

No. 635,150.

Patented Oct. 17, 1899.

F. SCHREIDT.
SAFETY VALVE.

(Application filed Mar. 11, 1898. Renewed Mar. 24, 1899.)

(No Model.)

2 Sheets—Sheet 1.

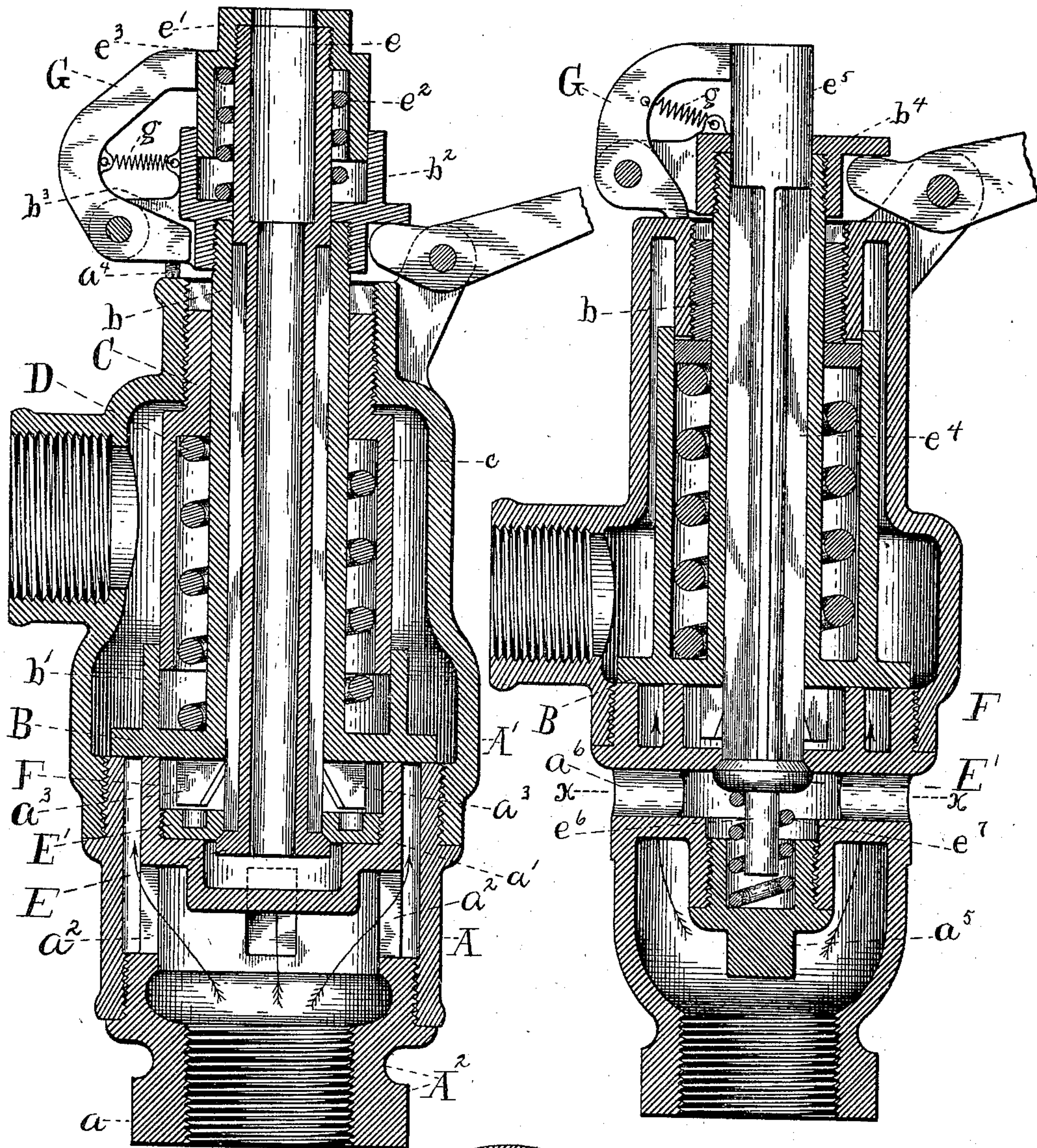


Fig. 1

Fig. 2

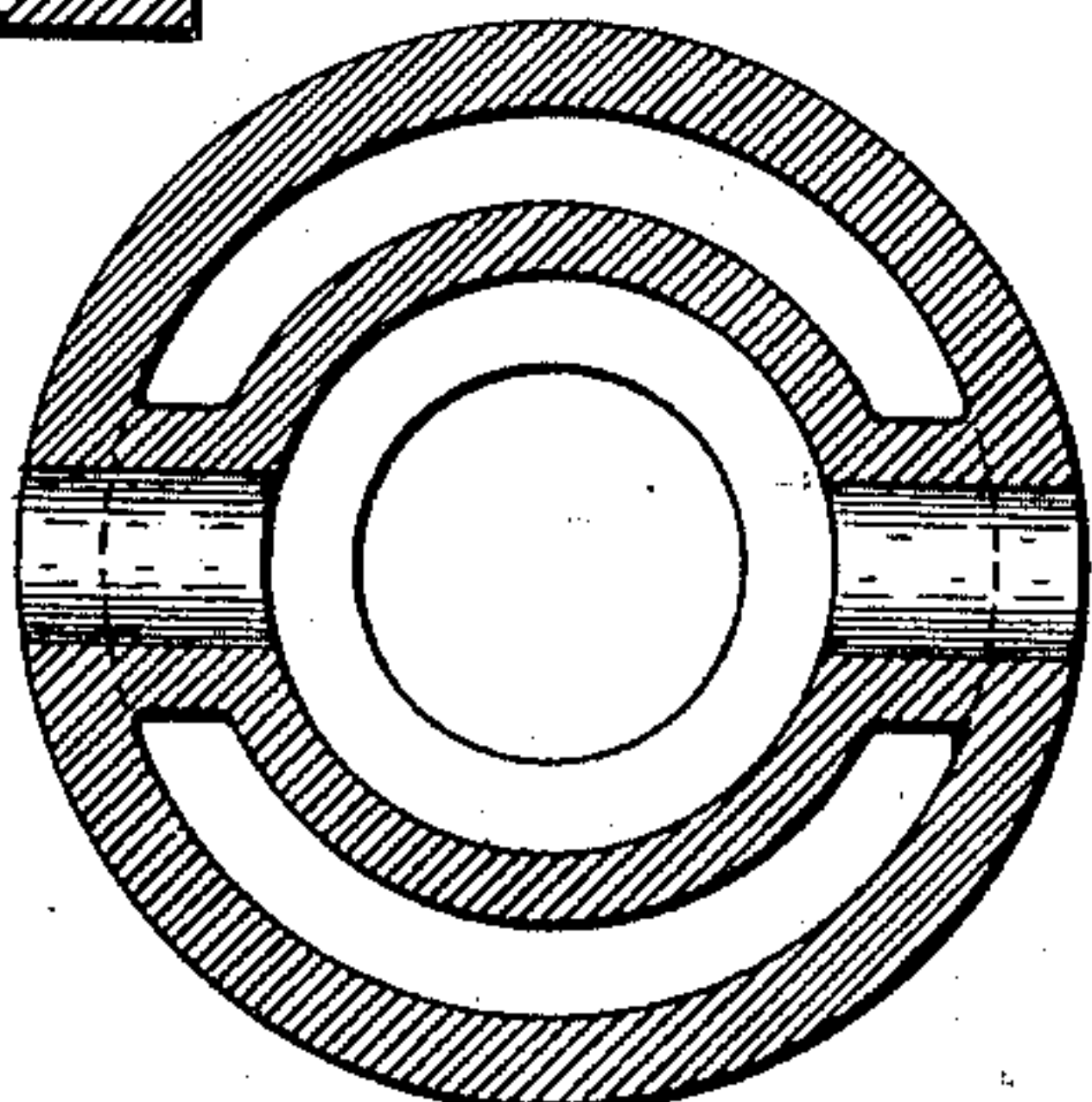


Fig. 3

WITNESSES

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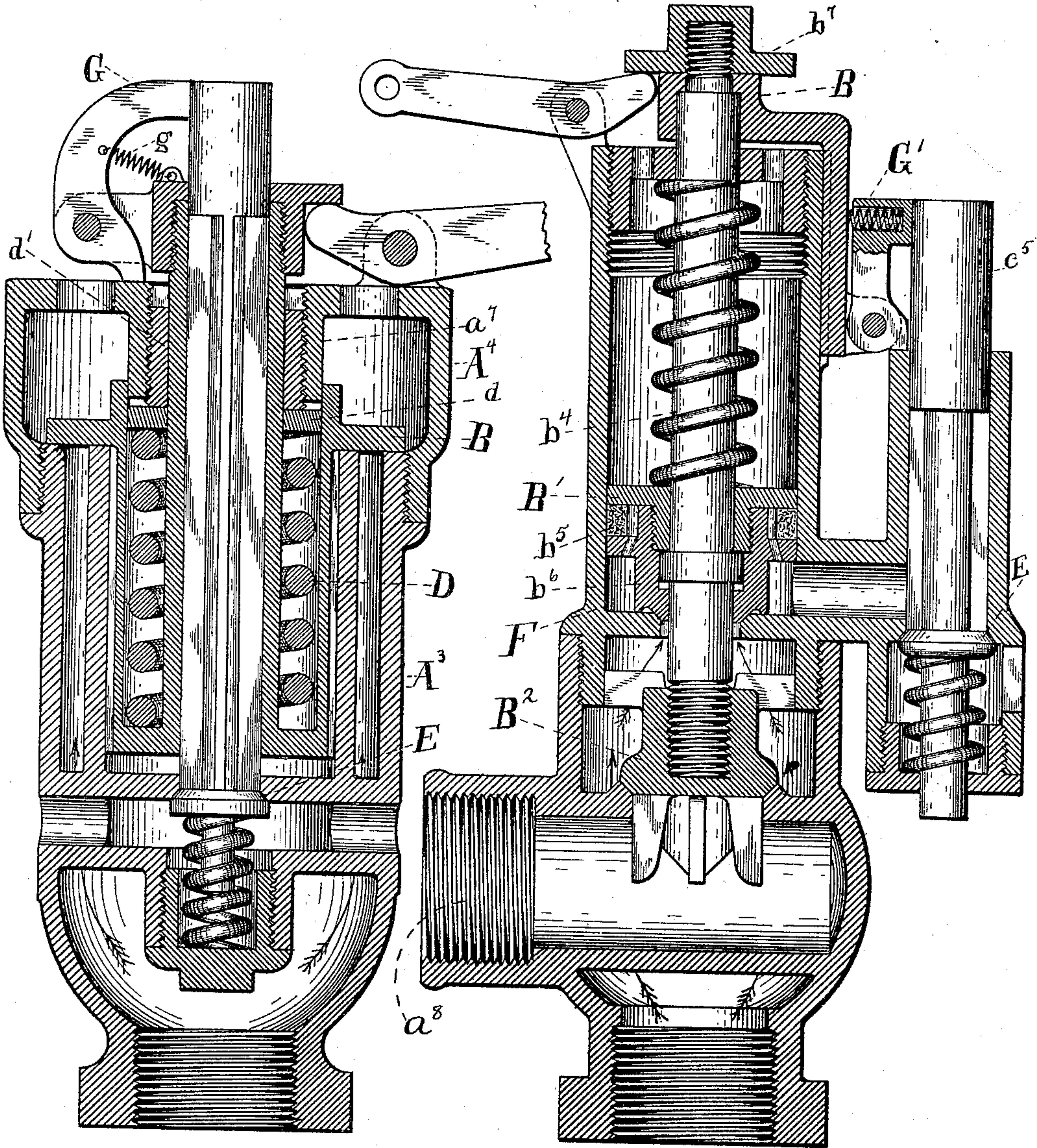


Fig. 4

Fig. 5

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UNITED STATES PATENT OFFICE.

FRANK SCHREIDT, OF MANSFIELD, OHIO.

SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 635,150, dated October 17, 1899.

Application filed March 11, 1898. Renewed March 24, 1899. Serial No. 710,390. (No model.)

To all whom it may concern:

Be it known that I, FRANK SCHREIDT, a citizen of the United States, and a resident of Mansfield, in the county of Richland and State of Ohio, have invented certain new and useful Improvements in Safety-Valves, of which the following is a specification.

My invention relates to safety and relief valves. Its object is to provide means by which the main valve is held to its seat until the pressure in the boiler has exceeded its predetermined limit, when it will be instantly thrown wide open and so held by the pressure from the boiler upon it and the fluid confined in a chamber controlled by a supplemental valve, which is automatically opened to relieve the pressure in said chamber by the main valve in its movement toward its seat, thus insuring that the main valve shall remain open until the excess of pressure is relieved and quickly closed upon its seat to prevent waste of steam or fluid under pressure. The means by which I attain these results are fully illustrated in the accompanying drawings. In connection with these drawings the invention will be first fully described, and then specifically pointed out in the claims.

