

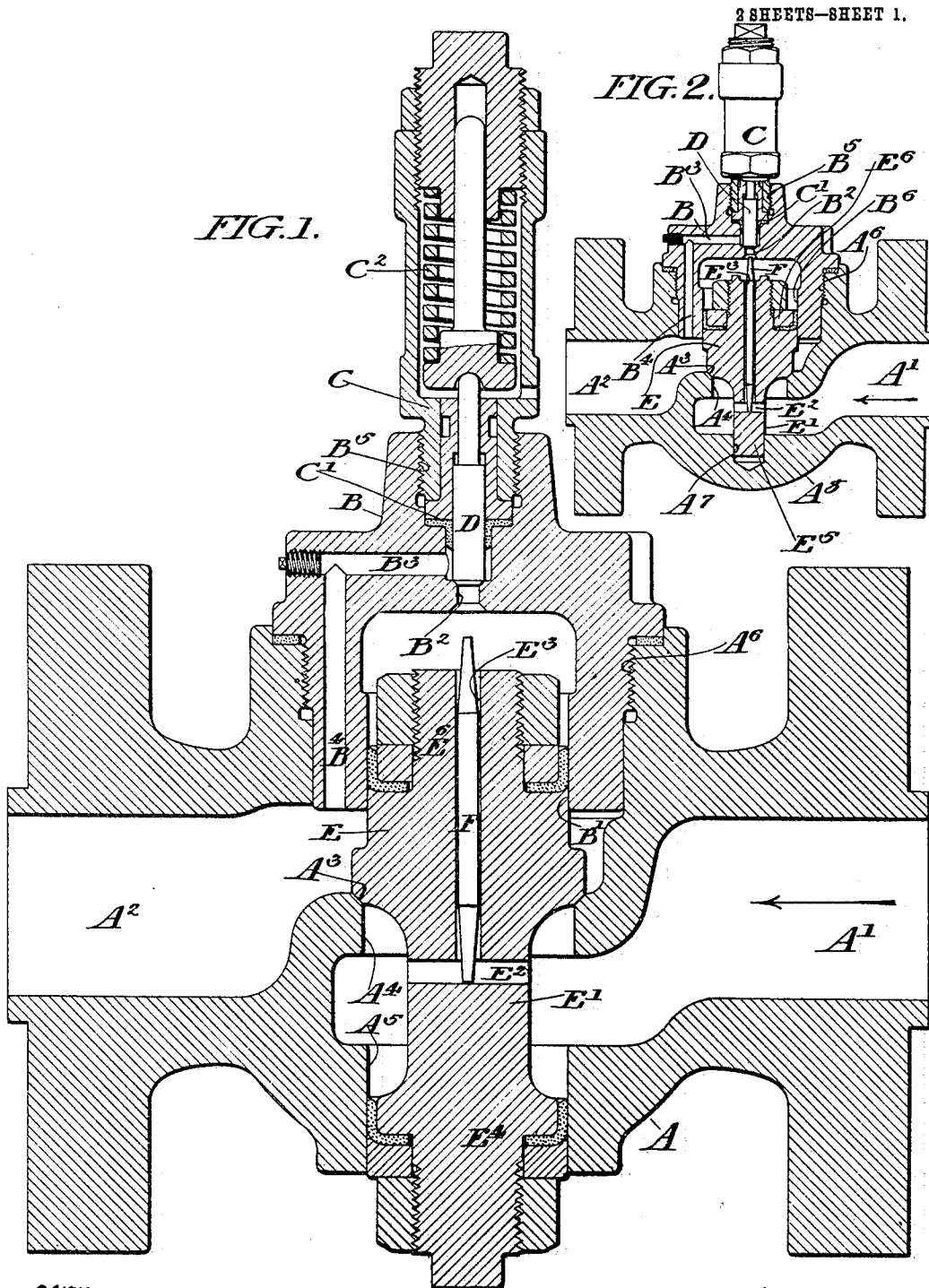
No. 781,913.

PATENTED FEB. 7, 1905.

L. SCHUTTE.
SAFETY VALVE.

APPLICATION FILED JULY 7, 1904.

