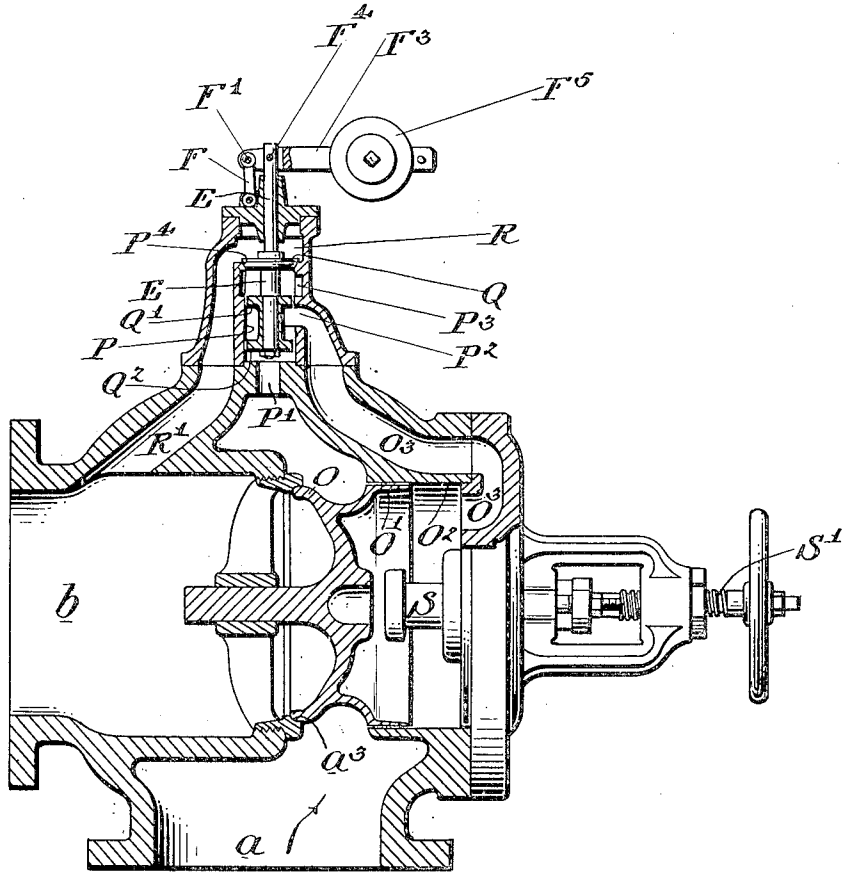
No. 869,524. PATENTED OCT. 29, 1907.

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SAFETY VALVE.

APPLICATION FILED JAN. 18, 1906.



WITNESSES:

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SAFETY-VALVE.

No. 869,524. Specification of Letters Patent. Patented Oct. 29, 1907.

Application filed January 18, 1905. Serial No. 241,624.

To all whom it may concern:

Be it known that I, LOUIS SCHUTTE, a citizen of the United States of America, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Safety-Valves, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to the construction of safety valves and has for its object to provide a valve which shall be free from the usual marked tendency to chatter and which is mainly characterized by the use in connection with the main safety valve of a pilot valve which determines the movements of the main safety valve.

My improvements will be best understood as described in connection with the drawing in which they are illustrated, and in which

a, indicates the entrance passage leading into the valve casing, and *b*, the exit passage from the valve casing, a^3, being the seat for the safety valve and the valve casing having opposite to the seat and on the admission side of the casing a cylinder O^2, the diameter of which is slightly greater than the effective area of the valve seat a^3, that is to say, the diameter of the valve seat which is covered by the valve when seated.

O, is the valve which is provided with a piston extension O′, forming a loose fit in the cylinder O^2, as indicated.

In my present construction I provide the valve casing with a by-pass connecting the admission and delivery sides of the casing, in which by-pass is formed a small valve seat P^4, and below it a cylindrical chamber P, between which and the valve seat P^4, is preferably formed an enlarged chamber P^3. The upper part of the cylindrical chamber P, is connected with the cylinder O^2, through a passage O^3, leading into the cylindrical chamber through a port P^2, P′, indicating the port connecting the cylindrical chamber with the admission side of the casing and R′, the port connecting the top of the cylindrical chamber above the valve seat with the delivery side of the casing.

Q, is a valve adapted to seat itself on the seat P^4, and having attached to it, a disk Q^2, which forms a loose fit with the cylinder P, below the port P^2. By preference the valve has also attached to it a disk or piston Q′, fitting loosely in the top of the cylindrical chamber P, and so placed that when the valve Q, rises from its seat, the disk Q′, is lifted into the enlarged chamber P^3. The valve Q, which I call the pilot valve, is held to its seat by any convenient yielding means, but preferably by means acting with decreasing force as the valve moves away from its seat; thus, as shown, the spindle E, which presses the valve to its seat is acted on by a lever F^3, pivoted to the spindle at F^4, and at F^2, pivoted to a link F, the lever F^3, when the valve is seated keeping a horizontal position and being acted on by a weight F^5. It will be obvious that as the lever is moved upward by the valve in rising the valve F^3, will take a slanting position, with the effect of decreasing the leverage exerted by the weight F^5. This feature of construction as also the general construction of the pilot valve considered as a safety valve, forms the subject matter of my co-pending application filed January 18, 1905, Serial Number 241,623.

