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F. SCHREIDT.

SAFETY VALVE.

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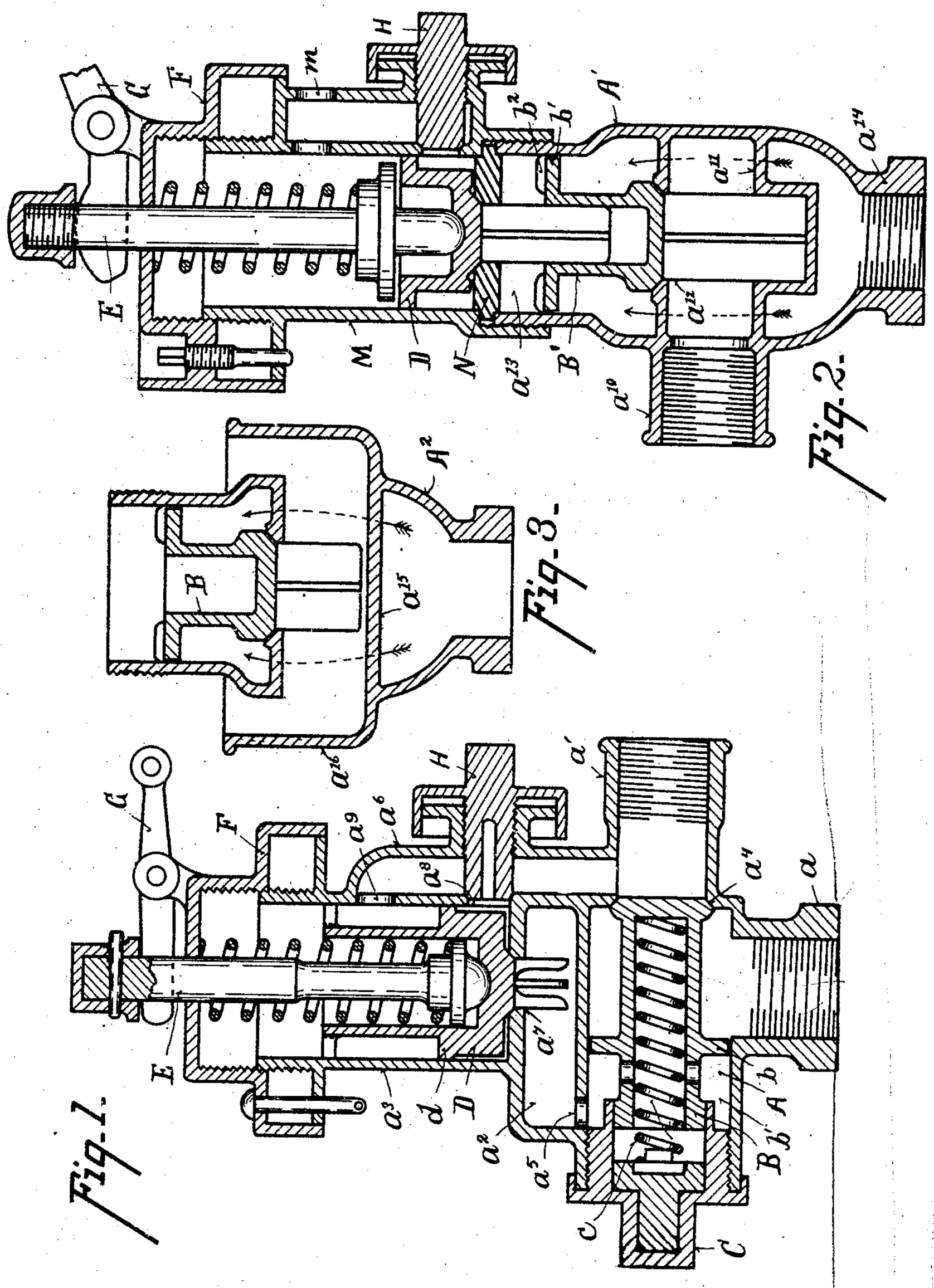

Fig. 2.

Fig. 3.

Fig. 1.

Witnesses
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UNITED STATES PATENT OFFICE.

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SAFETY-VALVE.

SPECIFICATION forming part of Letters Patent No. 786,317, dated April 4, 1905.

Application filed February 24, 1903. Serial No. 144,626.

To all whom it may concern:

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

The object of my invention is a safety relief-valve in which the presence of packed joints is omitted and in which the rate of closing the main valve after it has been thrown from its seat may be regulated readily.

In the accompanying drawings I have illustrated two forms of valve embodying my invention.

Figure 1 is a central vertical sectional view of one form of my invention. Fig. 2 is a similar view of the other form of my invention. Fig. 3 is a detail sectional view of a slightly-modified form of the casing of the main valve shown in Fig. 2.

