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E. J. TE PAS

2,047,654

RELIEF VALVE

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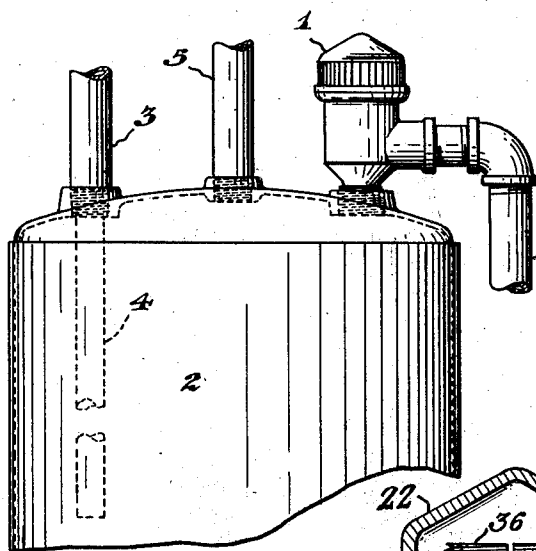


Fig. 1.

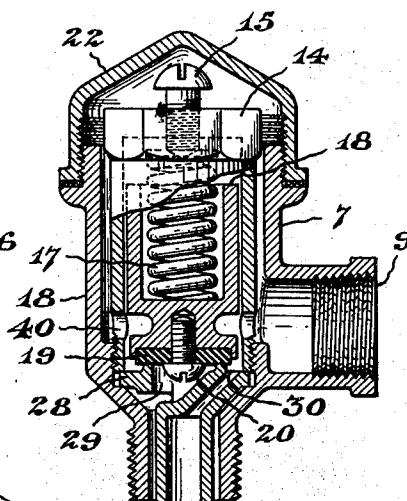


Fig. 4.

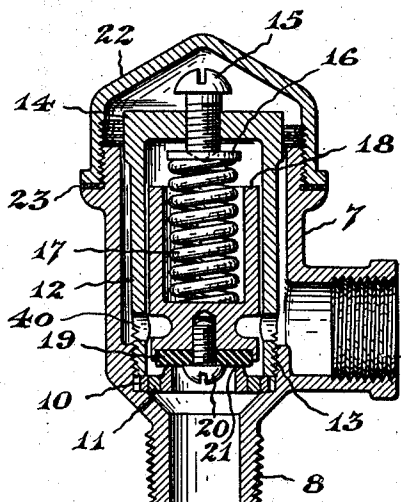


Fig. 2.

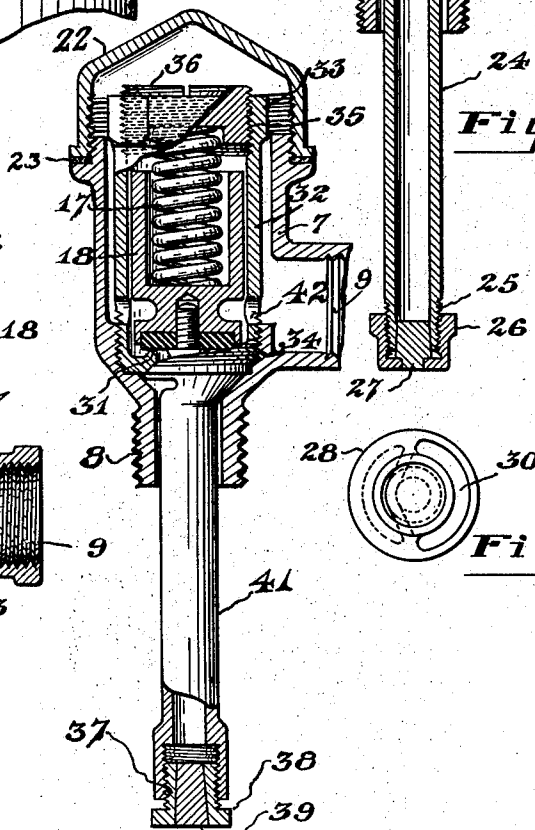


Fig. 5.