2 SHEETS—SHEET 1.



Witnesses
Edward
R. Williams

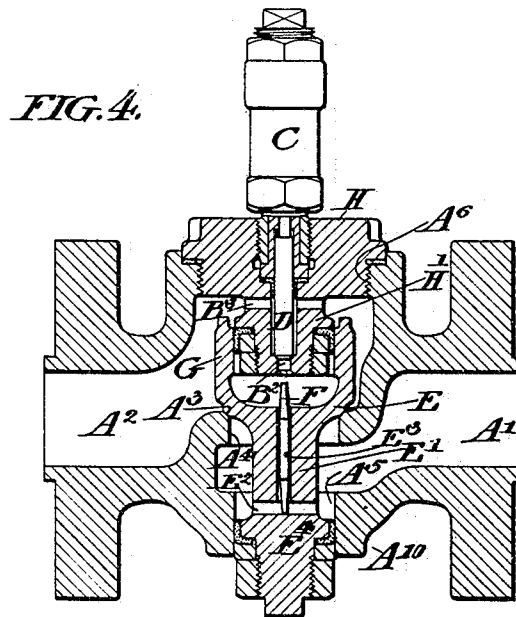
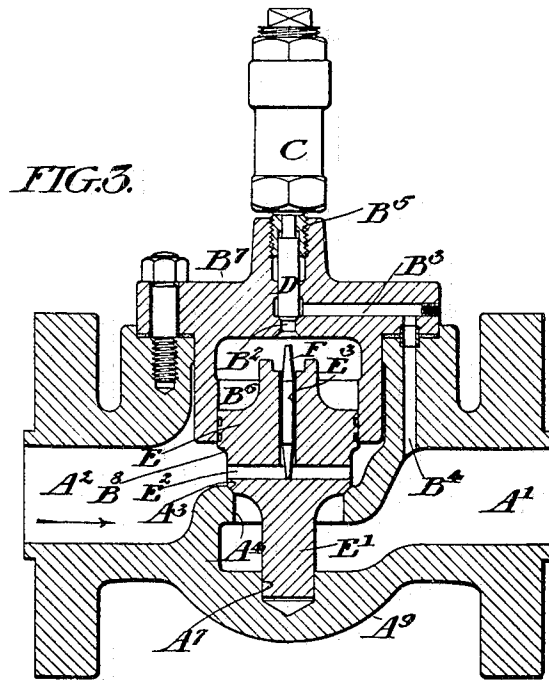
Inventor
Louis Schutte
by
James D. Chambers
his atty

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UNITED STATES PATENT OFFICE.

LOUIS SCHUTTE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO
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SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 781,913, dated February 7, 1905.

Application filed July 7, 1904. Serial No. 215,637.

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 safety-valves, and is especially intended and adapted for use in connection with hydraulic mains and for the purpose of providing a valve which will yield under sudden increases of pressure, such as are incident to the ram-like action of the liquid on sudden stoppage; but my invention is also adapted for use in connection with steam or other mains in which safety-valves are required or advisable.

The nature of my improvements will be best understood as described in connection with the drawings, in which they are illustrated, and in which—

Figure 1 is a sectional elevation of a valve embodying my invention in what I consider to be its best and most practicable form. Fig. 2 is a similar elevation showing a modification of my improved valve. Fig. 3 is again a sectional elevation showing such a modification as is incident to the use of the valve where the entrance and exhaust chambers of the casing are reversed from the positions they occupy in Figs. 1 and 2, and Fig. 4 is a sectional elevation showing an equivalent arrangement for that illustrated in Fig. 1.

A, Fig. 1, indicates the casing of the valve, which is formed with entrance and exit chambers A' and A'' and with the connecting port or passage A¹, provided at its top with a valve-seat A³. The modified casings A⁸ of Fig. 2, A⁹ of Fig. 3, and A¹⁰ of Fig. 4 are provided with the same parts; but it will be understood that in Fig. 3 A² is the entrance-chamber and A' the exit-chamber.

Referring to the construction shown in Fig.

1, A⁵ is an open-ended cylinder formed directly beneath the valve-seated passage A¹, and A⁶ is a threaded opening through the top of the casing, into which screws the cover-section B, which is formed with a downwardly-extending cylindrical portion B' in direct line to the port A¹ of preferably slightly less diameter than the port A¹ and of considerably greater diameter than the cylinder A⁵. Through the top of the cylinder B' is formed the port B², which communicates through ports B³ and B⁴ with the outlet-chamber of the casing, the port-section B² being provided with a valve-seat at its top, as shown. B⁵ indicates a threaded perforation in the top of the cover, into which screws the spring-casing C, the lower end being utilized to form part of a stuffing-gland, as indicated at C', and the casing C, enclosing an adjustable spring C², which through convenient connecting mechanism presses down against a valve D, which passes through the gland C' and is held by the spring on the valve-seat of the port B². E is the main valve, which, as shown in Fig. 1, has a downwardly-extending portion E', which connects it with a piston E', moving in the cylinder A⁵ and through which is formed a transverse port E², connecting with the bottom of a vertical port E³, arranged through the valve and its upper cylindrical extension E⁶, which fits in the cylinder B', the port E³ being directly in line with the port B². F is a rod which is situated in a port E³, so as to form a loose-fitting piston therein, the rod having preferably a diameter substantially equal to the exposed face of the valve D.

