C. R. MILLS.

QUICK ACTING SAFETY VALVE.

APPLICATION FILED SEPT. 2, 1908.

934,083.

Patented Sept. 14, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

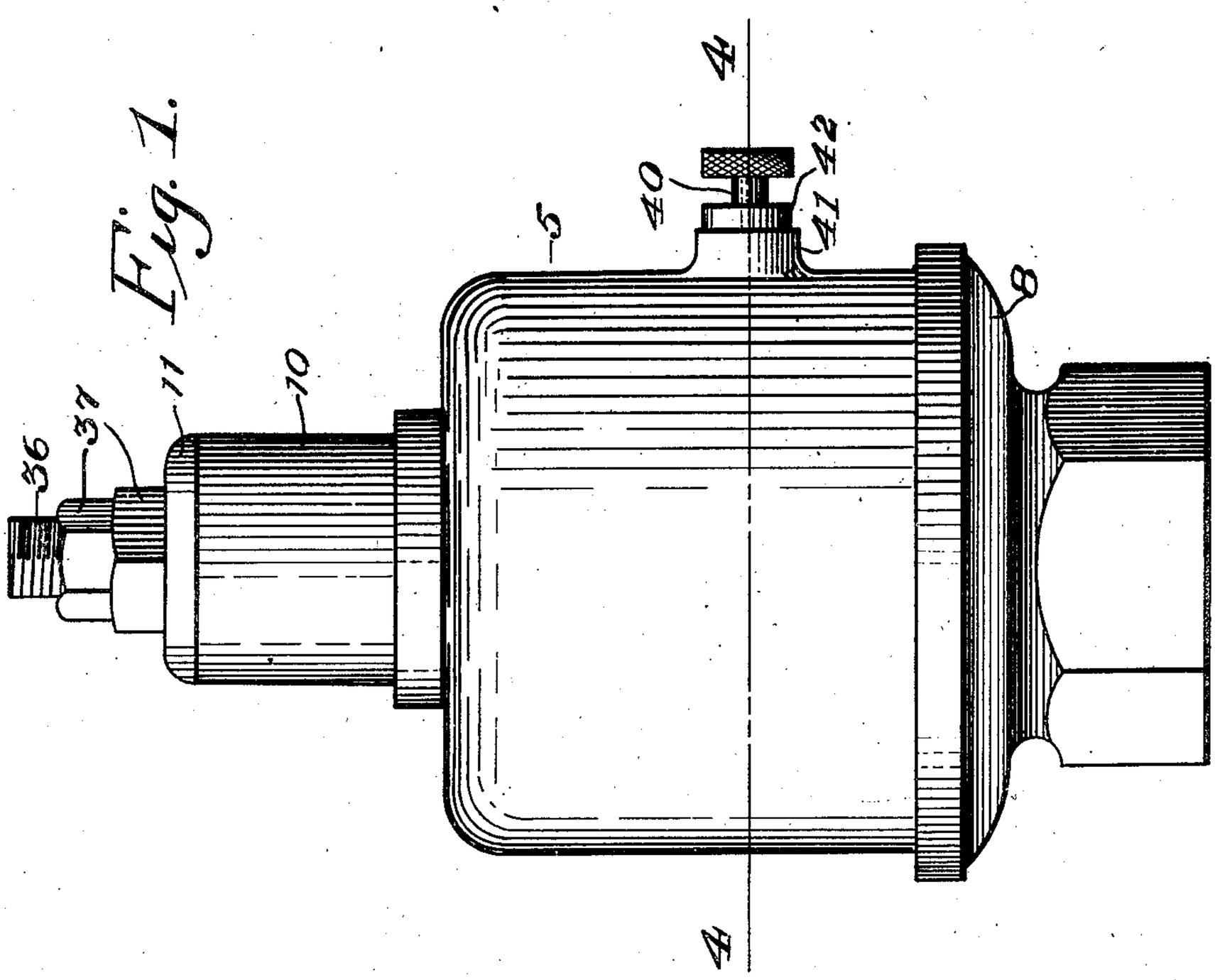
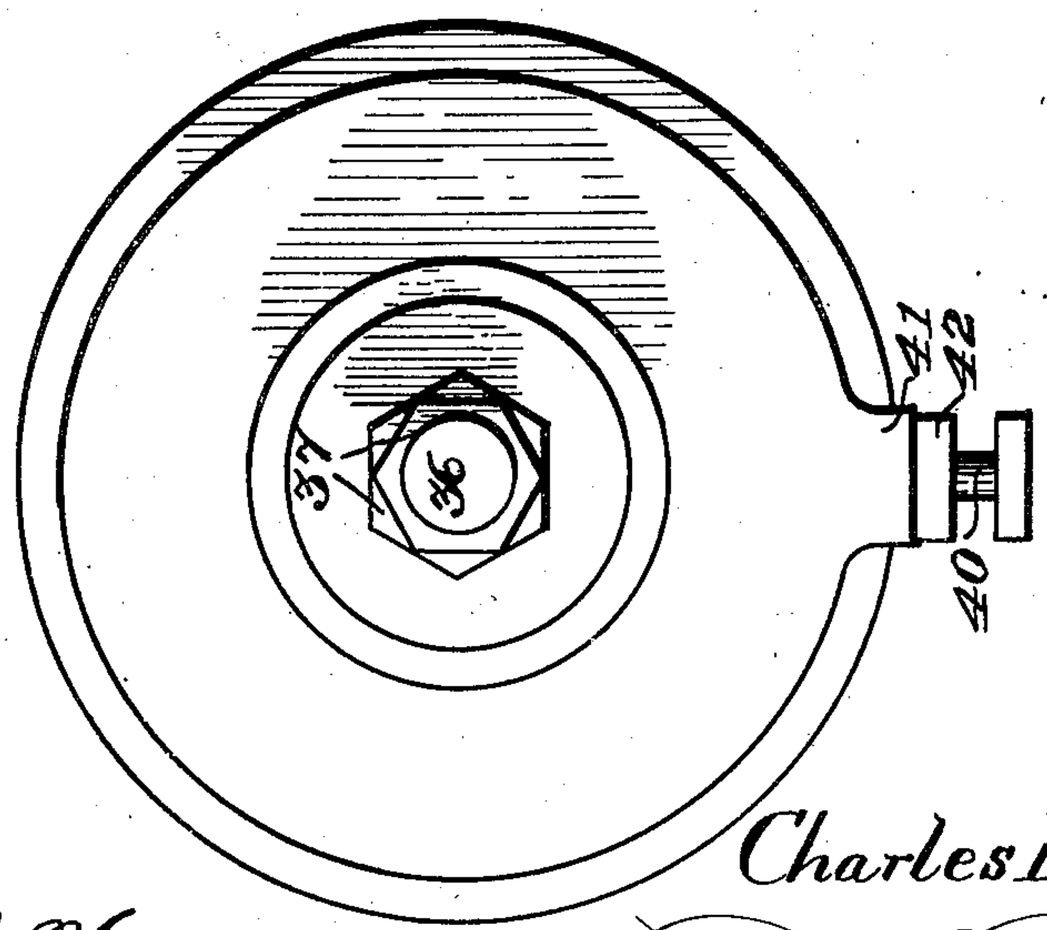