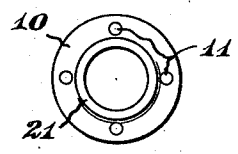


Fig. 3.

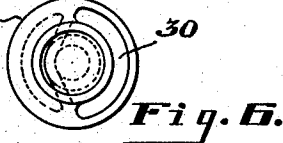


Fig. 6.

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RELIEF VALVE

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Application February 23, 1932, Serial No. 594,438

4 Claims. (Cl. 137—53)

This invention relates to temperature and pressure relief valves of the type disclosed in Patent No. 1,740,420 issued to Arthur Friedman, December 17, 1929.

5 The present invention is directed to certain improvements in a valve structure of the type referred to, in which the fusible or temperature responsive element of the valve is arranged to extend into the storage container so as to be
10 directly responsive to the temperature of the water contained therein.

Another object of this invention is to provide in a relief valve of the type referred to, a readily removable and replaceable temperature responsive
15 sive element.

A further object of this invention relates to the provision of a removable and replaceable valve assembly embodying temperature and pressure responsive devices, the assembly being arranged
20 to be put together and adjusted as a unit separate from the valve body.

With these and other objects in view, the invention consists in the novel construction, arrangement and combination of parts, hereinafter described, illustrated in some of its embodiments
25 in the accompanying drawing and particularly pointed out in the appended claims.

In the drawing, Figure 1 is a side elevational view illustrating the upper portion of a hot water storage tank with my improved relief valve in operative position on the tank. Figure 2 is an enlarged central sectional view of the relief valve
30 illustrated in connection with Figure 1. Figure 3 is a plan view of the removable and replaceable temperature responsive valve seat used in connection with the valve shown in Figure 2. Figure 4 is a central sectional view of a modified form of valve structure. Figure 5 is a side elevational
35 view partly in section of a modified form of valve operating unit. Figure 6 is a plan view of the valve seat shown in connection with the valve illustrated by Figure 4 of the drawing.

For purposes of illustration, I have shown my improved relief valve in connection with the storage tank of a water heater. Obviously the valve is capable of being used in connection with other appliances where it is desired to control temperature and pressure and it is not intended to limit my invention to the particular form of
40 appliance in connection with which it is illustrated in this application.

In Figure 1, of the drawing, I have shown my improved relief valve 1 installed in operative position in a hot water storage tank 2. The
45 water in the tank 2 may be heated by any suit-

able means such as a gas burner (not shown). The tank is connected to a cold water supply line 3 which is connected to a dip pipe 4, that extends to a point adjacent the bottom of the tank 2. The hot water supply system piping communi-
5 cates with the top portion of the tank 2, by means of the hot water outlet pipe 5. The inlet opening of the relief valve 1 is in communication with the interior of the tank and its outlet opening is arranged for connection with a drain pipe 6
10 which extends to a point arranged for receiving the water relieved from the tank 2 by the operation of the valve 1.

The valve illustrated in Figure 1 is shown in detail in Figure 2, and it comprises a cast metal
15 casing or valve body 7, having a threaded inlet conduit 8 provided for connecting the valve in communicating relation with the interior of a storage tank. The valve casing is further provided with a threaded outlet conduit 9 for con-
20 necting the valve with the drain pipe 6. Between the inlet and outlet conduits there is provided a chamber for the accommodation of the valve parts. Access to this chamber is had by way of an enlarged opening formed in the outlet side
25 of the valve body.

