E. E. GOLD.

VALVE FOR HEATING SYSTEMS.

APPLICATION FILED NOV. 17, 1908.

985,410.

Patented Feb. 28, 1911.

FIG. 1.

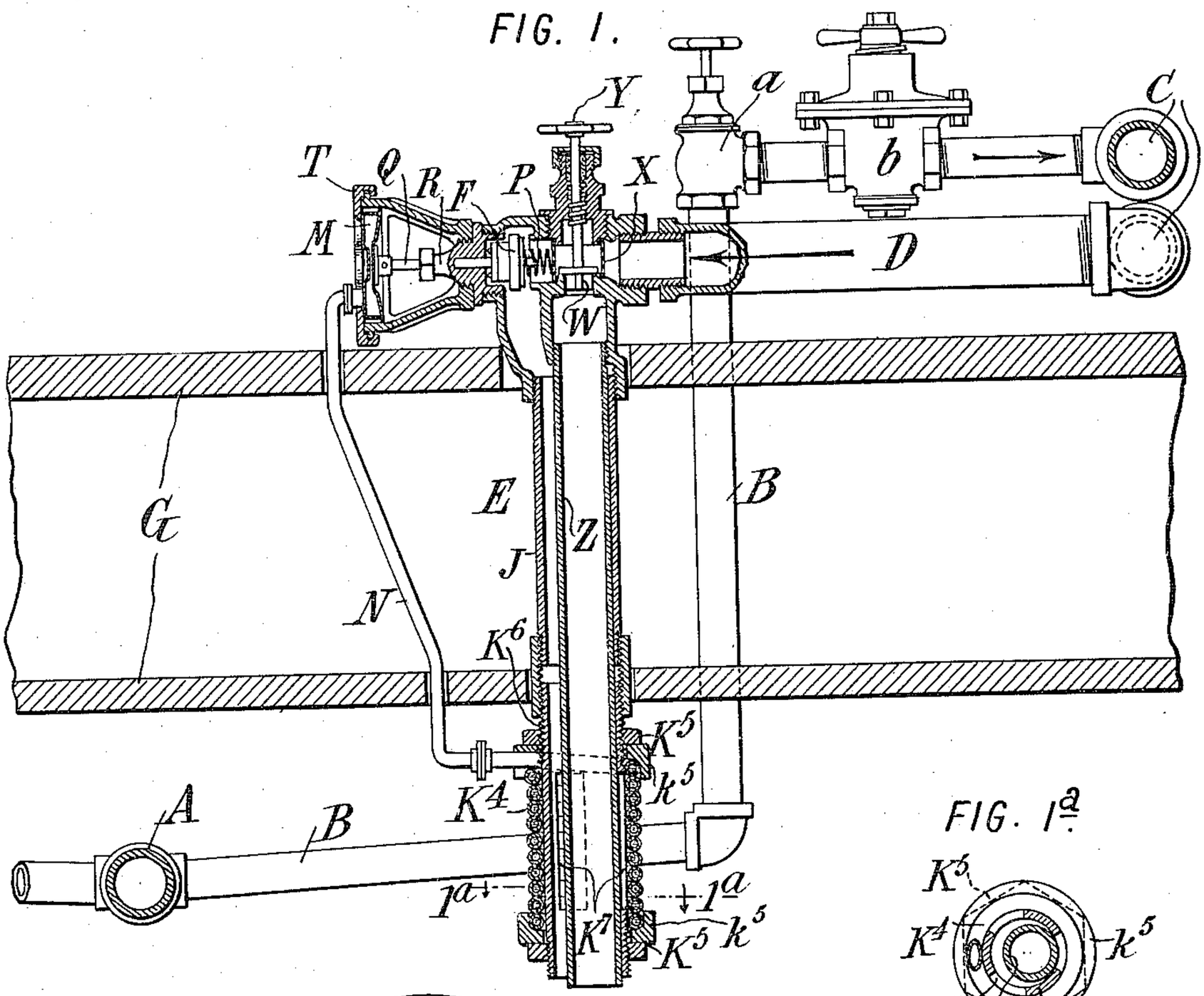


FIG. 1a.

FIG. 2.