In operation the spring C² is adjusted so as to hold the valve D to its seat at a predetermined pressure, which is regulated, of course, by the pressure which the conduits are intended to be exposed to. The valve E being seated, the pressure of the fluid in the chamber A' is communicated to the cylinder B' through the ports E² and E³, and the valve is held to its seat by this pressure, the aggregate pressure acting on the pistons E' and E⁶.

being materially greater than the pressure acting directly on the valve E. When the pressure in the chamber A' and cylinder B' exceeds that determined by the spring-pressure on the valve D, this valve is raised from its seat and the liquid in the cylinder B' escapes through ports B², B³, and B⁴ to the outlet-chamber A², and the diminution of pressure on the piston E⁶ permits the valve E to open, as the exposed area of the valve is greater than that of the piston E⁴; but the release of pressure in cylinder B² causes the full pressure of the chamber A' to act on the piston-like rod F, forcing it upward into the port E³ and into the port B², its end coming in contact with the valve D and guiding that valve away from its seat until the pressure acting on the rod F falls below that exerted by the spring C². My device thus avoids the "chattering," so to speak, of the valve D, which would take place if no such device were provided to prevent it, and it will of course be understood that as soon as the valve D seats itself on the port B² the pressure of chamber A' will promptly be restored to the cylinder B' and the safety-valve closed.

In the construction shown in Fig. 2 the device is very similar except that in place of having the open-ended cylinder A⁵ the casing is formed with a guide perforation A⁷, into which an extension E⁵ of the projection E' of the valve E extends. In this construction also it will be noticed that the cylinder marked B⁶, which takes the place of the cylinder B', is of proportionately larger area with respect to the port A⁴ than is the case in Fig. 1. Otherwise the devices are practically the same and need no further description.

In the construction shown in Fig. 3 the cover marked B⁷, which takes the place of the cover B of Figs. 1 and 2, is secured to the casing in a somewhat different manner, but otherwise does not differ materially from the cover B. The cylinder B⁶ in the construction of Fig. 3 is somewhat larger than the similar cylinder in Fig. 2, and the transverse ports E² in place of being formed in the valve extension E' are formed above the valve proper, so as to communicate with the chamber A², which in this construction is the inlet-chamber of the casing. The operation of the device is practically as already described and need not be further explained.

In Fig. 4 I have illustrated a modification in which in place of the cover B of Fig. 1 a cover H is provided, which is formed with a piston-like extension H', in which piston-like extension are formed the ports B² and B³, the valve D extending through the piston-like extension to seat itself on port B². The main valve E in this modification in place of having a piston extending up from its top is formed with a cylindrical extension, (marked G,) which fits on the piston H', the device being

in every respect an equivalent for the construction shown in Fig. 1, with simply a reversal of the piston and cylinder construction, and in this connection I will note that where in my claims I refer to a piston as connected with the valve I intend to be understood as including also such a modified construction as Fig. 4.

In the constructions of Figs. 1, 2, and 4 the packing devices illustrated are such as are adapted for use with hydraulic mains. In the construction of Fig. 3 I have indicated a structure which is more particularly adapted for use with steam-mains where the cup-leather packing would not be necessary or desirable.

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-casing having inlet and outlet chambers connected by a passage including a valve-seat, a cylinder situated above said valve-seat and connected to the outlet-chamber of the casing through a port, B², B³, a valve D, normally closing said port and held to its seat by resilient pressure, a valve arranged to close the main port in the chamber, a piston attached thereto and moving in the cylinder aforesaid, said valve and piston having a port E³, formed therein in line with the port B², and a lateral port or ports connecting said port E³, with the inlet-chamber of the casing, and a rod F, forming a loose-fitting piston in the port E³, and adapted, when raised, to impinge on valve D.

2. A safety-valve having in combination a valve-casing having inlet and outlet chambers connected by a passage including a valve-seat, a cylinder situated above said valve-seat and connected to the outlet-chamber of the casing through a port B², B³, a valve D, normally closing said port and held to its seat by resilient pressure, a valve arranged to close the main port in the chamber, a piston attached thereto and moving in the cylinder aforesaid, said valve and piston having a port E³, formed therein in line with the port B², and a lateral port or ports connecting said port E³, with the inlet-chamber of the casing and a rod F, having a sectional area substantially equal to the exposed face of valve D, said rod forming a loose-fitting piston in the port E³, and adapted when raised to impinge on valve D.

3. A safety-valve having in combination a casing provided with inlet and outlet chambers connected by a port including a valve-seat, said casing being formed or provided with a closed-ended cylinder B', situated above the valve-seat and an open cylinder A⁵, of less diameter situated below the valve-seat, in combination with a conduit B² B³, leading

from the upper cylinder to the outlet-chamber of the casing, a valve D, seated in said port by resilient pressure, a valve adapted to close the valve-seated port in the casing, piston-like extensions of said valve working in the upper and lower cylinders, a port E³, formed in the upper piston in line with port B, and connected to the inlet side of the casing, and a rod F, forming a loose-fitting piston in port E³, and adapted to impinge on valve D, when raised.

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Witnesses:

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