Nov. 22, 1927. 1,650,150

I. I. NELSON

RELIEF VALVE

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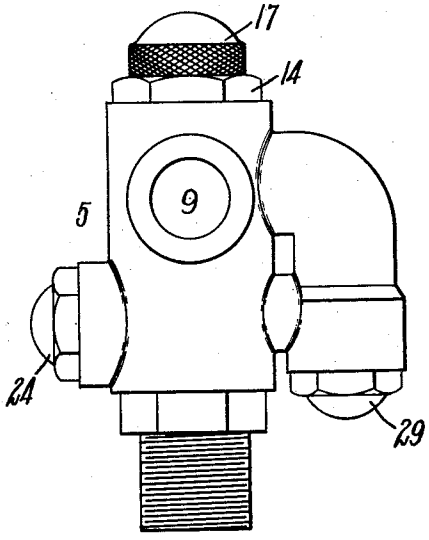


Fig. 1.

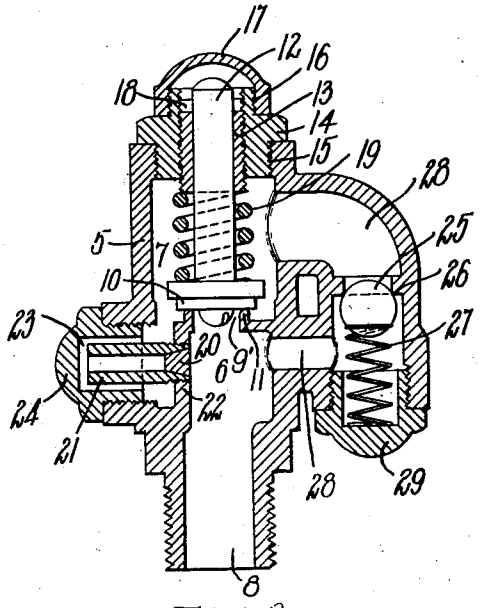


Fig. 2.

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RELIEF VALVE.

Application filed March 12, 1927. Serial No. 174,963.

This invention relates to an improvement in relief valves for boilers.

The object of the invention is to provide a relief valve for boilers which will open when the pressure in the boiler exceeds a predetermined amount and which will also open when the temperature in the boiler exceeds a predetermined amount, and which will furthermore open to relieve a lack of pressure or vacuum in the boiler.

To these ends the invention consists in a relief valve such as disclosed in the following specification and particularly pointed out in the claims thereof.

Referring to the drawings:

Figure 1 is a front elevation of my improved relief valve.

Fig. 2 is a sectional elevation thereof.

Like numerals refer to like parts in the views of the drawings.

In the drawings, 5 is the valve casing, 6 an inner chamber and 7 an outer chamber in said casing. 8 is a fluid inlet leading into the inner chamber 6 and 9 is a fluid discharge outlet from the outer chamber 7. The inner chamber 6 is connected to the outer chamber 7 by a passage 9′. A movable valve member 10 contacts with a seat 11 and is adapted to close the passage 9 between the inner chamber 6 and the outer chamber 7. The valve member 10 has an upwardly extending valve stem 12 thereon which is slidably mounted in a sleeve 13 having screw-threaded engagement with a casing top 14.

The casing top is screw threaded at 15 to engage a corresponding screw thread in the casing 5 and the said top is also screw threaded at 16 to be engaged by a screw-threaded cap 17.

The upper end of the sleeve 13 is slotted at 18 to receive a wrench whereby the sleeve may be adjusted to increase or diminish the tension of a spring 19, the upper end of which bears against the lower end of the sleeve 13, and the lower end of which bears against the valve member 10.

When excess pressure develops in the boiler and consequently in the inner chamber 6, the valve member 10 will be lifted from its seat 11 and the fluid will pass from the inner chamber 6 into the outer chamber 7 and thence through the discharge outlet 9 to the atmosphere. The valve member 10, therefore, constitutes a pressure relief valve member.

A fusible plug 20 is inserted in the inner end of a tubular holder 21, which has screw-threaded engagement with a wall 22 of the inner chamber. The outer end of the tubular holder 21 opens into the outer chamber 7 through an auxiliary chamber 23 and projects into a cap 24 which is spaced apart from the said tube and has screw-threaded engagement with the casing 5.

When excess temperature develops in the chamber 6, the fusible plug 20 will melt and open a passage from the inner chamber 6 through the tubular holder 21 and auxiliary chamber 23 into the outer chamber 7, and the fluid passing out will then pass from the inner chamber 6 through the tubular holder 21 and auxiliary chamber 23 into the outer chamber 7 and out of the discharge outlet 9. The fusible plug can be replaced by removing the cap 24 and the holder 21, inserting a new plug in the holder and replacing the parts.