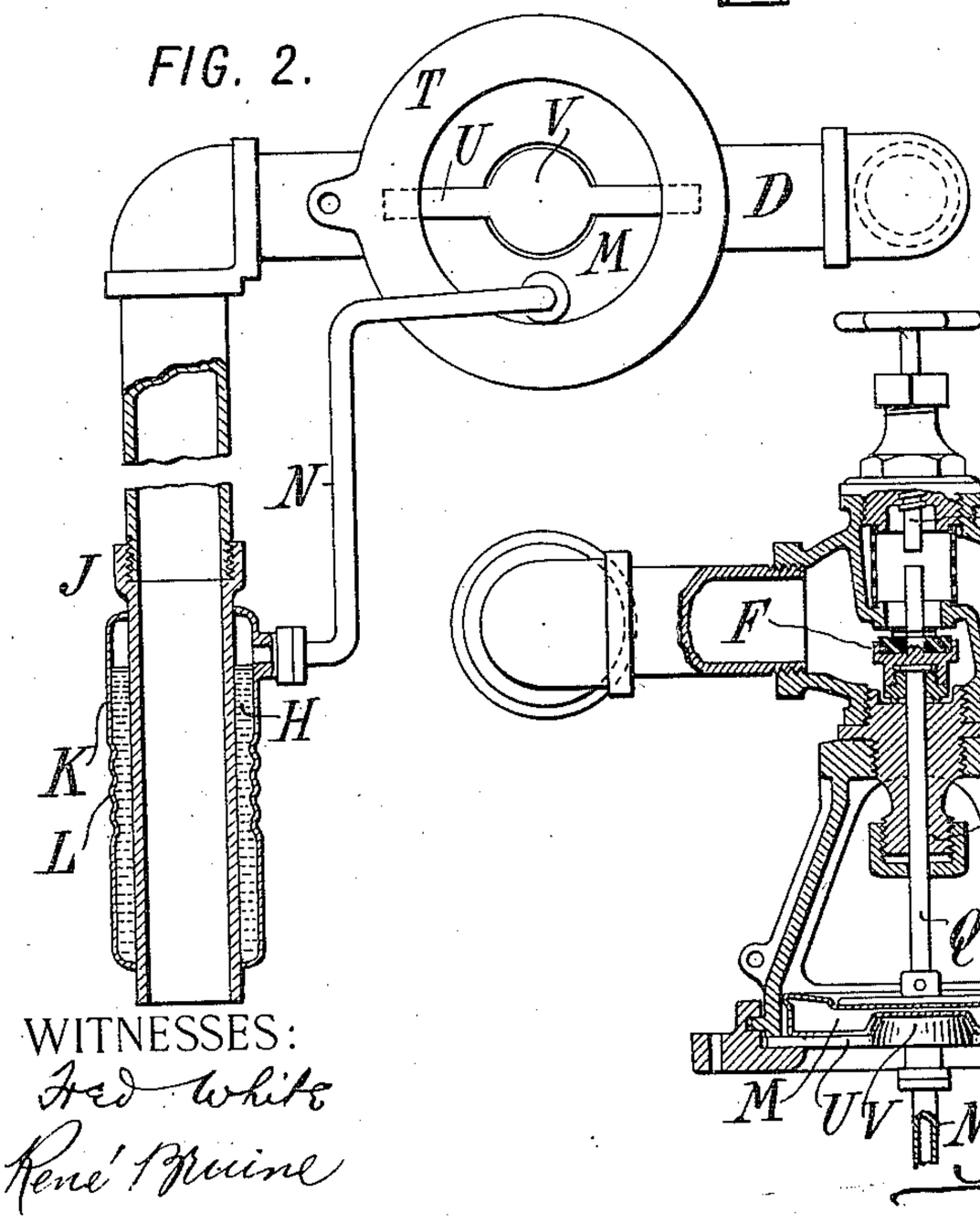
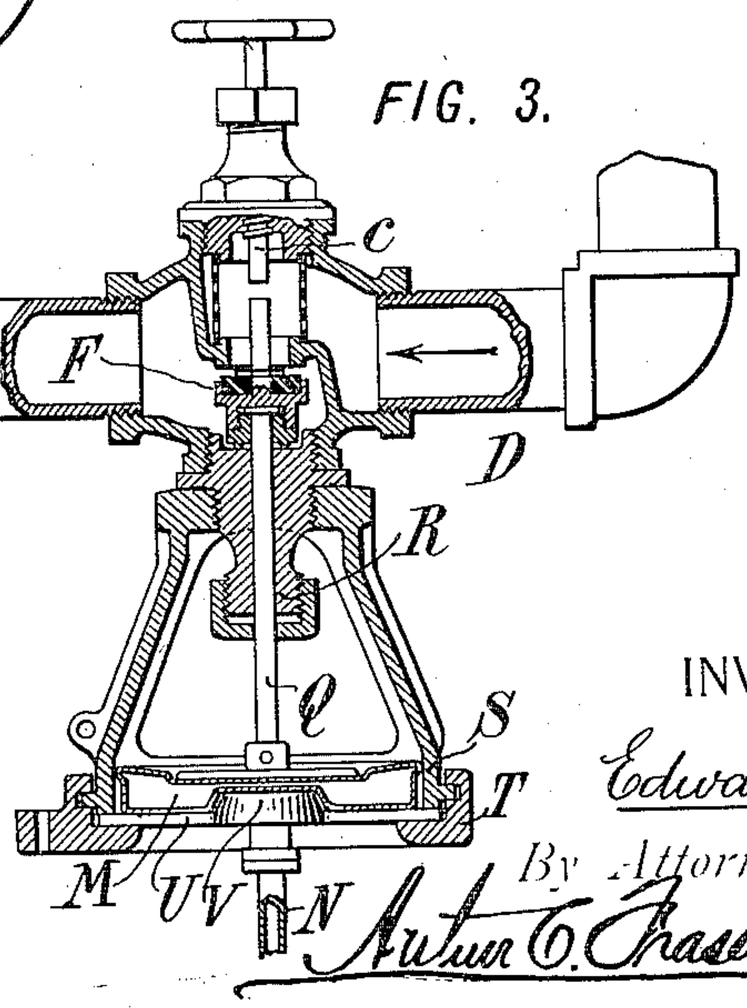


