J. C. WATSON.

RELIEF VALVE.

APPLICATION FILED JAN. 12, 1912.

1,040,068. Patented Oct. 1, 1912.

FIG_1_

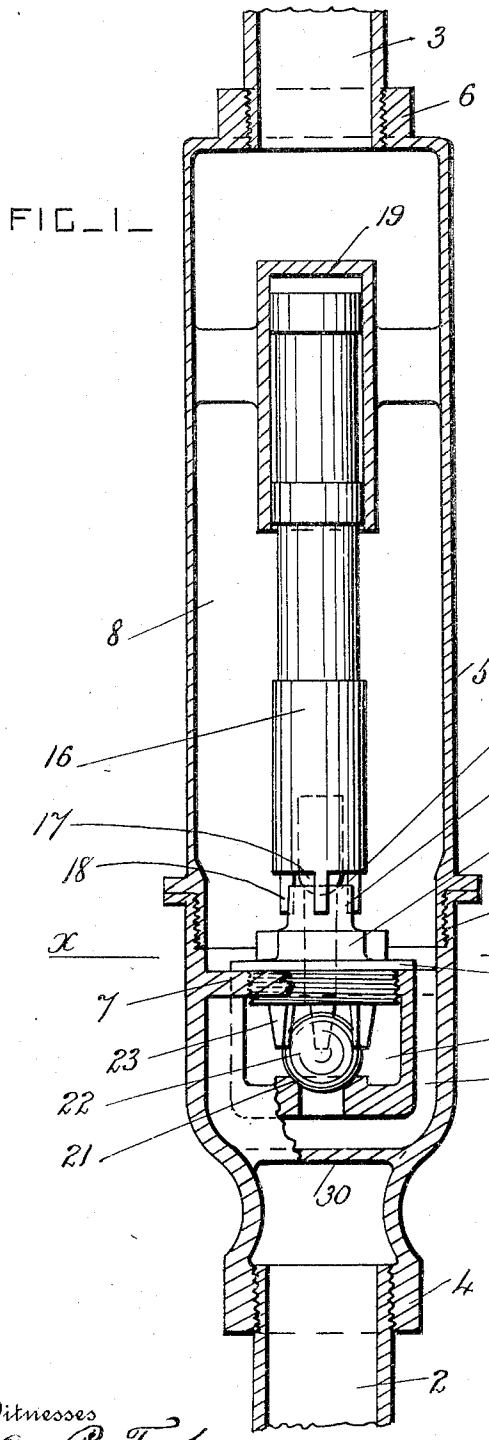


FIG_2_

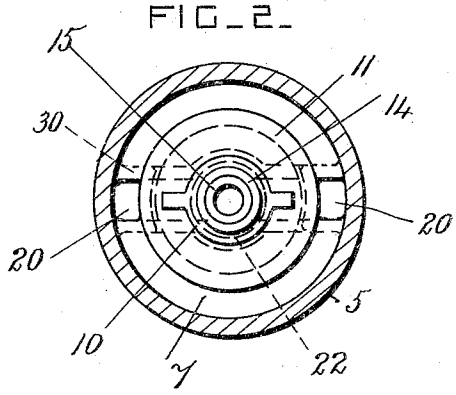
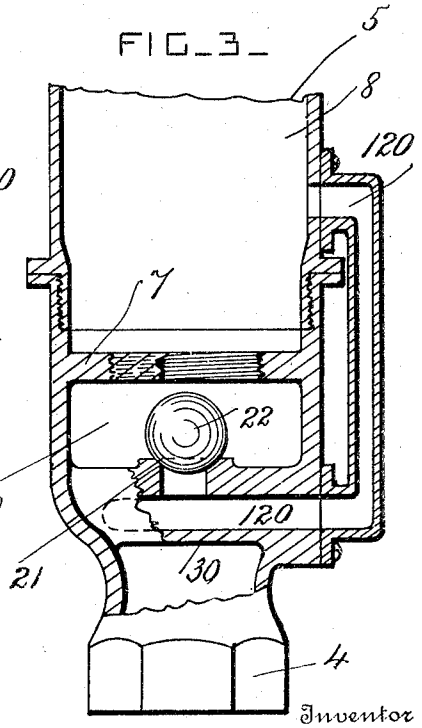


FIG_3_



Witnesses

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UNITED STATES PATENT OFFICE.

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RELIEF-VALVE.

1,040,068. Specification of Letters Patent. Patented Oct. 1, 1912.

Application filed January 12, 1912. Serial No. 670,921.

To all whom it may concern:

Be it known that I, JOHN C. WATSON, a citizen of the United States, residing at Terre Haute, in the county of Vigo and State of Indiana, have invented certain new and useful Improvements in Relief-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.

This invention relates to relief valves used to determine the working pressure in the hot water heating apparatus used in dwellings; and it consists in the novel construction and combination of the parts hereinafter fully described and claimed.

In the drawings, Figure 1 is a vertical section through a relief valve constructed according to this invention. Fig. 2 is a cross-section through the relief valve casing, showing a plan view of the return valve seat, and taken on the line *x*—*x* in Fig. 1. Fig. 3 is a partial view similar to Fig. 1, but shows a modification in the arrangement of the by-pass passage.

An expansion pipe is provided and is formed in two sections 2 and 3, and any approved form of expansion vessel is connected to the upper pipe section 3. The lower section 2 is connected to the water heater, and when the water is expanded by heat, or when steam is formed in the heater, the surplus water rises in the expansion pipe and flows into the expansion vessel. When the sections of the expansion pipe are continuous, and when no relief valve is provided, the heating apparatus works at substantially atmospheric pressure.