Referring now to the drawings, in which like parts are indicated by similar reference-letters wherever they occur throughout the various views, Figure 1 is a diametrical sectional view of my preferred form of valve. Fig. 2 is a similar view of a modified form. Fig. 3 is a transverse sectional view of the lower part of the valve-case, taken on line $x x$ of Figs. 2 and 4. Fig. 4 is a diametrical sectional view of another modification. Fig. 5 is a longitudinal central sectional view of another modified form of my invention.

Referring first to Fig. 1, A and A' represent the case or shell of my preferred form of valve, with the section A², which is screwed into the part A and has its body perforated and screw-tapped to be connected to the boiler or other pressure-tank, the lower part a being formed angular to seat a wrench for making the connection. The purpose of making the parts A and A² separate and connecting them together, as shown, is to save metal, make the steam-space under the main valve accurate and just large enough to be in proportion to the area of the valve-inlet, so that a spring of

uniform strength may be used for all of the valves, and the chamber underneath the main valve also made smaller and exactly uniform for all sizes of valves. The part A of the case is formed integral with an annular depending cup a' , which is connected to the part A by webs a^2 , which leaves between the cup and outer casing A steamways, as indicated by arrows, to allow the pressure from the boiler to bear upon the under side of the main valve B, which is seated upon the top edges of the parts A and a' and guided in its vertical movement by wings a^3 , which bear against the circular walls of the cup a' . The main valve B has an upper tubular extension b and a larger tubular extension b' formed integral with it. The extension b passes through an adjusting-nut C, which has a lower tubular extension c to fit and slide within the upper extension b' , forming an annular chamber or jacket between the parts b and c to receive the coil-spring D, by which the pressure of the main valve upon its seat is regulated. Upon the upper end of the extension b is screwed a cup-shaped cap b^2 , through which and the upper extension b passes the hollow stem e of the supplemental or relief valve E, which is an upwardly-closing valve seated against a ring E', which is screwed into the part a' of the lower case, forming between the valve-ring and under side of the main valve B a chamber F, into which the fluid under pressure passes so soon as the main valve is lifted slightly from its seat, thus exposing the whole under side of the valve to the pressure of the fluid and rapidly throwing it wide open. On top of the hollow valve-stem e is secured a cap e' , which slides into the cup b^2 , forming a chamber for the spiral spring e^2 , which holds the valve E to its seat. The cap b^2 has upon one side an outwardly-projecting lug b^3 , upon which is journaled a trigger G, which has a spring g connected to it and to a lug from the cap b^2 to draw the upper end of the trigger toward and against the cap e' . The lower arm of the trigger G projects inwardly from its pivot and over a screw or projection a^4 from the upper end of the case A'. The operation of this valve is as follows: When the pressure in the boiler exceeds the pressure at which the spring D is set, the valve B will be started from its seat, and the pres-

sure filling the chamber F exerts its force upon the whole underside of the valve, throwing it wide open. The valve in its upper movement will of course carry the trigger G with it, and when the upper end passes the shoulder e^3 the spring will snap it upon the shoulder. The pressure in the chamber F will hold the valve B open until the pressure in the boiler has fallen to or below its predetermined limit, when the main valve will start to close upon its seat, and the trigger pulling down upon the shoulder e^3 will open the valve E and allow the pressure in the chamber F to pass out and through the hollow stem, permitting the spring D to snap the main valve quickly to its seat. As the valve passes to its seat the short arm of the trigger will strike the projection a^4 , throw the trigger back off the shoulder e^3 , when the spring e^2 will close the valve E upwardly against its seat.

In the form shown in Fig. 2 the supplemental valve E' has a solid stem, with guide-wings e^4 , to slide within the tubular stem b of the main valve B, and the solid cylinder or plug e^5 , which slides through the cap b^4 , against which the trigger G is held by the spring g . In this form the valve E has a lower extension e^6 , which extends into a cup-shaped plug a^5 in the case, and the valve is normally held to its seat by the spring e^7 , coiled around this extension and seated in the hollow plug a^5 .

The operation of the main valve is the same as in the preferred form, excepting that the trigger snaps over the cylinder e^5 of the valve, and when the main valve in closing throws the supplemental valve from its seat the chamber F is relieved through the transverse passages a^6 , instead of through the hollow stem.