FIG. 3.



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VALVE FOR HEATING SYSTEMS.

985,410. Specification of Letters Patent. Patented Feb. 28, 1911.

Application filed November 17, 1908. Serial No. 463,109.

To all whom it may concern:

Be it known that I, EDWARD E. GOLD, a citizen of the United States, residing in the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Valves for Heating Systems, of which the following is a specification.

My invention aims to provide an improvement in valves for heating systems especially applicable to the heating of railway cars by steam or indirectly by hot water which is heated by steam.

The accompanying drawings illustrate embodiments and applications of the invention.

Figure 1 is a vertical sectional view of a discharge trap with the adjacent parts of a heating system in elevation. Fig. 1ª is a cross-section on the line 1ª—1ª of Fig. 1. Fig. 2 is an elevation of another style of trap. Fig. 3 is a horizontal section of the valve and adjacent parts of Fig. 2.

Referring now to the apparatus illustrated, and especially to Fig. 1, the usual train-pipe A carrying a pressure of steam reduced from that in the locomotive boiler and varying from 40 to 80 pounds generally, extends the length of the car and is provided with suitable branches B leading to the radiating systems of the separate sides of the car. The radiating pipes are represented at C and the discharge pipe at D. The trap through which the water of condensation is allowed to escape is indicated as a whole by the letter E. It includes a valve body F which, when the system is being operated as a pressure system, normally closes the discharge end of the pipe so as to prevent escape of steam and fall of pressure, and which opens at intervals when the water of condensation has accumulated in the discharge end of the pipe, so as to permit the escape of such water. Ordinarily this valve body is arranged within the car and has a stem extending down through the double floor G of the car to an expansible vessel situated somewhat below the lower floor and which contains a thermostatic liquid such as alcohol, ether, or the like. Then when the valve is opened the water of condensation escapes and is followed by steam which is directed upon the expansible vessel and vaporizes the liquid therein and causes the vessel to expand and move the valve stem in a direction to close the valve and prevent the further escape of steam. When the valve has been closed for a time the temperature of the outer air to which the expansible vessel containing the thermostatic liquid is exposed effects the condensation of the thermostatic liquid and the contraction of the expansible vessel, and opens the valve. The exposure of the expansible vessel outside of the car introduces complications in order to protect it from injury and in order to prevent the protecting structure from causing it to become clogged with ice. Its position also is one in which it is not readily accessible. In the system illustrated these and other disadvantages are eliminated by transferring the expansible vessel which operates the valve body to a point within the car where it is easily protected, entirely outside of the range of the escaping water of condensation so that there is no danger of freezing, and where it is perfectly accessible. At the same time the advantage is maintained of utilizing the escaping steam or hot water to expand the vessel, and of using the outside atmosphere to contract it. This is accomplished by providing a vessel outside the car and exposed to the escaping steam and to the outer atmosphere and containing the expansible fluid, and providing communication between the expansible fluid outside the car and the expansible vessel within the car.

