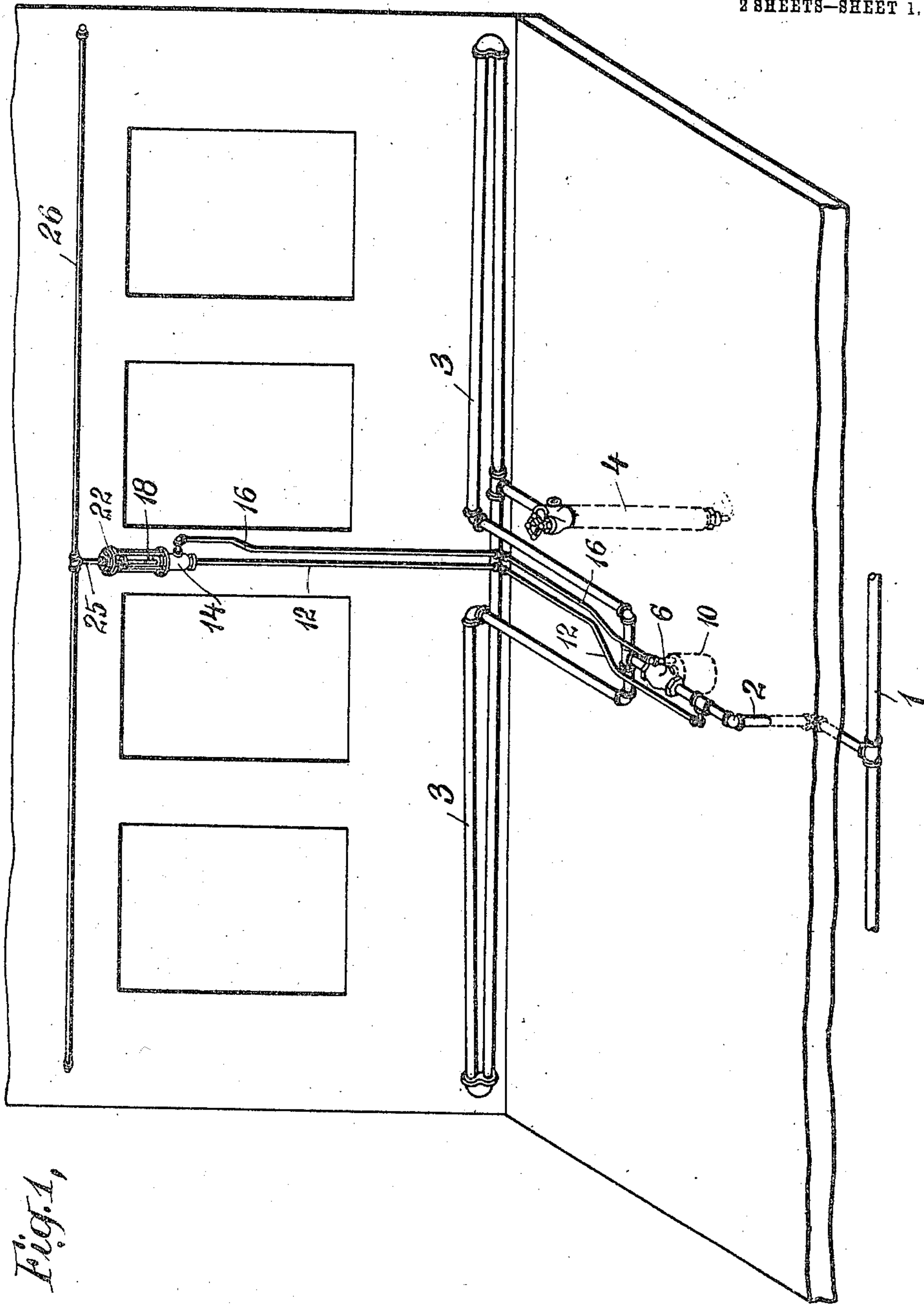


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966,409.

Patented Aug. 2, 1910.