A removable valve seat 10, having fusible inserts 11 is interposed between the inlet and outlet of the valve. These inserts are adapted to melt when subjected to a predetermined high tempera-
30 ture. It is understood, of course, that such temperatures as just referred to, are way below the temperatures at which the rest of the valve structure would be affected. The valve seat 10 is held in place on a suitable shoulder in the valve
35 body by means of a seat-locking sleeve 12, which is threaded at 13 for engagement with the threaded part of the valve body 7 located above the inlet opening thereof. The other end of the sleeve 12 is provided with a wrench engaging portion 14
40 by means of which its removal or replacement may be readily effected. A plurality of openings 40 are provided in the sleeve 12 for connecting its interior with the outlet side of the valve. The central upper portion of the seat-locking
45 sleeve 12, is threaded at its upper end for the reception of an adjusting screw 15. This screw is arranged to engage a disk 16, which forms a seat or abutment for the upper end of the valve spring 17 and it provides a means for adjusting
50 the pressure at which the valve relieves.

A combined valve head and spring cup 18 is provided within the sleeve member 12. The valve member 18 is of cylindrical shape and forms a cup for the accommodation of the spring 17. The
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lower closed end of the valve member 18 is recessed for reception of a non-metallic bibb washer 19 retained therein by means of the bibb screw 20. The bibb washer 19, contacts with the raised portion 21, formed on the removable valve seat 10, and normally seals the port of the valve seat in opposition to pressures up to the predetermined amount, at which the valve is adjusted to open and relieve the system in connection with which it is used.

A closure cap 22 is provided for the side opening of the valve body. A gasket 23 is carried between the closure cap and valve body to prevent leakage at this point when the valve is in its open position.

In the event the inserts 11 of the valve seat fuse in response to abnormally high temperatures, the valve cap 22, the sleeve 12 and the seat 10 may be readily removed in the order stated and a new valve seat then can be installed. After replacement of the valve parts just mentioned, the valve is ready for use again. All of these operations can be accomplished without disturbing the pressure setting of the valve. This is an important feature of my valve as it allows inexperienced persons to safely replace the valve seat after its fusible provisions have melted. The spring adjusting screw 15 is tightly threaded in the member 12 so that the removal and replacement of the member 12 will not affect its adjustment. If desired, a lock nut (not shown) could be used on the screw 15 to accomplish the same result.

In the modified form of device shown in Figure 4, the valve seat 10 is replaced by a valve seat which is provided with a tubular, downwardly extending portion or dip pipe 24, terminating in a threaded end 25. This portion of the tube is arranged to receive an apertured threaded cap 26, provided for retaining in place a fusible plug 27, which closes or seals the lower end of the tube 24. The upper end of the tube 24 terminates in an annular disk 28, having a port 29 under control of the pressure responsive valve head 18. The member 28 is provided with a second port 30 which communicates with the interior of the tube 24 and serves to relieve the contents of the tank in the event of the fusing of the member 27. In the modification illustrated by Figure 4, the valve parts are identical with those shown in Figure 2 with the exception of the elements used to replace the valve seat 10 shown in Figure 2.

In Figure 5, I have shown a modified form of construction in which the valve seat and its retaining member form a single integral element of the valve. This arrangement greatly facilitates the replacement of the fusible element as all of the operating parts of the valve may be removed as a unit. In this construction, the valve head, valve spring, bibb washer, bibb screw and valve body are identical to the corresponding elements shown in connection with the forms of valve structure illustrated by Figures 2 and 4.

In general, the construction illustrated by Figure 5, closely follows the arrangement shown in Figure 4, the principal difference being that the valve seat and its locking member are formed in one piece. In this construction, I have provided a sleeve member 32 having a valve seat 31 integrally formed in its lower portion for controlling a port similar to the port 29 of Figure 4. The sleeve 32 has a wrench engaging portion 33 and a threaded lower portion 34, which cooperates with the threaded portion of the valve body lo-

cated just above the inlet opening, as illustrated in Figures 2 and 4.

A valve member 18 and spring 17 are carried within the sleeve 32 cooperating with the seat 31 to control fluid flow through the valve port defined by the valve seat 31. The upper end of the sleeve 32 is interiorly threaded at 35 for the reception of a threaded plug 36, provided for the purpose of adjusting the tension of the spring 17 and in this manner varying the pressure at which the valve operates.