Various styles of vessel may be used for carrying the expansible fluid and exposing it to the steam. Preferably the construction shown in Figs. 1 and 1ª is employed, consisting of a cylindrical coil K^4 of copper or brass tubing, the lower end of which is sealed and the upper end of which is continued in the pipe N which conveys the pressure to the valve-operating expansible vessel. The coil may be supported in any suitable way to provide access of the escaping steam to it. For example, it may be supported between cup-shaped washers k^5 and nuts K^5 screwed upon the opposite ends of a core K^6 forming a continuation of the vertical discharge pipe J, and which is provided with openings K^7 for permitting the steam to come into contact with the cylindrical coil. The nuts K^5 may be adjusted so as to hold the convolutions of the coil in contact with each other and prevent the passage of steam or of air between them, or these nuts may set the coil with greater or smaller passages between the convolutions. The cold air is blowing on the coil at all times that the train

is running, and the effect of separating the convolutions would be to expose the coil more extensively to the cooling action of the air and to render the system more sensitive to the coldness of the outer air. The use of a coil of pipe as the vessel for carrying the thermostatic fluid and exposing it to the heat and cold has great advantages, especially in that it expands and contracts freely and can be made free from joints except the single joint which connects it with the expansible vessel adjacent to the valve, in that it exposes a large surface to the steam at one side and to the air at the other side, and in that it can be readily and cheaply applied to traps or heating systems already in use.

It has always been a difficult matter to provide for the proper ventilation or exposure to the atmosphere of the vessel carrying the thermostatic liquid. In practically all the traps employed in car heating this vessel has been inclosed, and efforts have been made to secure as full an exposure to the atmosphere as possible. With the present system and especially with the coiled pipe serving as the vessel for carrying the thermostatic liquid, there is a perfect exposure to the atmosphere. This is of importance in determining the sensitiveness of the system. For theoretical perfection the system should operate so sensitively as to maintain as nearly as possible the same temperature at the discharge end of the radiator as at its admission end, thus getting the greatest efficiency out of the piping whose radiating surface is designed for a standard temperature. With a thermostat of the kind shown in Fig. 1 I have succeeded in securing, without appreciable waste of steam and working at atmospheric pressure, a temperature at the discharge end of the radiator approximately 12 per cent. greater (above zero Fahrenheit) than can be secured under the same conditions with the best traps of the type in which thermostat is inclosed. Also the large exposure to the air accomplishes a very perfect regulation of the heating of the car; the rapidity with which the valve is opened and shut varying widely under different atmospheric temperatures.

The vessel carrying the volatile liquid is not separately claimed in the present application for patent, being claimed in a divisional application No. 523,998 filed October 22, 1909. As a substitute for the preferred arrangement above described there may be used with the valve mechanism a variety of other pressure-generating means. In the apparatus of Fig. 2 the expansible fluid H (alcohol, ether, or the like) is carried in a vessel formed by a portion of the discharge pipe J of the system, and by a jacket K surrounding the same and brazed thereon. The jacket K is provided with corrugations L to allow a slight differential expansion between the jacket and the pipe J without injury to the joints of the vessel, but as far as its effect upon the operation of the system is concerned it might be considered a substantially inexpansible vessel. The space within the jacket K is in communication with the expansible vessel M controlling the valve F, by means of a tube N.

The valve F (Fig. 1) is normally pressed open by a spring P. Its stem Q passes through a stuffing box R to the inner corrugated movable face of the expansible vessel M, the latter being held between a ring S (Fig. 3) supported by a spider from the stuffing box or valve casing and an outer ring T which locks by a bayonet joint or similar device over the inner ring S. The outward movement of the valve stem is limited by a depression at the center of the outer wall of the expansible vessel M, and preferably (as shown in Fig. 3) the outer wall of this vessel is held substantially rigid by a cross-bar or plate U with a central boss V fitting the shape of the outer face of the expansible vessel, the cross-bar or plate U being held in place by the outer ring T. It is not essential, however, to use a separate bar U for this purpose. The cross-bar and central enlargement supporting the back of the expansible vessel may be made in one piece with the outer ring T, as shown in Fig. 1, and others. Figs. 2 and 3 show the construction using a separate cross-bar. In this valve there is no opening spring illustrated, the valve being arranged to open under the pressure of the steam.