2 SHEETS—SHEET 1.



1507

WITNESSES:

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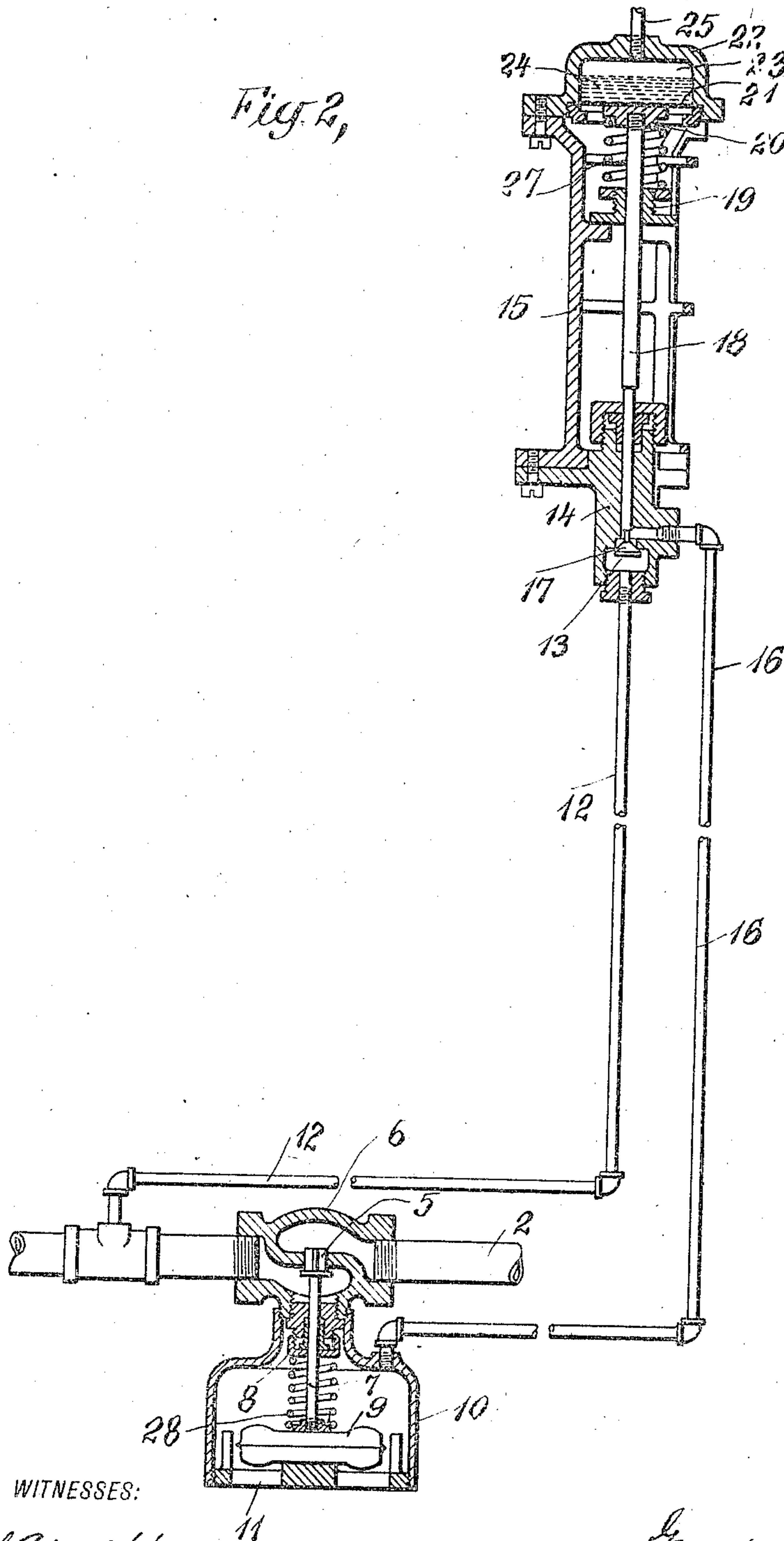
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G. E. HULSE.
HEATING SYSTEM.
APPLICATION FILED FEB. 6, 1909.

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2 SHEETS—SHEET 2.

Fig. 2,



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UNITED STATES PATENT OFFICE.

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HEATING SYSTEM.

966,409.

Specification of Letters Patent.

Patented Aug. 2, 1910.

Application filed February 6, 1909. Serial No. 476,350.

To all whom it may concern:

Be it known that I, GEORGE E. HULSE, a citizen of the United States, residing at Newark, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Heating Systems, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to heating systems, and more particularly to systems of this description in which the temperature of a compartment is to be maintained substantially constant.

One of the objects is to provide a practical device to be used in a system of this character which will be quick to respond to variations in the temperature and positive in its action.

Another object is to provide a device of this character which will be of simple, durable and economical construction.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, wherein is shown one of various possible embodiments of the invention, Figure 1 is a perspective view illustrating the relative positions of the various parts of the system; and Fig. 2 is a vertical sectional view taken through the automatic regulator and the main valve.

