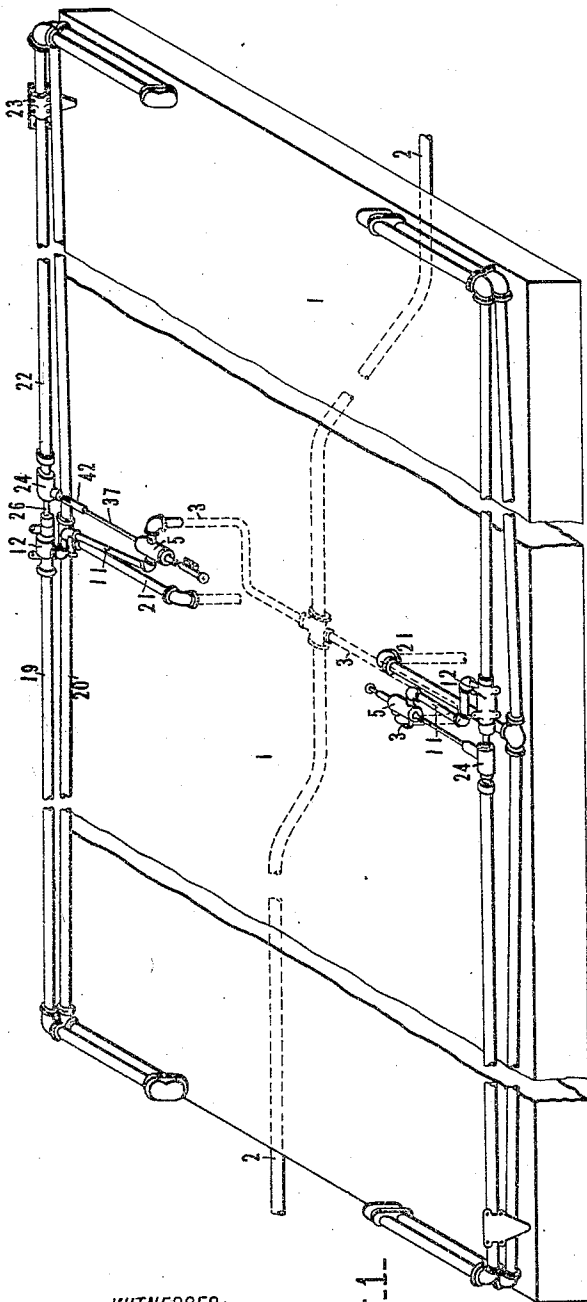


E. C. SOFIO.
CAR HEATING APPARATUS.
APPLICATION FILED NOV. 2, 1909.

1,052,017.

Patented Feb. 4, 1913.

2 SHEETS—SHEET 1.



WITNESSES:
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Paul A. Voelff

Fig. 1-

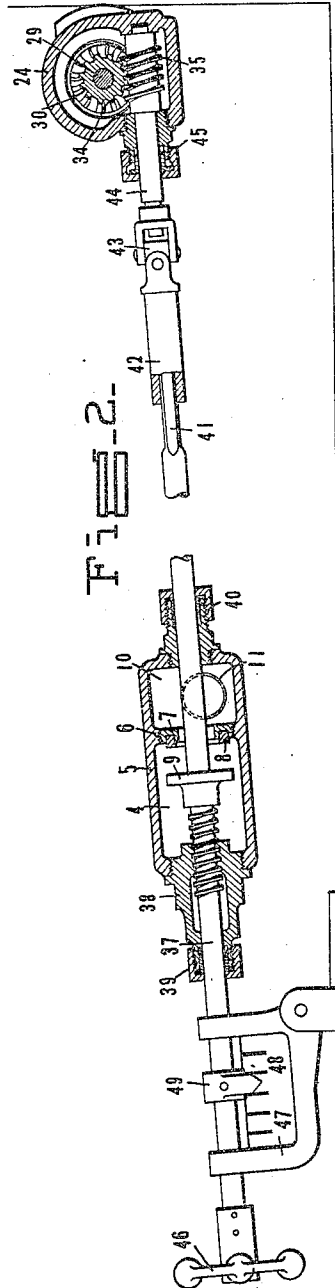


Fig. 2-

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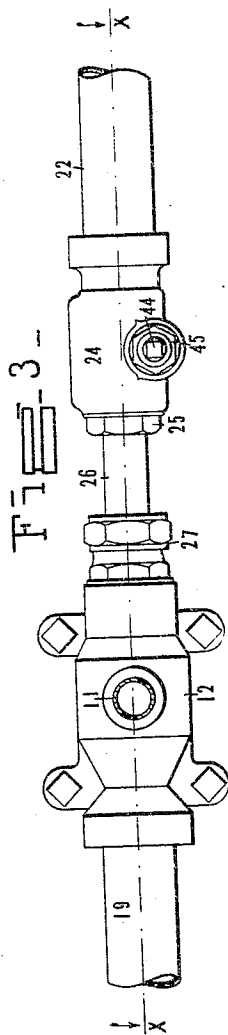