Referring back to Fig. 1, it will be seen that the water of condensation passing through the trap valve F and down the discharge pipe J thereof finds a perfectly free outlet. As soon as the water of condensation has all passed out and the steam comes, it heats the thermostatic liquid H and vaporizes it, creating a fluid pressure which is transmitted to the expansible vessel M within the car and closes the valve. When the flow of steam has been stopped long enough, the outside temperature causes the condensation of the thermostatic vapor and the collapsing of the vessel M and the opening of the valve to release the water of condensation which has accumulated in the meantime. It is desirable to provide a blow-off valve, and this is conveniently combined with the trap. The blow-off valve in Fig. 1 is indicated at W and is a simple hand valve surrounded by a screen X and raised and lowered by means of a spindle Y. The discharge pipe Z for the blow-off is preferably arranged within or closely adjacent to the discharge of the trap, so that by opening the blow-off and allowing live steam to pass freely through the discharge pipe Z any

ice in the surrounding discharge pipe J of the trap will be melted.

Figs. 2 and 3 show an arrangement of the discharge valve or trap valve in a somewhat different location from that shown in Fig. 1, and adapted also to be held open by hand so that it may serve at once as a trap valve and as a blow-off valve. The vertical portion J of the discharge pipe in this case is entirely clear, so that there is less danger of clogging by freezing, and the elimination of a separate blow-off valve simplifies the construction. The valve F in this case is arranged to move horizontally, its stem Q being connected with the expansible vessel M which is connected by the communicating pipe N with the jacket K below the floor of the car as previously described. The steam flowing in the direction of the arrow tends to open the valve when there is no pressure in the expansible vessel. When such pressure arises the valve closes. In order to use the valve as a blow-off, a stem *c* is passed through a stuffing box at the opposite side of the valve casing, and is arranged to screw in and out in line with the extended stem of the valve F, so that by screwing in the stem *c* the valve F may be forced open and held so against the fluid pressure in the expansible vessel, thus blowing out the pipes.

No claim is made in the present application to the vessel carrying the volatile liquid, as stated above; nor to the discharge valve and connected parts constituting an automatic trap, this being the subject of a separate divisional application No. 473,576 filed January 21, 1909; nor to the system as a whole, this being the subject of a separate divisional application No. 523,997 filed October 22, 1909; and the claims of the present application being based on the construction of the valve and immediately related parts independently of the manner of applying it in a heating system.

What I claim is:—

1. A valve for heating systems including in combination a stem Q, a valve casing, a stuffing box at one side of said valve casing through which said stem passes, a ring S supported from the casing of the valve, a ring T detachably engaging the ring S, an expansible vessel M held between the rings S and T and engaging the valve stem, means for introducing fluid pressure into said expansible vessel, and a stem projecting through the opposite side of the valve casing and adjustable by hand to a position to hold the valve against the action of the expansible vessel, said means for introducing pressure including a vessel carrying a thermostatic fluid and communicating with said expansible vessel, said vessel carrying the thermostatic fluid having a passage which is located in the path of the heating medium at the discharge side of the valve, the outer side of said vessel carrying the heating medium being exposed to the surrounding atmosphere.

2. A valve for heating systems including in combination a stem, an expansible vessel having a wall in engagement with said stem, and means for introducing fluid pressure into said expansible vessel, comprising a coil of pipe carrying a thermostatic fluid and communicating with said expansible vessel, the inner side of said coil being located in the path of the heating medium at the discharge side of the valve, and the outer side being exposed to the surrounding atmosphere.

3. A valve for heating systems including in combination a stem Q, a valve casing, a stuffing box at one side of said valve casing through which said stem passes, a ring S supported from the casing of the valve, a ring T detachably engaging the ring S, an expansible vessel M held between the rings S and T and engaging the valve stem, means for introducing fluid pressure into said expansible vessel, and a stem projecting through the opposite side of the valve casing and adjustable by hand to a position to hold the valve against the action of the expansible vessel, said means for introducing pressure including a coil of pipe communicating with said expansible vessel, carrying a thermostatic liquid and located in the path of the heating medium at the discharge side of the valve.

In witness whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

EDWARD E. GOLD.

Witnesses:
DOMINGO A. USINA,
THEODORE T. SNELL.