Feb. 8, 1938. L. D. LOVEKIN 2,107,673

TEMPERATURE LIMITING DEVICE FOR HOT WATER SYSTEMS

Filed Dec. 19, 1933 3 Sheets-Sheet 1

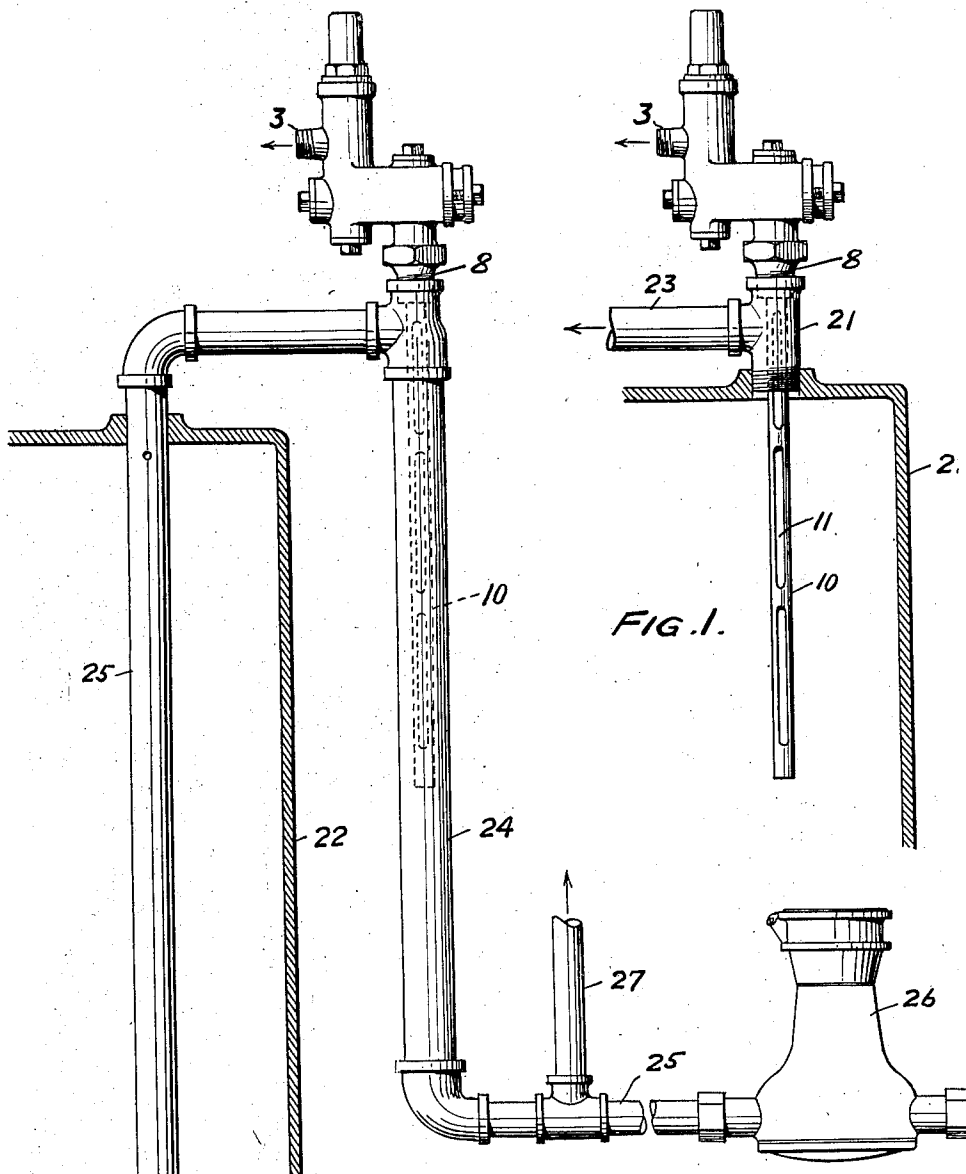


FIG. 1.

FIG. 2.