Referring to the drawings, in which similar reference numerals indicate similar parts throughout the several views, the system is shown as applied to a railway car, for which use it is peculiarly adapted. A train pipe 1 which is in connection with a source of supply of a heated medium, preferably steam from the locomotive, is connected by branch piping 2 to the radiators 3 located in the various cars, the said radiators being connected to a suitable trap 4 through which the water of condensation is drained. Interposed in the branch piping 2 is a valve 5 located within a casing 6 and provided with a stem 7 which passes through a suitable stuff-

ing box 8 secured to the casing 6 and has its outer end operatively connected with a thermostatic cell or diaphragm 9 located within a suitable casing 10, which may be supported upon the valve casing in any convenient manner and is provided with perforations 11. A conduit 12 communicates with the branch piping 2 upon the supply side of the valve 5 and leads to the inlet of an auxiliary valve chamber 13 formed in a casing 14 which may be secured in any suitable manner to the frame 15 of an automatic regulator. The outlet of said auxiliary valve chamber is in communication with the casing 10 through a suitable conduit 16.

The passage of the heated medium through the conduits 12 and 16 is controlled by an auxiliary valve 17 having a stem 18 secured thereto, preferably guided intermediate its length by a suitable bushing 19 supported by the frame 15 and having a suitable head 20 secured to its outer end, which head is in operative relation to a flexible diaphragm 21. A cup-shaped member 22 is secured to the frame 15 in any suitable manner, retaining the diaphragm 21 in position and forming therewith a chamber 23 containing a volatile liquid 24, such as chloroform, for a purpose hereinafter described. A pipe 25 preferably threaded within an opening in the cup-shaped member 22 leads to piping 26 closed at both ends, which preferably extends substantially throughout the length of the car and is located at any convenient point therein, as, for example, upon the side wall above the windows, as shown in Fig. 1. A suitable spring 27 tends normally to hold the auxiliary valve 17 in its closed position. The regulator is preferably located near the upper portion of the car, as indicated in Fig. 1, being secured to the side wall in any suitable manner. The piping 26 will, of course, be completely filled by the vapor of the volatile liquid 24 which is contained within the chamber 23.

The operation of the device, which should be largely obvious from the above description, is as follows: Supposing the temperature rises above a certain predetermined point, the pressure of the vapor in the piping 26 and chamber 23 will increase until it is sufficient to overcome the tension of the spring 27 at which instant the diaphragm 21 will be forced downward, thereby causing

the auxiliary valve 17 to open and permit steam from the branch piping 2 to pass through conduits 12 and 16 into the chamber 10. The heated medium will thus be directed against the thermostatic cell 9 causing the same to expand and partially or entirely close the valve 5, this action throttling or cutting off the steam from the radiators 3. It is to be noted that the degree to which the main valve 5 is closed is dependent not only upon the temperature of the apartment, but upon the temperature or pressure of the steam supply. If, now, the temperature falls below said predetermined point the pressure of the vapor will decrease, thus permitting the spring 27 to close the auxiliary valve, shutting off the flow of steam into the chamber 10 and permitting the thermostatic cell 9 to cool and contract, thereby opening the valve 5 and permitting a fresh supply of the heated medium to flow into the radiators. The opening of the valve 5 may be assisted, if desired, by a suitable spring 28 one end of which may bear against the stuffing box 8, and the other end against the thermostatic device. The perforations 11 within the casing 10 permit the heated medium to pass out of the same after it has performed its work and also allows outside air to enter the casing to cool the thermostatic device when the flow of the heated medium into said casing has been cut off, as above described.

While the system has been shown as applied to a railway car, it will, of course, be understood that it could be installed in any building or compartment where it is desired to maintain a constant temperature and although the thermostatic cell 9 is preferably positioned outside the apartment to be heated, as shown, nevertheless certain features of the invention comprehend a construction in which it is within the same. Certain features illustrated and described in this application, namely, the piping 26 extending substantially throughout the length of the car and containing vapor of the volatile liquid 24, are shown, described and claimed in my copending application for Improvements in Systems of Heating, filed Apr. 2, 1909, Serial No. 489,224, and are accordingly not claimed herein.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense. It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope

of the invention which, as a matter of language, might be said to fall therebetween.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a heating system, in combination, piping adapted to convey a heated medium from a source of supply to the radiating means, a valve interposed in said piping to regulate the flow of the medium there- through, thermostatic means influenced substantially by the temperature of the heated medium as supplied to said valve for operating said valve, a conduit independently positioned with respect to the radiating means adapted to convey the heated medium into operative relation with said thermostatic means, a valve interposed in said conduit for regulating the flow of said heated medium therethrough, and thermostatic means controlled by the temperature of the space to be heated for operating said valve.