Fig. 4-

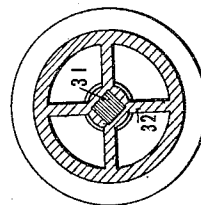
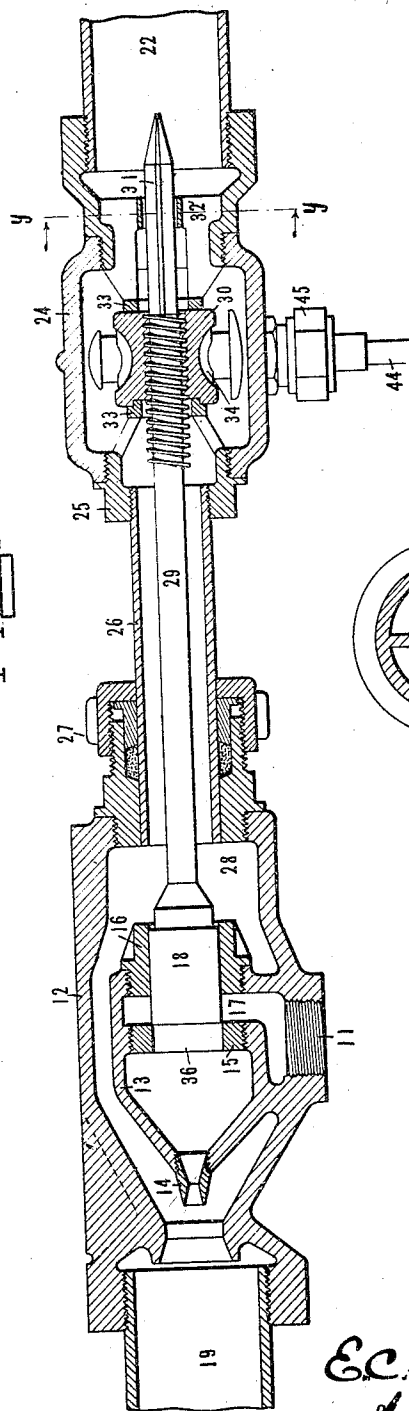


Fig. 5-

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UNITED STATES PATENT OFFICE.

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CAR-HEATING APPARATUS.

1,052,017.

Specification of Letters Patent.

Patented Feb. 4, 1913.

Application filed November 2, 1909. Serial No. 535,349.

To all whom it may concern:

Be it known that I, EDWARD C. SOFIO, a citizen of the United States, residing at Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Car-Heating Apparatus, 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 car heating apparatus.

One of the objects thereof is to provide simple, practical and efficient heating apparatus for cars.

Another object is to provide in apparatus of the above nature thermostatically-controlled valve mechanism of simple and durable construction adapted to act freely and efficiently under all conditions of use.

Another object is to provide apparatus of the type first mentioned in which expansion of a portion of the heating apparatus is utilized without tendency to strain any of the parts.

Other objects are to provide in apparatus of the above general nature, positive and reliable adjusting means and convenient means for manual control of the parts.

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 drawing, wherein is shown one of various possible embodiments of this invention, Figure 1 is a diagrammatic perspective view thereof. Fig. 2 is a side elevation, partially in section and showing adjusting and controlling means. Fig. 3 is a side elevation of automatic controlling means. Fig. 4 is a sectional view along the line of $x-x$ of Fig. 3, showing the parts on an enlarged scale. Fig. 5 is a sectional view taken along the line $y-y$ of Fig. 4.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring now to Fig. 1 of the drawings, there is shown mounted beneath a car floor

diagrammatically indicated at 1, a train pipe 2, from which steam connections 3 lead to each side of the car. As the apparatus upon both sides of the car is substantially identical that upon one side only will be described in detail. Steam pipe 3 leads to compartment 4 in a fitting or casing 5. Tapped within this casing upon an annular shoulder 6 is a collar 7 having therein a gasket 8, forming a seat for the valve 9, actuated as hereinafter described. From the compartment 10 of casing 5 upon the remote side of the collar 7 leads a steam pipe 11 through suitable elbows to a fitting 12, best shown in Fig. 4 of the drawings. Within this fitting is cast an injector member 13 having tapped therein the nozzle 14 and guide collars 15 and 16. The steam entering from pipe 11 passes within the annular space 17 between collars 15 and 16 and its passage toward the nozzle 14 is controlled by a piston valve 18, which is controlled in turn as hereinafter described. From the injector fitting 12 the steam is led through radiating pipe 19 toward and partially across one end of the car, thence turning downwardly and returning to the opposite end of the car through the conduit 20. Midway in this conduit is positioned a drip pipe 21 which is preferably opened to the atmosphere, although, if desired, a trap may be utilized, to drain off the water of condensation. From conduit 20 the steam passes upwardly and thence returns upon itself in conduit 22, also forming a part of the radiating pipes. This last mentioned pipe 22 is held in fixed position as by a clamp 23 at a predetermined point spaced from the injector fitting 12, above described. Conduit 22 terminates at its free end within a collar tapped within a fitting 24 having threaded into its remote end a collar 25 bearing a short pipe 26, which forms a virtual extension of the pipe 22. This last pipe passes through a suitable stuffing-box 27 mounted upon the fitting 12 and discharges the steam after its passage through the radiator into the chamber 28, from which it is sucked by the jet of live steam at the nozzle 14 to again circulate within the system. The spindle 29 of the valve 18 is threaded within a sleeve 30 and its squared shank 31 thence passes through the guide 32. Sleeve 30 is rotatable between a pair of supports 33 and is provided with suit-