Fig. 2.



Witnesses

Albert L. Krey.

M. J. Miller.

Inventor

Charles R. Mills.

By Legate & Lancaster

Attorneys

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Fig. 3.

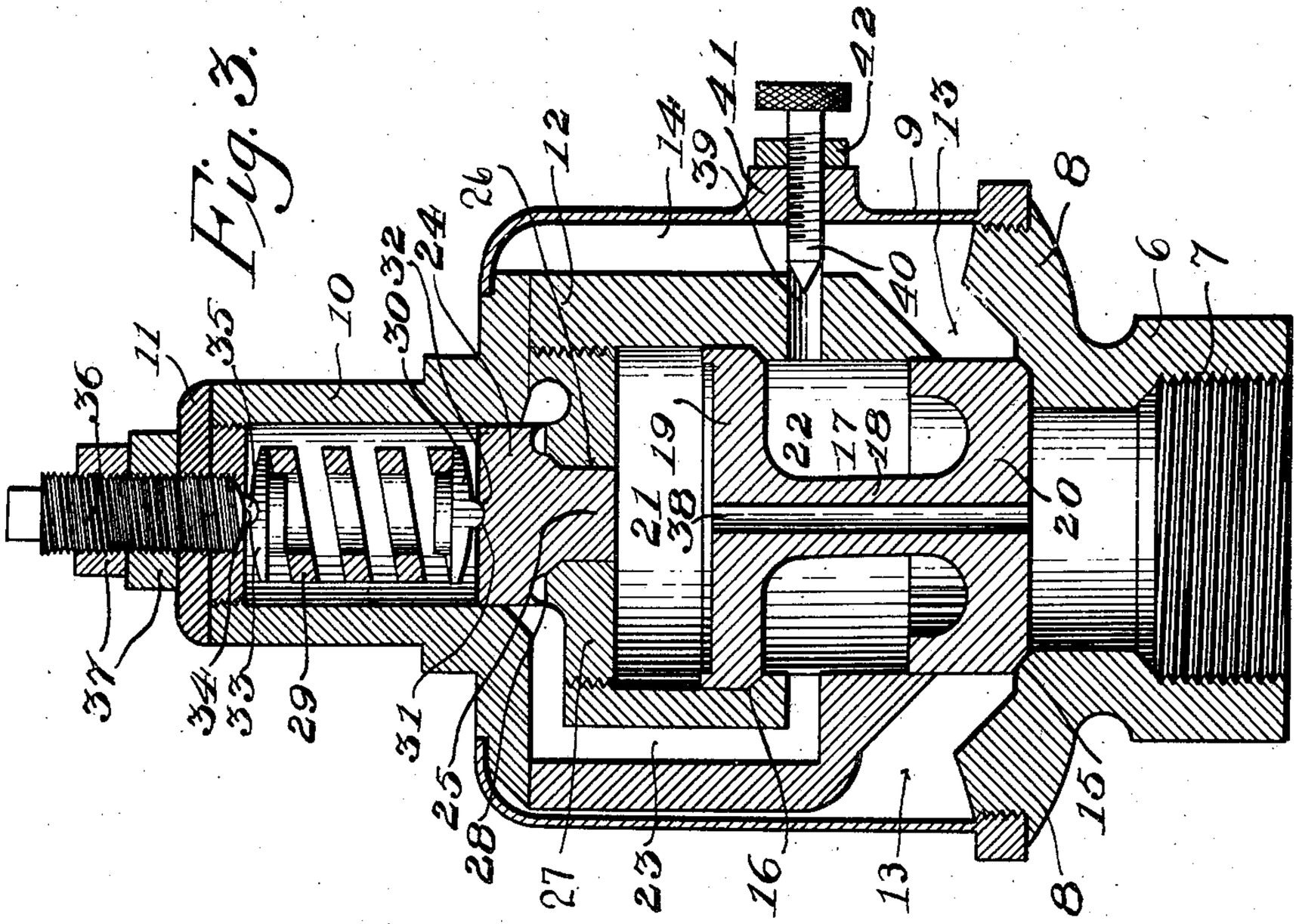
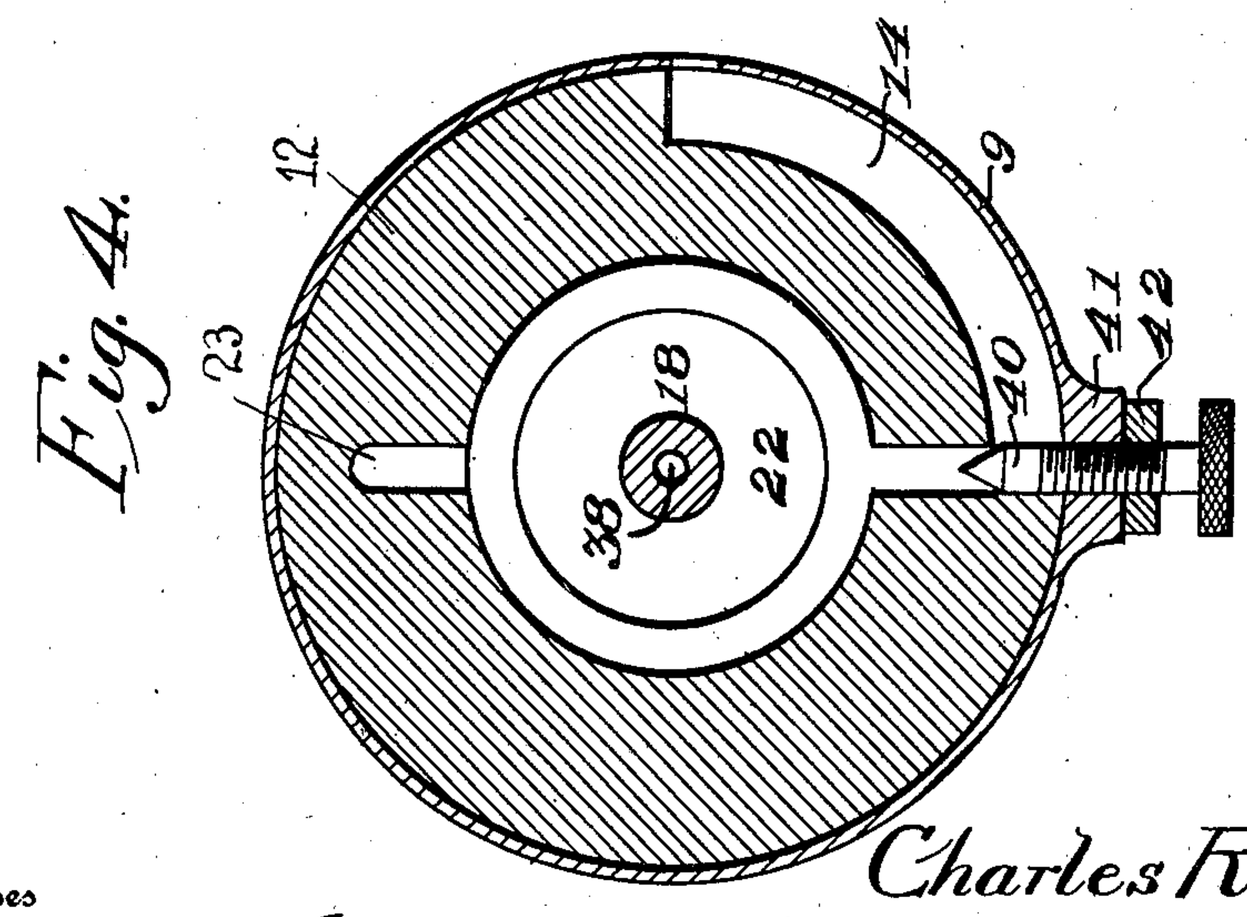