2. In a heating system, in combination, piping adapted to convey a heated medium from a source of supply to the radiating means, a valve interposed in said piping to regulate the flow of the medium there- through, means for operating said valve adapted to be controlled by the temperature of said heated medium, means for conveying the heated medium from said piping into operative relation to said valve operating means, and means responsive to variations in the temperature of the surrounding atmosphere for regulating the flow of said medium through said conveying means.

3. In a heating system, in combination, piping adapted to convey a heated medium from a source of supply to the radiating means, a valve interposed in said piping to regulate the flow of the medium there- through, thermostatic means for operating said valve in accordance with the temperature of said heated medium, means communicating with said piping at a point in advance of said valve adapted to convey the heated medium therefrom into operative relation with said thermostatic means, and means responsive to the temperature of the surrounding atmosphere adapted to regulate the flow of said heated medium through said conveying means.

4. In a heating system, in combination, piping adapted to convey a heated medium from a source of supply to the radiating means, a valve interposed in said piping to regulate the flow of the medium there- through, thermostatic means influenced substantially by the temperature of the heated medium supplied to said valve for operating said valve, a conduit independently positioned with respect to the radiating means adapted to convey the heated medium into operative relation with said thermostatic means, and means responsive to variations

in the temperature of the surrounding atmosphere adapted to regulate the flow of said heated medium through said conduit.

5. In a heating system, in combination, 5
piping adapted to convey a heated medium
from a source of supply to the radiating
means, a valve interposed in said piping to
regulate the flow of the medium there-
through, thermostatic means for operating
10 said valve in accordance with the tempera-
ture of said heated medium, an auxiliary
valve for controlling the operation of said
means, a diaphragm operatively associated
with said auxiliary valve, and fluid-contain-
15 ing means in operative relation to said dia-
phragm and containing an expansible and
contractible fluid whereby the operation of
said auxiliary valve is controlled in accord-
ance with the temperature of the space to be
20 heated.

6. In a heating system, in combination,
piping adapted to convey a heated medium
from a source of supply to the radiating
means, a valve interposed in said piping for
25 regulating the flow of the medium there-
through, thermostatic means for operating
said valve in accordance with the tempera-
ture of said heated medium, an auxiliary
valve for controlling the operation of said
30 means, a diaphragm operatively associated
with said auxiliary valve, and fluid-contain-
ing means in operative relation to said dia-
phragm and containing a volatile liquid
whereby the operation of said auxiliary
35 valve is controlled in accordance with the
temperature of the space to be heated.

7. In a heating system, in combination,
piping adapted to convey a heated medium
from a source of supply to the radiating
40 means, a valve interposed in said piping for
regulating the flow of the heated medium
therethrough, thermostatic means influenced
substantially by the temperature of the heat-
ed medium as supplied to said valve for op-
45 erating said valve, a conduit independently
positioned with respect to the radiating
means adapted to convey a heated medium
to said means, an auxiliary valve in said
conduit to regulate the flow of the heated
50 medium therethrough, means normally tend-
ing to maintain said auxiliary valve in its

closed position, and automatically operating
means adapted to open said valve when the
temperature of the surrounding air rises
above a predetermined point. 55

8. In a heating system, in combination,
piping adapted to convey a heated medium
from a source of supply to the radiating
means, a valve interposed in said piping for
regulating the flow of the heated medium 60
therethrough, thermostatic means for open-
ing said valve in accordance with the tem-
perature of said heated medium; means com-
municating with said piping at a point in
advance of said valve and adapted to convey 85
the heated medium therefrom to said ther-
mostatic means, an auxiliary valve inter-
posed in said means to regulate the flow of
the heated medium therethrough, means nor-
mally tending to maintain said auxiliary 70
valve in its closed position, and automatic-
ally operating means adapted to open said
valve when the temperature of the air rises
above a predetermined point.

9. In a heating system, in combination, 75
piping adapted to convey a heated medium
from a source of supply to the radiating
means, a valve interposed in said piping for
regulating the flow of the heated medium
therethrough, thermostatic means for oper- 80
ating said valve in accordance with the tem-
perature of said heated medium, a conduit
adapted to convey a heated medium to said
operating means, an auxiliary valve inter-
posed in said conduit to regulate the flow of 85
the heated medium therethrough, means nor-
mally tending to maintain said auxiliary
valve in its closed position, a diaphragm op-
eratively associated with said auxiliary
valve, fluid-containing means associated
with said diaphragm, and a volatile fluid 90
within said containing means whereby said
first valve is controlled by the combined ef-
fects of the temperature of the heated me-
dium and of the surrounding atmosphere.

In testimony whereof I affix my signature, 95
in the presence of two witnesses.

GEORGE EGBERT HULSE.

Witnesses:

C. W. WALTON,
JOHN T. CLARK.