, which, by reason of its greater diameter, receives a larger amount of pressure and is lifted, thus raising the valve B′. When the pressure falls below the limit of fifty pounds, the valve C′ will close, cutting off the supply of steam from the chamber F and removing the pressure from the piston B^2, leaving the spring K to exert its force and close the valve B′.

It will be seen that by the construction above described I keep both valves to their seats by a regulated pressure (either by the springs shown or their equivalents) acting directly against the pressure of the steam, while in all other valves of which I am aware the pressure of the steam has been utilized wholly or in part to keep the valve or valves to their seats, and such an arrangement would defeat the very object aimed at in my invention, which is to provide a safety-valve composed of a main and supplemental valve under independent tension acting against the steam-pressure, one being set under less tension than the other, but both being adapted to be lifted from their seats when a certain pressure is reached, so that even in case one should refuse to work this would in no wise interfere with the working of the other.

It will of course be understood that I do not limit myself to springs to keep the valves upon their seats by regulated pressure, as I may use weights as an equivalent for the springs.

Having thus described my invention, what I claim is—

1. In combination, the chamber A, a main valve having a hollow stem, a piston, B^2, carried thereby within the closed chamber, a spring for closing said valve, an independent valve and spring within the hollow stem, said spring being of less tension than the spring of the main valve, and openings between said stem and the space below the piston B^2, whereby, when the supplemental valve is lifted, steam

is admitted below the piston to operate the same, substantially as described.

2. In combination, the case A, the main valve B′, having a hollow stem, a piston, B^2, carried thereby and inclosed within the case A, a spring for operating the valve B′ against steam-pressure, a diaphragm, D, a chamber, F, between it and the piston B^2, openings from the hollow stem to the chamber F, a valve for controlling the entrance of steam to said chamber, and a chamber, E, with openings for the blowing off of steam, substantially as described.

3. In a safety-valve, the main valve having a hollow stem, and a supplemental valve within the hollow stem, said valves being kept to their seats against the pressure of the steam by independent springs varying in tension, the steam-pressure operating to open both valves, but one in advance of the other, by reason of the variation in the tension of the springs, substantially as described.

4. A safety-valve consisting of a main valve and a supplemental valve, both valves being kept to their seats wholly by regulated pressure against the pressure of the steam, the steam-pressure operating to open both valves.

5. In a safety-valve, the main valve having a hollow stem, a supplemental valve within the stem, and pressure-springs or their equivalents for the valves, whereby they are held to their seats, and devices for regulating the said pressure against the steam-pressure, the said steam-pressure operating to open both valves.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM R. FOX.

Witnesses:
E. W. TOWER,
M. W. FISHER.