A dip pipe 41 is integrally formed with the sleeve 32 and it communicates with the interior of the sleeve 32 by way of a port similar to the one shown in connection with Figures 4 and 6 15 and indicated by the numeral 30. The lower end of the dip pipe 41 is interiorly threaded for the reception of the threaded plug 37, the lower end of which is provided with a wrench engaging portion 38. The removable plug 37 has a central bore which is filled with a relatively fusible material similar to that used in connection with the forms of valve illustrated by Figures 2 and 4. The sleeve 32 is provided with a plurality of openings 42 for affording communication between the interior of the sleeve and the outlet opening of the valve casing. The sleeve and its associated dip pipe may be constructed from a one piece casting or they may be formed separately, initially, and later detachably or permanently connected to each other. Any of these constructions would fulfill the objects of this invention.

In the construction illustrated by Figure 5, all of the operating parts of the valve may be removed as a unit by simply removing the sleeve member 32 in which the aforesaid valve parts are secured in assembled relation. By this arrangement, the replacement of the fusible element of the valve is greatly facilitated and the pressure responsive parts of the valve are not disturbed nor is their adjustment changed in effecting such replacement.

Furthermore, it is to be understood that the particular forms of apparatus shown and described, and the particular procedure set forth, are presented for purposes of explanation and illustration and that various modifications of said apparatus and procedure can be made without departing from my invention as defined in the appended claims.

Having thus described my invention, what I claim is:

1. In a relief valve construction, in combination, a casing having inlet and outlet openings, separate temperature and pressure responsive means in said casing for controlling fluid flow between the inlet and outlet openings of said casing said temperature means and said pressure means being interconnected and insertable and removable as a unit in said casing, said temperature responsive means comprising a dip pipe, the outer end of which is sealed with a fusible element, and said pressure responsive means comprising a spring pressed valve and a seat therefor and adjusting means for said spring, said several parts being so related as to permit such unit insertion or removal while maintaining the adjustment of said pressure responsive means.

2. In a relief valve construction, in combination, a permanently connectible valve casing with inlet and outlet openings and a chamber therebetween, a unitary removable construction therein comprising a member having separate passageways detachably carried in the inlet open-

ing of said casing, one of said passageways being defined in part by a dip tube extending through the inlet opening of said casing, adjustable pressure responsive means to control fluid flow through one of the passageways of said member, and temperature responsive means including a fusible element detachably carried by said tube to control fluid flow through the other passageway of said member, said unitary member, tube and adjustable pressure means being removable as a unit whereby to permit replacement of said temperature responsive means without disturbance to said adjustable pressure means.

3. In a unitary temperature-pressure responsive valve adapted to be inserted in or withdrawn from a permanently installed valve casing, the combination of a cylindrical supporting sleeve, an integral valve seat providing a main port at one end of said sleeve, a pressure responsive member in said sleeve for engaging said seat in flow obstructing relation, a spring for urging said member against said seat, adjustable means mounted in the opposite end of said sleeve for adjustably

compressing said spring, an aperture in the side wall of said sleeve, an auxiliary port adjacent said main port, a dip tube operatively connected with said auxiliary port and extending integrally from said sleeve, and a fusible element replaceably secured in the extended end of said dip tube, said entire unitary temperature-pressure responsive valve being removable from the casing while maintaining the adjusted condition of said spring.

4. In a unitary temperature-pressure responsive valve adapted to be inserted in or withdrawn from a permanently installed valve casing, the combination of a cylindrical supporting sleeve having two ports, pressure responsive means therein for controlling one of said ports, means for adjusting said pressure responsive means also carried by said sleeve, a dip tube carried by said sleeve and extending from the other port and a fusible element mounted in the extended end of the dip tube.

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