S, is the spindle by which the safety valve O can be held to its seat when desired, the spindle S, being retracted by a screw stem S′.

In normal operation, both the valves O, and Q, being seated, the cylinder O^2, and the cylinder P, will be filled with steam or other fluid under the same pressure as exists in the entrance chamber *a*, of the casing, and the entire area of the valve O, will be under this pressure. When the pressure however rises to the point at which the valve Q, is set to open, that valve will be lifted from its seat and the fluid in the cylinder O^2, will at once escape through the pilot safety valve, reducing the pressure in cylinder O^2, to that existing on the side *b*, of the casing whereupon the pressure in the chamber *a*, acting on the slightly greater area of the piston O′, will open the valve O, and permit the direct escape of fluid from the chamber *a*, to the chamber *b*, the valve remaining open until the pressure in chamber *a*, has fallen to such a point that the pilot will again seat itself when normal conditions are restored when the pressure in the cylinder O^2, reaches or nearly reaches the pressure in the chamber *a*. The direct escape in any considerable volume of the fluid from the chamber *a*, into the port R′, is prevented by the disk Q^2, and the cylinder P, and by preference the additional disk or cylinder Q′, is employed so that as soon as the valve Q, opens and the pressure fluid escapes from the chamber P^3, the full pressure of the fluid in the cylinder O^2, will be exerted on the disk or piston Q′, to force it and the valve Q, upward until the disk has passed into the chamber P^3, and the fluid has a free escape through that chamber and the port R′.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is,

1. A safety valve having in combination a valve seat a^3, and a cylinder O^2, situated in front of said seat, of slightly greater diameter than the effective area of the seat, a

chamber having a small valve seat P^4, and a cylindrical chamber P, situated below said seat, said chamber forming a by-pass around the main valve seat a^3, a port connecting cylinder P, with cylinder O^2, a valve adapted to seat itself on seat a^3, and formed with a piston extension making a loose fit with cylinder O^2, a pilot valve adapted to seat itself on small seat P^4, having a disk attachment working in cylinder P, and means acting to hold the pilot valve to its seat.

2. A safety valve having in combination, a valve seat a^3, and a cylinder O^2, situated in front of said seat, a cylindrical chamber P, at one side of the valve seat a^3, said chamber having a valve seat P^4, at its top, a port P', at its bottom connecting it with the admission side of the casing, a port P^2, at its side, and laterally expanded chamber P^3, above port P^2, a conduit from the top of the cylinder P, to the delivery side of the casing, a conduit from port P^2, to the cylinder O^2, a valve O, adapted to seat itself on seat a^3, and having a piston O', of slightly greater diameter forming a leaky fit in cylinder O^2, a valve Q, seated on seat P^4, and having a disk Q', forming a leaky fit in the cylinder P, between port P^2, and chamber P^3, a second disk Q^2, fitting a cylinder P, below port P^2, and also attached to valve Q, and means acting with regulated force to seat valve Q.

3. A safety valve having in combination a valve seat a^3, and a cylinder O^2, situated in front of said seat, a cylindrical chamber P, at one side of the valve seat a^3, said chamber having a valve seat P^4, at its top, a port P'', at its bottom connecting it with the admission side of the casing, a port P^2, at its side and a laterally expanded chamber P^3, above port P^2, a conduit from the top of the cylinder P, to the delivery side of the casing, a conduit from port P^2, to the cylinder O^2, a valve O, adapted to seat itself on seat a^3, and having a piston O', of slightly greater diameter forming a leaky fit in cylinder O^2, a valve Q, seated on seat P^4, and having a disk Q', forming a leaky fit in the cylinder P, between port P^2, and chamber P^3, a second disk Q^2, fitting in cylinder P, below port P^2, and also attached to valve Q, and means acting to seat valve Q, and with decreasing force as said valve recedes from its seat.

4. In a safety valve construction the combination with an inlet and exhaust passage, of a main pressure valve adapted to establish communication between said passages, a by-pass around said valve, the said main valve having a piston extension of larger pressure area than that of the main valve, a chamber in which said piston extension operates, a minute communication between said inlet passage and said chamber, a cylindrical chamber forming a part of said by-pass, a means of communication between said cylindrical chamber and the first mentioned chamber, a loaded supplemental valve adapted to operate partly within said cylindrical chamber, the said supplemental valve being exposed to the pressure within said inlet passage and said first mentioned chamber for the purpose of relieving the pressure on the main valve within the inlet passage and the first mentioned chamber.

5. In a safety valve construction having an inlet passage and a piston extension on the main valve operating in a chamber, the combination with a by-pass around said valve, of a cylindrical chamber forming a part of said by-pass, the said cylindrical chamber having an enlarged circumferential portion near one end thereof, a loaded supplemental valve consisting of a puppet and a pair of disks, the said puppet adapted to open and close one end of said cylindrical chamber and the said pair of disks being exposed to the pressure in said inlet passage and said first mentioned chamber for the purpose of operating said puppet and establishing communication between said first mentioned chamber and the exhaust passage respectively.

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Witnesses:
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