Fig. 4.



Witnesses

Albert L. Krey.

H. J. Miller.

Inventor

Charles R. Mills.

By Franklin Hamilton

Attorney

UNITED STATES PATENT OFFICE.

CHARLES R. MILLS, OF MALDEN, MASSACHUSETTS.

QUICK-ACTING SAFETY-VALVE.

934,083. Specification of Letters Patent. Patented Sept. 14, 1909.

Application filed September 2, 1908. Serial No. 451,416.

To all whom it may concern:

Be it known that I, CHARLES R. MILLS, a citizen of the United States, residing at Malden, in the State of Massachusetts, have invented certain new and useful Improvements in Quick-Acting Safety-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The invention relates to a safety valve and more particularly to the class of rapid or quick acting safety valves.

The primary object of the invention is the provision of a safety valve adapted to relieve the excess of fluid pressure above a predetermined point from a steam boiler or the like into the atmosphere.

Another object of the invention is the provision of a safety valve comprising a valve casing having mounted therein a main valve normally closed and movable in a valve chamber and separating the same into two compartments, a bypass or port forming communication between the two compartments and a spring controlled auxiliary valve controlling said bypass or port to permit the unseating of the main valve upon excessive pressure above a predetermined point and to permit the discharge of the same to the atmosphere.

A further object of the invention is the provision of a safety valve of a simplified construction, the parts of which are assembled in a compact manner, thoroughly efficient in its operation and less expensive in the manufacture than other valves now in use.

In the drawings accompanying and forming part of this specification is illustrated one form of embodiment of the invention which to enable those skilled in the art to practice the invention will be set forth at length in the following description while the novelty of the invention will be included in the claims succeeding said description. It is to be understood however, that minor details, changes, variations and modifications may be resorted to such as come properly within the scope of the claims succeeding the description without departing from the spirit of the invention.

In the drawings: Figure 1 is an elevation of the invention. Fig. 2 is a top plan view thereof. Fig. 3 is a longitudinal sectional view. Fig. 4 is a transverse sectional view on the line 4—4 of Fig. 1.

Similar reference characters indicate corresponding parts throughout the several views in the drawings.

In the drawings the numeral 5 designates generally the safety valve which comprises an annular body portion or casing 6 the same apertured and internally threaded as at 7 to receive a high pressure pipe. Said body portion is formed with a thickened outwardly spreading annular flange 8 having screw threaded engagement with an outer cylinder 9 the latter carrying at its opposite end a centrally bored shell 10 with a screw threaded cap 11 and within the cylinder is an annular inner wall 12 the latter having diagonal ports 13 leading to an exhaust chamber 14 between the inner wall 12 and the cylinder 9 and having communication with the atmosphere.

Formed on the body portion or casing 6 at the inner face thereof is a valve seat 15 and also formed in the inner face of the inner wall 12 is a valve seat 16 and slidable within the space formed by the inner wall 12 is a main valve 17 formed with a central reduced stem portion 18 connecting upper and lower spaced valve heads 19 and 20 respectively and the upper valve head 19 divides the space formed by the inner wall 12 into chambers 21 and 22 and the upper valve head is normally in engagement with the valve seat 16 and is of greater area than the lower valve head 20 which latter is normally in engagement with the valve seat 15 so as to close the ports 13 contained in the inner walls of the valve. The said chambers 21 and 22 have communication with each other through a bypass or port 23 formed in the inner wall 12 and which bypass or port is controlled by an auxiliary valve 24 slidably mounted in the shell 10 and having a central depending reduced portion 25 normally fitting into a correspondingly shaped opening 26 contained in a collar 27 having threaded engagement with the inner face of the inner wall 12 above the chamber 22 and which collar has a valve seat 28 for the said auxiliary valve 24 which latter is normally seated thereagainst to close the bypass or port 23 so as to cut off communication between the chambers 21 and 22 respectively. The said auxiliary valve 24 is held in engagement with its valve seat 28 by a coiled expansion spring 29, one end having its

bearing against a disk 30 formed with a central boss 31 engaging a corresponding recess 32 formed centrally in the upper face of the auxiliary valve and this engagement of the boss with said recess prevents lateral displacement of the expansion spring. The other end of the expansion spring has its bearing against a disk 33 the latter containing in its upper face a central recess 34 to receive a correspondingly shaped projection 35 formed on the end of an adjusting screw 36 threaded centrally in the cap 11 and which screw is adapted to regulate the tension of the coiled spring to maintain the auxiliary valve in a position to close the bypass when the fluid pressure of the boiler is below a predetermined point. Surrounding the adjusting screw 36 are jam nuts 37 to lock the latter after it has been properly adjusted to tension the expansion spring within the shell.

Centrally of the stem portion 18 of the main valve 17 is a passage 38 which admits pressure fluid from a boiler to the chamber 21 above the upper valve head of the main valve and when an excessive pressure occurs in the boiler the same passes through the passage 38 and acts directly against the reduced portion 25 of the auxiliary valve 24 so as to raise the latter from its seat 28 whereby communication is established between the chamber 21 and the chamber 22 through the bypass or port 23.