WITNESS:
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TEMPERATURE LIMITING DEVICE FOR HOT WATER SYSTEMS

Filed Dec. 19, 1933 3 Sheets-Sheet 2

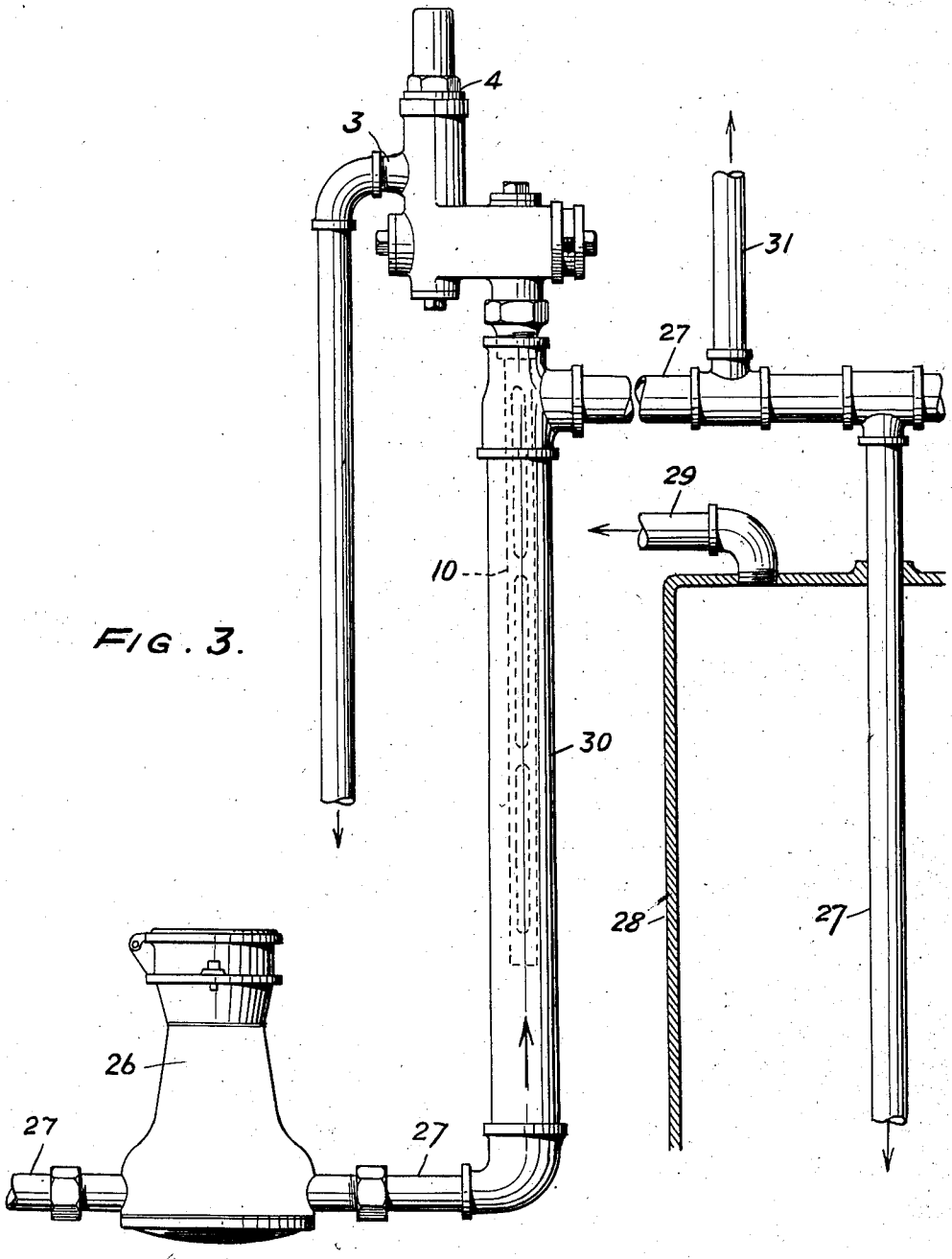


FIG. 3.