The vacuum relief valve comprises a ball 25 which is held against a seat 26 in the casing by a spring 27, the seat 26 being positioned in a by-pass 28 leading from the inner chamber 6 to the outer chamber 7. It will be seen that the ball 25 is operated to close the by-pass against the action of gravity by the spring 27 and by the pressure of the fluid in the inner chamber 6, but if a vacuum should occur in the chamber 6 the pressure of the air from the outer chamber 7 would press downwardly upon the ball 25 and move the same from its seat 26, allowing the air to enter the inner chamber 6 through the by-pass 28. The lower end of the spring 27 rests upon and within a cap 29 having screw-threaded engagement with the casing 5.

The general operation of the valve hereinbefore specifically and to some extent in general described is as follows:—Assuming the valve to be connected to a range boiler, if the pressure in the boiler exceeds a predetermined amount the valve 10 will open and allow the fluid to pass from the inner chamber 6 to the outer chamber 7 and out through the discharge outlet 9.

If the temperature within the chamber 6 exceeds a predetermined amount, the fusible plug 20 will melt and the fluid will pass through the inner chamber 6 to the holder 21, auxiliary chamber 23, outer chamber 7, and outwardly through the discharge outlet 9, it being understood that the auxiliary

chamber 23 forms in effect a part of the outer chamber 7.

If a vacuum, or partial vacuum occurs within the chamber 6, the pressure of the air from the outer chamber 7 will cause the ball 25 to be forced away from its seat 26 and the air will then pass from the outer chamber 7 through the by-pass 28 into the inner chamber 6 and break the vacuum.

It will be seen that the top 14 may be removed from the casing, thus allowing the valve member 10 and the spring 19 to be removed from the valve casing when desired without interference with any of the other parts of the valve. It will also be seen that the cap 24 can be removed, and the fusible plug holder 21 inserted, without interference with other parts of the valve as a whole, and the same is true of the cap 29, which upon being removed allows the spring 27 and ball 25 to be removed without interference with other parts of the valve.

I claim:

1. A relief valve having, in combination, a casing provided with an inner and an outer chamber with a fluid inlet entering the inner chamber and a fluid discharge outlet from the outer chamber, a movable valve member between said chambers adapted to be operated by excess pressure in said inner chamber to open a passage between said chambers, a fusible plug between said chambers adapted to melt at a predetermined temperature and thereby open a passage between said chambers, there being a second passage 28 between said chambers and a vacuum relief valve adapted to close said second passage 28 between said chambers, the seat of said vacuum relief valve being spaced apart from and positioned above the seat of said movable valve member and above said fusible plug.

2. A relief valve having, in combination, a casing provided with an inner and an outer chamber with a fluid inlet entering the inner chamber and a fluid discharge outlet from the outer chamber, a movable valve member between said chambers adapted to be operated by excess pressure in said inner chamber to open a passage between said chambers, a fusible plug between said chambers adapted to melt at a predetermined temperature and thereby open a passage between said chambers, and a vacuum relief valve adapted to close a passage between said chambers, the said fusible plug being replaceable without interference with said movable valve member.

3. A relief valve having, in combination, a casing provided with an inner and an outer chamber with a fluid inlet entering the inner chamber and a fluid discharge outlet from the outer chamber, a movable relief valve member between said chambers, a spring to close said valve member, means to adjust the pressure of said spring, said movable valve member being positioned between said chambers and adapted to be operated by excess pressure in said inner chamber to open a passage between said chambers, a fusible plug between said chambers adapted to melt at a predetermined temperature and open a passage between said chambers, and a vacuum relief valve adapted to close a passage between said chambers, and means to remove each of said relief members respectively independent of the other two.

4. A relief valve having, in combination, a casing provided with an inner and an outer chamber with a fluid inlet entering the inner chamber and a fluid discharge outlet from the outer chamber, a tubular holder detachably fastened to said casing and opening at its inner end into said inner chamber and into said outer chamber at its outer end, a fusible plug in said holder, and a cap detachably fastened to said casing in alignment with said holder and spaced apart therefrom, whereby said plug may be replaced without interference with other parts of the valve.

5. A relief valve having, in combination, a casing provided with an inner and an outer chamber with a fluid inlet entering the inner chamber and a fluid discharge outlet from the outer chamber, a tubular holder detachably fastened to said casing and opening at its inner end into said inner chamber and into said outer chamber at its outer end, a fusible plug in said holder, and a hollow cap detachably fastened to said casing in alignment with said holder, the outer end of which projects into said cap and is spaced apart therefrom forming an auxiliary chamber communicating with said outer chamber, whereby said plug may be replaced without interference with other parts of the valve.

In testimony whereof I have hereunto set my hand.

IRA I. NELSON.