In the form shown in Fig. 4 the lower part of the case A^3 is molded in a single piece and the upper part of the case A^4 has an enlarged chamber open at the top for the escape of the fluid which passes the main valve B, the main valve in this case being at the top of the tubular extension instead of below it, and the pressure of the spring D being regulated by a follower d and the screw-threaded plug d' , which screws into an inwardly-projecting tubular extension a^7 of the part A^4 . The supplemental valve E, its stem, lower projection, upper cylindrical extension, and the trigger G are substantially the same and operate in the same manner as in the form described in Fig. 2.

In the modification shown in Fig. 5 the supplemental valve E and its case are arranged alongside of the case of the main valve. In this case the main valve is what may be termed a "double" valve—that is, it has the two valves B' and B^2 arranged upon the same stem b^4 . The valve B' is a piston-valve formed of two disks having a spring packing-ring b^5 between them and steam-passages in the lower disk to permit the steam-pres-

sure to pass within the ring and keep it expanded against the case. The stem b^4 has a collar upon it, which permits the stem to have a limited play between the tubular end of the upper disk and the recessed cylindrical chamber in the extension b^6 of the lower disk, which has an annular flange resting upon the case surrounding its cone-shaped valve. When the pressure in the boiler exceeds its limit, the valve B' will be lifted against the pressure of the spring d^4 until the lower wall of the extension b^6 strikes the collar, when the valves B' and B^2 will move together and allow the excess of pressure to pass off through the escape a^8 . To the top of the stem b^4 is fitted an angle-arm B^3 , which is guided in ways upon one side of the valve-case and held in place by a screw-cap b^7 . This arm carries the trigger G' , which when the stem b^4 is carried up by the pressure of the valves B' and B^2 will pass over the cylindrical extension e^5 of the supplemental valve E, and when the main valves again descend to their seat the trigger will open the valve E and exhaust the chamber F through the opening in the spring-chamber below the supplemental valve.

What I claim is—

1. In a safety-valve the combination of the case, the main valve held to its seat by spring-pressure, an inclosed chamber below the main valve to receive the pressure from the boiler when said main valve is started from its seat, a supplemental exhaust-valve for said chamber, and means such as shown to automatically throw the supplemental valve from its seat and relieve the chamber of pressure as the main valve moves toward its seat.

2. In a safety-valve the combination of the case, a main valve therein having its outer surface exposed to the fluid-pressure when seated, a spring to hold the valve to its seat against the boiler-pressure, a chamber below the valve to receive the pressure when the valve is started from its seat to expose the full area of the valve to the pressure and throw it wide open, a spring-loaded supplemental valve to hold the pressure within the chamber when closed, a trigger carried by the main valve-stem to pass over the stem of the supplemental valve when the main valve is lifted and to throw the supplemental valve from its seat, relieve the pressure in the chamber and permit the main valve to rapidly close upon its seat.

3. The combination as hereinbefore set forth of the two-part valve-case having a cup-shaped chamber within its lower member and the upper edges of said member forming a valve-seat with steamways between the case and the cup to permit the steam-pressure to bear upon the outer portion of the main valve, an upwardly-extending cylinder upon the main valve, an adjusting-nut screwed into the upper part of the case and having an enlarged cylindrical portion which fits into the cylinder upon the main valve and forms a

chamber for the spring which holds the valve
to its seat, the tubular stem of the main valve
passing through the adjusting-nut and pro-
vided on top with a cup-shaped cap, an up-
5 wardly-closing valve controlling the passage
of steam from the cup-shaped chamber below
the main valve, said valve having a hollow
stem extending through the cap of the main
valve-stem and provided with an adjusting-
10 nut, a cylinder forming with the main cylin-
der-cap a spring-chamber, a spring within
said chamber to hold the supplemental valve
to its seat, a spring-pressed trigger carried
by the stem of the main valve and adapted

to snap over the stem of the supplemental 15
valve when the main valve is lifted from its
seat and to throw the supplemental valve
from its seat when the main valve starts to
close, and the projection on the main valve-
case to release the trigger from the supple- 20
mental-valve stem and permit the supple-
mental valve to close when the main valve
has reached its seat.

FRANK SCHREIDT.

Witnesses:

W. H. BOWERS,
JAS. T. FITZGERALD.