Leading from the chamber 22 to the exhaust chamber 14 and contained in the inner wall 12 is an exhaust port 39 the latter regulated by a pin valve 40 in threaded engagement with a boss 41 formed on the cylinder 9 at one side thereof and which pin valve is regulated by hand to open said port 39 sufficiently to reduce the pressure in chamber 21 below that of the boiler and after being properly adjusted is held against adjustment by a lock nut 42 surrounding the pin valve and in threaded engagement therewith.

It is obvious that the chamber 21 is in direct communication with the boiler at all times by passage 38 so that pressure from the said boiler entering the chamber 21 acts against the upper head 19 of the main valve so as to maintain the latter and the lower valve head 20 normally against their seats respectively and the expansion spring 29 resists the boiler pressure in the chamber 21 to hold the auxiliary valve 24 closed until the boiler pressure exceeds a predetermined point to overcome the tension of the expansion spring 29 when it will lift the auxiliary valve 26 from its seat 28 so that communication will be established between the chambers 21 and 22 through the bypass 23 and the high pressure enters chamber 22 where the said pressure equalizes to permit the main valve 17 to leave its seat which will open ports 13 the latter establishing communication between the apertured portion of the casing 6 and the exhaust chamber thereby the excessive pressure will be discharged from the exhaust chamber to the atmosphere and at the same time the pressure in chamber 22 will be expelled through the exhaust port 39 to said exhaust chamber 14 and when the boiler pressure has been reduced to or below a predetermined point the main valve 17 will automatically return to its closed position and likewise will the auxiliary valve.

It is apparent that the auxiliary valve 24 is provided with a large and small area, the smaller area being exposed to boiler pressure while the said valve 24 is closed and as soon as it is moved from its seat 28 the larger area thereof becomes exposed to the boiler pressure causing it to act quickly so that communication is formed between the chambers 21 and 22 through the bypass 23 whereby the pressure equalizes in said chambers at a point lower than the boiler pressure which causes the main valve 17 to leave its seat and remain open until the boiler pressure now acting on the larger area of the valve 24 is reduced sufficiently to allow the said valve 24 to close thereby cutting off communication between the chambers 21 and 22 and causing the pressure in the chamber 21 to increase to boiler pressure which will close the main valve 17. The pin valve 40 controls the equalizing point in the chambers 21 and 22 when the auxiliary valve 24 is unseated.

What is claimed is—

1. A valve of the class described comprising a casing having a pressure inlet, a balancing chamber within said casing in axial alinement with the pressure inlet, a shell surrounding the casing to form an exhaust chamber therebetween and having communication with the said balancing chamber, the said pressure inlet being provided with a valve seat, the said balancing chamber being provided with a valve seat, a main valve movable in the balancing chamber and having spaced heads, one of larger area with respect to the other, the smaller head engaging the valve seat in the pressure inlet and the larger head engaging the seat in the balancing chamber, said main valve containing a passage leading from the pressure inlet to the balancing chamber above the larger head of said valve, said casing containing a bypass having communication with the balancing chamber above and below the larger head of the main valve, a normally seated spring pressed auxiliary valve in advance of the main valve and in axial alinement with the passage through said valve and adapted to normally close the bypass.

2. A valve of the class described comprising a casing having a pressure inlet and a balancing chamber in communication with

the latter, the said casing containing an exhaust chamber having communication with the pressure inlet, a main valve slidable in said balancing chamber and having spaced heads one head being of larger area with respect to the other, the smaller head normally closing the pressure inlet and its communication with the exhaust chamber, a bypass forming communication with the balancing chamber above and below the larger head of the main valve, a spring controlled auxiliary valve normally closing said bypass, means for regulating the seating of said auxiliary valve, said main valve containing a central passage establishing communication between the pressure inlet and the balancing chamber above the larger head of said valve, said casing containing an opening forming communication between the balancing and exhaust chambers, and a pin valve controlling said opening.

In testimony whereof, I affix my signature, in presence of two witnesses.

CHARLES R. MILLS.

Witnesses:
MINNIE SILVERSTEIN,
ALBERT H. D. FRENCH.