According to this invention a relief valve is provided, and its casing 5 has connections 6 and 4 at its upper and lower ends for securing it to the upper and lower pipe sections 3 and 2 respectively. For convenience of manufacture the casing 5 is preferably made in two pieces which are connected together by screwthreaded junction portions 60. The lower part of the casing is provided with a horizontal partition 7 arranged below its screwthreaded junction socket, which partition separates the casing into two chambers 8 and 9.

A tubular plug 10 is screwed into, or is otherwise secured to, the partition 7, and has a flange 11 which bears on the said partition. A cylindrical stem 14 projects upwardly from this plug and has a valve-seat 15 at its upper end. A regulator 16, formed of a metallic bar, is provided, and this regulator has a valve 17 at its lower end which normally rests on the seat 15 and closes the main passage which is formed through the tubular plug. The lower end of the regulator bar is provided with guide lugs 18 which project below the valve 17 and slide in contact with the stem 14. The upper end portion of the regulator bar is suitably guided in the upper chamber 8, and for this purpose a cylindrical guide cap 19 is preferably formed in, or secured in, the upper part of the chamber 8. The upper end portion of the regulator bar slides in this cap, and the cap also limits the lift of the valve. The valve 17 is preferably hemispherical where it engages with its valve-seat, but it may be of any other approved form or construction.

A by-pass passage 20 is provided in the lower part of the casing. This by-pass passage is preferably U-shaped or loop-shaped in form, and its upper ends are arranged to communicate with the upper chamber 8. The by-pass passage is arranged on the underside of the partition 7, and its middle part is provided with a valve-seat 21 which is arranged in line with the axis of the tubular plug 10 and a little below the plug. The lower part of the by-pass passage 20 is formed by a pipe or bridge-piece 30, which is formed integral with the casing, and which extends crosswise between its walls. This bridge-piece has the return or by-pass passage 20 extending through it and communicating with the upper chamber and having an outlet into the lower chamber, which outlet is normally closed by a valve 22. Large spaces are formed in the lower chamber between the pipe 30 and the walls of the casing, and between the pipe 30 and the said partition, for the passage of water from the pipe 2 to the regulator valve 17. A by-pass valve 22 normally rests on the valve-seat 21, and closes the communication between the by-pass passage and the lower chamber 9. The valve 22 is preferably a ball valve, but any other approved form of valve may be used. The tubular plug 10 is provided with downwardly projecting guide

lugs 23, and the valve 22 works between these guide lugs. The lugs 23 permit the valve to rise and fall, and they prevent it from being displaced.

The weighted regulator valve determines the maximum pressure at which the heating apparatus works, and the pressure of the steam or water raises this valve when the maximum pressure is reached. When the water or steam raises the regulator valve, it flows upwardly through the main passage in the tubular plug, and through the upper chamber, into the expansion vessel. When the pressure falls, the water descends by gravity from the expansion vessel, and upper chamber, through the by-pass passage, raising the ball valve and flowing back to the boiler.

The use of this relief valve enables the heating apparatus to be worked at a pressure above that of the atmosphere, and the water or steam is consequently used at a correspondingly higher temperature, and a great economy in the consumption of fuel is thereby effected.

In the modification shown in Fig. 3, the by-pass passage 120 is arranged at one side only of the casing and projects laterally thereof. The loop-shaped passage is preferred, but it is not necessary that it should communicate with the upper casing at each end in order to be effective.

What I claim is:

1. In a relief valve, the combination, with a casing provided with a partition having a regulator valve-seat and separating the casing into upper and lower chambers, said casing having also a bridge-piece extending crosswise between the side walls of its lower chamber and having a return passage extending through it and communicating with the upper chamber and having an outlet into the lower chamber; of a regulator valve normally closing the passage through the regulator valve-seat, and a return valve which normally closes the said outlet.

2. In a relief valve, the combination, with a casing provided with a partition having a regulator valve-seat and separating the casing into upper and lower chambers, said casing having also a bridge-piece extending crosswise between the side walls of its lower chamber and having a return passage extending through it and communicating with the upper chamber at each end and having an outlet into the lower chamber at its middle part; of a regulator valve normally closing the passage through the regulator valve-seat, and a return valve which normally closes the said outlet.

3. In a relief valve, the combination, with a casing provided with a partition having a regulator valve-seat and separating the casing into upper and lower chambers, said casing having also a bridge-piece extending crosswise between the side walls of its lower chamber and having a return passage extending through it and communicating with the upper chamber and having an outlet into the lower chamber; of a regulator bar provided with a valve which normally closes the passage through the regulator valve-seat, a guide-cap secured in the upper chamber and inclosing the upper portion of the regulator bar and limiting its lift, and a return valve which normally closes the said outlet.

4. In a relief valve, the combination, with a casing provided with a partition which separates it into upper and lower chambers, and a tubular plug secured to the said partition and forming a communication between the said chambers and provided with a valve-seat and downwardly projecting guides, said casing having a by-pass passage connecting its chambers and provided with a valve-seat arranged under the aforesaid valve-seat; of a regulator valve which closes the valve-seat of the said plug, and a by-pass return valve working between the said guides and normally closing the valve-seat of the by-pass passage.

5. In a relief valve, the combination, with a casing provided with a partition which separates it into upper and lower chambers, and a tubular plug secured to the said partition and forming a communication between the said chambers and provided with an upwardly projecting stem and a valve-seat, and having downwardly projecting guides, said casing having a by-pass passage connecting its chambers and having a valve-seat arranged under the tubular plug; of a regulator valve which normally closes the valve-seat of the plug and which has guides which engage with the said stem, and a by-pass return valve working between the guides on the said plug and normally closing the valve-seat of the by-pass passage.

In testimony whereof I have affixed my signature in the presence of two witnesses.

JOHN C. WATSON.

Witnesses:
W. C. Bell,
Emily L. Moore.