Referring to Fig. 1, valve-casing A has a downward interiorly-screw-threaded extension a, communicating with the live steam, and a lateral extension a', likewise interiorly screw-threaded to be connected to the exhaust. Upon top of the valve-chamber A a secondary chamber a^2 is formed, above which is a vertical cylindrical extension a^3. Within casing A is a horizontal main valve B, which is beveled to fit seat a^4, formed upon the inner end of extension a'. The other end of the valve B projects into cap C, which is screwed into the casing A at a point opposite the outlet a'. Between the cap C and valve B a coiled spring c is located. Valve B has a flange b to fit against the inner walls of the casing, forming a chamber b' upon the side of the flange removed from the outlet. Chamber b' communicates with the chamber a^2 by means of a perforation a^5 in the walls of casing A. Upon the side of extension a^3 is a by-pass a^6, which communicates with the outlet a'. Within extension a^3 is a secondary valve D, which is seated downward against a valve-seat a^7, formed in the wall between the chambers a^2 and extension a^3. Valve D is held to its seat by means of a spring-pressed rod E, which extends upward through a cap F, which closes the upper end of extension a^3 and upon which is located a hand-lever G, which engages rod E for raising the valve D when desired. Auxiliary valve D has near its lower end a horizontal flange d, which contacts the inner walls of extension a^3. In the side wall of extension a^3 and at a point below the flange d when the auxiliary valve is seated is a perforation a^8, which leads into the by-pass a^6. Seated against the edges of the perforation is a plug H. The upper end of by-pass a^6 communicates with the extension a^3 by means of a perforation a^9.

The operation of the device is as follows: Steam admitted at the inlet a passes around flange b into chambers b' and a^2. When the pressure of the steam exceeds the pressure at which the secondary valve D is set, the secondary valve is raised and the pressure in chamber a^2 is released, thereby releasing pressure in chamber b', when the pressure upon the side of flange b toward the valve-seat a^4 carries the valve B inward away from valve-seat a^4 and allows the excess of pressure to be relieved. The length of time auxiliary valve D will remain off its seat depends upon the situation of plug H relative to perforation a^8. The closer the relation between the perforation and the plug the more slowly is the valve D returned to its seat, and consequently the longer the main valve B is held from its seat. By carrying plug H farther away from the perforation the closing of the valve D is made more rapid, and in consequence the main valve B returns to its seat more quickly.

Referring to Fig. 2, valve-casing A′ has registering with its outlet a^{10} a horizontal cylindrical wall a^{11}, extending clear across the interior of the casing and being closed from communication with the interior thereof except for a perforation a^{12} in its upper wall. Main valve B′ is seated downward against this perforation a^{12} and has a horizontal flange b', fitting against the inner wall of the casing A′. Instead of the casing of the auxiliary valve D being formed integral with the casing of the main valve, as shown in Fig. 1, the casing M of the auxiliary valve is formed in a separate piece interiorly screw-threaded to engage the upper end of casing A′, upon the upper end of which is located a disk N, which forms the seat for auxiliary valve D and between which

the flange b' is formed and chamber a^{13}. In place of the by-pass communicating with the outlet, as in Fig. 1, the by-pass in this modification has in its walls a perforation M, placing it in communication with the outer air.

The operation is as follows: Steam entering the inlet a^{14} passes up around the cylindrical wall a^{11} and around the main valve B', past the flange b', and into chamber a^{13}. When the pressure of the steam exceeds the pressure at which the auxiliary valve is set, it is raised from its seat, and the pressure in chamber a^{13} being released the main valve is carried upward by the pressure upon the lower side of flange b', the upper limit of travel of the valve being made by wings b^2 coming in contact with disk N. In this modification, as in that aforedescribed, the length of time the auxiliary valve remains unseated depends upon the position of the plug H.

In the modification shown in Fig. 3 casing A^2 of the main valve, instead of having a lateral outlet, such as shown in Fig. 2, has an interior cylindrical extension a^{15} open upon both ends and communicating with a cup-shaped outlet a^{16}. The auxiliary valve and its connections are all similar to that described, and shown in Fig. 2.

What I claim is—

1. In a safety-valve the combination of a valve-casing having an inlet and an outlet opening, a main valve upon the interior of the casing to control the outlet having an annular flange fitting against the walls of the casing and forming a chamber surrounding the valve adjacent to the valve-seat and a second chamber upon the end of the valve opposite to the end which contacts the seat, the annular flange contacting the walls so as to allow the pressure of steam to pass around it into the second chamber, a secondary chamber having an enlarged perforation therein forming a valve-seat, an auxiliary valve exterior to the second chamber seated against said perforation and of an area such as to be raised by the pressure of steam in the secondary chamber when it exceeds a predetermined limit and a spring for holding the auxiliary valve to its seat until the pressure exceeds the predetermined pressure substantially as shown and described.

2. In a safety-valve, the combination of a valve-casing having an inlet and an outlet, a main valve upon the interior of the casing to control the outlet, having an annular flange fitting against the walls of the casing and forming a chamber surrounding the valve adjacent to the valve-seat, a second chamber upon the end of the valve opposite to the end which contacts the seat, the flange contacting the walls so as to allow the pressure of steam to pass around it into the second chamber, the second chamber having a perforation therein, an auxiliary valve exterior to the second chamber and seated against the perforation, the auxiliary valve having a flange contacting its walls and forming a chamber adjacent to its seat, the chamber having a perforation in its walls, a spring for holding the auxiliary valve to its seat, and a regulating-plug seated against the perforation, substantially as shown and described.

3. In a safety-valve the combination of a valve-casing having an inlet and an outlet opening, the interior extension of the casing communicating with the outlet and closed from the inlet-opening, a perforation in the extension, a second casing fitting upon the upper end of the first casing, a valve-seat formed between the two casings, a main valve seated against the perforations in the extension and having a flange contacting the walls of the main casing and forming a chamber with the valve-seat in the upper end of the casing, an auxiliary valve within the second casing and contacting the seat formed between the two casings and having a flange forming a chamber adjacent to the seat, the chamber having a perforation in its walls, and a regulating-plug seated against the perforation, substantially as shown and described.

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Witnesses:
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