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TEMPERATURE LIMITING DEVICE FOR HOT WATER SYSTEMS

Filed Dec. 19, 1933 3 Sheets-Sheet 3

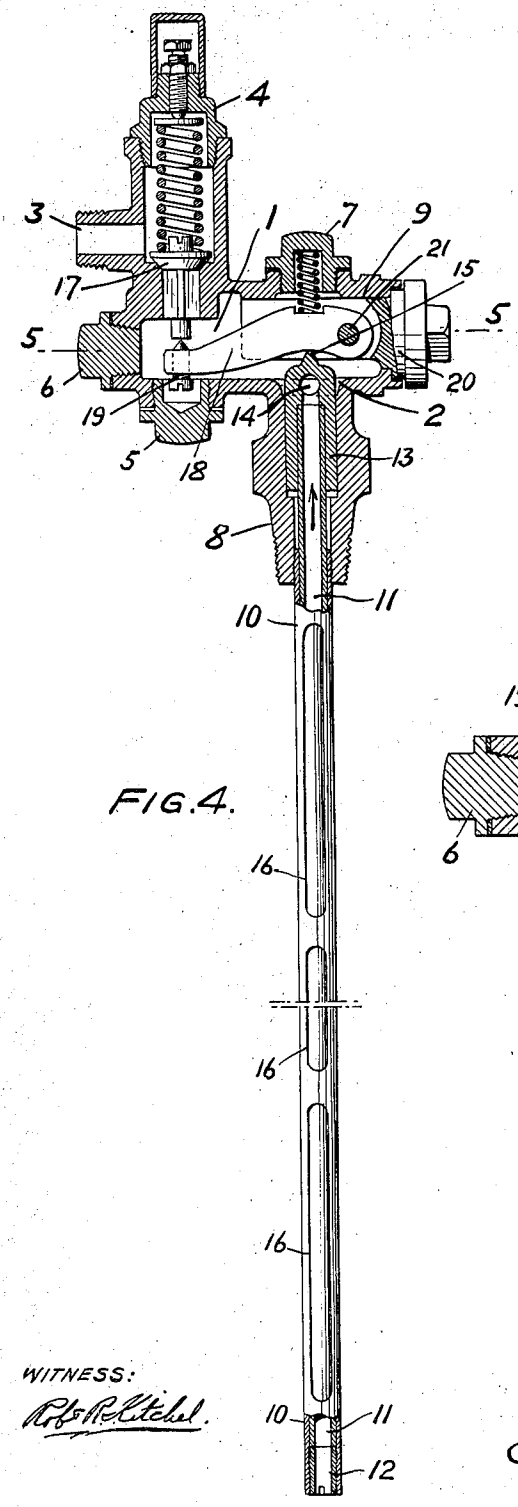


FIG. 4.

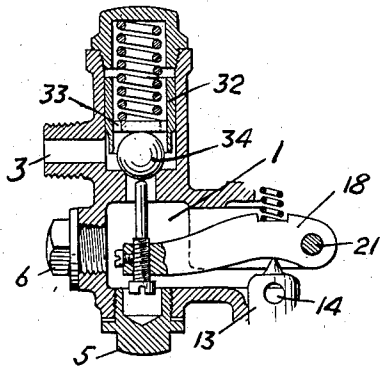


FIG. 7.

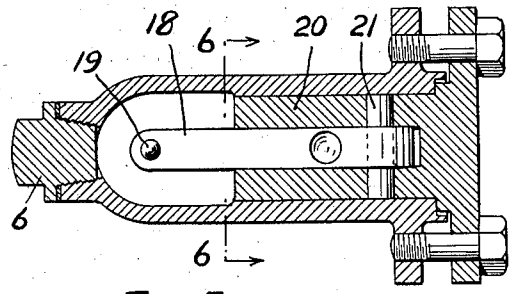


FIG. 5.

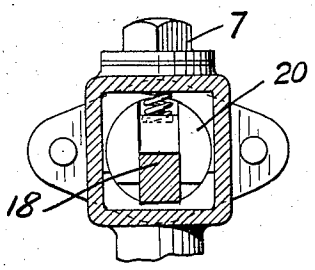


FIG. 6.

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Patented Feb. 8, 1938

2,107,673

UNITED STATES PATENT OFFICE

2,107,673

TEMPERATURE LIMITING DEVICE FOR HOT WATER SYSTEMS

Luther D. Lovekin, Villanova, Pa., assignor to Kitson Company, Philadelphia, Pa., a corporation of West Virginia

Application December 19, 1933, Serial No. 703,037

1 Claim. (Cl. 137—139)

Objects of the present invention are: to provide a device of the character stated which shall be self-resetting, and which shall be sensitive and accurate in operation and simple and comparatively inexpensive in construction; to provide for operating the device by the straight line thrust resulting from the differential expansion under rise in temperature of two straight nested elements of different metals thereby obviating the use of guides; to magnify the motion due to the straight line thrust and to apply it for opening a self-closing water and steam relief valve, generally to provide an improved device of the character mentioned and to make it adjustable for operation at different temperatures, and to provide a device which when applied in the cold water inlet of a boiler or heater will limit the rise in temperature of the feed water and confine it to the location of the device (thus protecting a water meter) without spilling or discharging more than a minimum of water and for short intervals of time as well as discharging steam when necessary.

The invention is applicable more particularly for open hot water systems, meaning those devoid of check valves and in which hot water might, except for the invention, reach the mains, and generally stated, the invention comprises the improvements to be presently described and finally claimed.

In the following description reference will be made to the accompanying drawings forming part hereof and in which,

Figures 1, 2 and 3 are elevational and sectional views illustrating features of the invention.

Figure 4 is an elevational view with parts in section illustrating a device embodying features of the invention.

Figure 5 is a sectional view drawn to an enlarged scale and taken on the line 5—5 of Figure 4.

Figure 6 is a sectional view taken on the line 6—6 of Figure 5, and

Figure 7 is a view similar to Figure 4 as far as it goes and illustrating a modification.

Referring to the drawings, there is a housing providing a fluid way 1 of which the inlet is indicated at 2 and the outlet at 3. The housing is shown as provided with caps 4, 5, 6, and 7, and it is provided with a neck 8 and with a generally cylindrical bore 9. Depending from the neck are nested elements both shown as tubes 10 and 11 of different metals; for example, the tube 11 may be of aluminum and the tube 10 of nickel. The tube 10 is screwed in the neck 8 and the tube 11 is seated on a thimble 12 inserted into the open end of the tube 10, and at the upper end of the tube 11 there is a fitting 13, slidable in the housing and provided with a fluid-way 14 and with a shoulder 15. The tube 10 is provided with openings 16 which permit water to reach the outside of the tube 11. It will thus be seen that there are two straight nested elements, of which one is tubular, and which are of different metals and move relatively under change of temperature. 17 is a spring seated valve interposed in the water-way 1. 18 is a pivoted lever operated upon by the cap 13 and provided with an adjustable screw 19 which operates on the valve 17. As shown the lever 18 is pivoted in the fork of a generally cylindrical plug 20 mounted in the cylindrical portion of the housing. By this construction the pivot 21 for the lever 18 is well supported and the lever 18 itself is properly guided, and thus accuracy of operation is insured. By adjusting the screw 19 the valve may be opened at different points in the movement of the lever 18 and thus the temperature at which the valve is opened may be adjusted. The purpose of the lever 18 is to magnify the movement of the elements 10 and 11 in its application to the valve 17.

Referring to Figure 1, the neck 8 is mounted in a fitting 21 extending to the exterior of the boiler 22 and provided with a hot water pipe 23. The elements 10 and 11 extend into the interior of the boiler. The operation may be described as follows: Should the temperature of the water in the boiler or tank 22 for any reason rise to a point for which the device is set the thrust, due to the relative expansion of the elements 10 and 11, acts through the cap 13 upon the lever 18 which opens the valve 17 permitting escape of hot water from the boiler through the element 11 to the water-way 1 and past the open valve 17 to the outlet or spillway 3. Cold water enters the boiler, or tank 22 and reduces its temperature to the proper value.

In the arrangement shown in Figure 2 a casing 24 is interposed in the cold water inlet pipe 25 which feeds the tank or boiler 22 through the water meter 26. Between the meter 26 and the casing 24 there are one or more cold water supply pipes 27 to the various fixtures of the house. The elements 10 and 11 project into the casing 24. In this arrangement if the temperature of the water in the boiler or tank 22 should rise hot water backs into the casing 24 because the system is an open one, but this hot water operates the described device to open the valve 17 to the

spillway 3 and thus the hot water or even steam escapes and is replaced by cold water so that the temperature in the tank 22 is limited. The hot water does not reach either the connection 27 or the meter 26, and this is desirable because hot water would injure the meter and it is not desirable to have hot water run out of the cold water fixtures.

In the arrangement shown in Figure 3 the described device is mounted in the cold water supply line 27 which leads to the boiler or tank 28 having a hot water offtake pipe 29. In this case the meter 26, the casing 30, and the described device with its elements 10 and 11 constitute a unitary structure that may be sold as such. In this case rise in temperature of the water in the pipe 27 on the boiler side of the casing 30 operates to open the valve 17 and permit of the escape of hot water and steam, thus restoring the temperature by the inflow of cold water. In this case it is possible for hot water to reach the cold water supply pipe 31 to the cold water fixtures but the hot water does not reach the meter 26 nor does it reach much below the ends of the elements 10 and 11.

It may be remarked that in operation unduly large quantities of water are not discharged from the spillway 3. Furthermore, the arrangement shown in Figure 2 is adapted for use where the casing and its accessories are located near the boiler or tank and the arrangement shown in Figure 3 is adapted to cases where the casing 30 is arranged remote from the tank or boiler.

The construction and mode of operation of the modification illustrated in Figure 7 are as above described except that a ball valve 34 is used and it is arranged in the flange of a spring pressed plunger sleeve 32 having openings 33. In this construction the pressure on the plunger is balanced so that the ball valve 34 operates properly.

It will be obvious to those skilled in the art to which the invention relates that modifications may be made in details of construction and arrangement and in matters of mere form without departing from the spirit of the invention which is not limited in respect to such matters or otherwise than as the prior art and the appended claim may require.

I claim:

In a self-resetting, temperature-limiting device for hot water systems, the combination of, a normally seated water relief valve, two straight temperature-responsive metal elements arranged one within the other and of which the inner one is tubular for the passage of water, a motion magnifying lever operated by said straight elements and arranged to open said valve and to permit it to close in response to differential expansion and contraction of said elements, a support for said lever comprising a generally cylindrical forked plug having a flat portion in its cylindrical wall, a valve casing enclosing said valve and to which said support is detachably secured, and a pivot pin near the root of the fork.

LUTHER D. LOVEKIN.