able teeth 34 upon its outer surface to mesh with an adjusting worm 35, the connections of which will hereinafter be described. It will thus be seen that the valve spindle 29, having thereon valve 18, moves in accordance with the expansion or contraction of the pipe member 22 to open or close the port 36 within the collar 15, and thus controls the inlet of live steam in accordance with the temperature of the radiating pipe 22 between the clamp 23 and injector fitting 12.

Referring to the apparatus shown in Fig. 2, of the drawings, the valve 9 is mounted upon a spindle 37, which is threaded within a fitting 38 mounted upon casing 5 and provided with a stuffing-box 39. This spindle extends through a stuffing-box 40 at the remote end of the casing 5 and terminates in a squared shank 41, slidably fitted within a sleeve 42. From this sleeve a connection is made through the universal joint 42 to a spindle 44 which passes through a suitable stuffing-box 45 in the fitting 24, and has formed thereon the thread 35 above referred to. Spindle 37 is provided with the hand-grip 46 and passes through a guide 47 provided with a graduated scale 48 co-acting with an index 49 upon the spindle. This index 49 may be secured in position in any desired manner, as by a pin entering a groove about the spindle, thus permitting it to travel longitudinally as the parts are adjusted without being swung away from the scale 48. It will thus be seen that upon turning the grip 46, the spindle 37 is rotated to adjust the valve 9 and the spindle 44 is turned to adjust the position of the valve spindle 29 with respect to the pipe 22 controlling the same.

In the operation of the above apparatus when it is desired to admit steam, the grip 46 is turned to open valve 9, and simultaneously therewith the sleeve 30 is turned to draw valve 18 in a direction away from the port 36. The steam entering through valve 9 passes into the chamber 17 and thence through port 36 and nozzle 14 into the radiating system. After traversing pipe 19 and pipe 20, any water of condensation being withdrawn through drip pipe 21, the steam returns through pipe 22, and thence drawn by the jet of live steam through nozzle 14 passes the extension 26 and again into the system. When the pipe 22 has reached the temperature at which it is desired to maintain the same, its expansion will cause the valve 18 to enter the port 36 and cut down or cut off the steam supply. As the pipe 22 tends to cool with a reduced or wholly cut-off supply of fresh steam, its contraction withdraws valve 18 and permits the entry of a fresh supply. This action repeats itself automatically and, in fact, there is substantially no movement of the parts as they quickly assume a position in which the

supply is just sufficient to maintain the pipes at the desired temperature. If, then, it is desired to maintain the pipes at a higher temperature, as on account of cooler weather conditions, the handle 46 is turned to withdraw the valve 18 farther from the port 36, thus requiring a higher temperature of the pipe 22 with a consequent greater expansion to throttle the steam supply. When mild weather conditions require a lower temperature of the radiating surfaces, the handle 46 is turned in the opposite direction and valve 18 so adjusted that it will close upon a slighter expansion of pipe 22. This expansion, as above noted, occurs only upon the apparatus being adjusted in accordance with change of weather conditions, and hence the movement through the stuffing-box 27 of the pipe 26 is not only extremely minute in extent, but highly infrequent, thus requiring substantially no renewal of the packing in practice. It may also be noted that the spindle 37 being adjusted to the proper point by aid of the scale 48, the valve 9 is opened by the same act. This simultaneous opening of the valve 9 is of material value in practice, as the system is not only adjusted to the proper point by one manipulation of the grip 46, but the steam is turned on at the same time, and hence the labor required is reduced to a minimum. Moreover, upon valve 18 being adjusted to close the port 36, as in shutting down the system, the valve 9 is closed in series with valve 18, thus preventing any escape of steam irrespective of the temperature of the radiating pipes. This connection of the parts, moreover, is gained without interfering with the free expansion and contraction of the pipe 22 by reason of the telescopic and universal joints above described. These joints, moreover, do away with any chance of cramping or binding of the parts under all conditions of use.

In the action of the valve 18, it is to be especially noted that any rise in temperature of pipe 22 from whatever cause, after the valve has closed port 36, is freely permitted without any tendency to strain or buckle the parts. This valve, while efficient in action, is free from any seat against which it is brought, and thus does away with the necessity for the cumbersome expedients to prevent injury by overexpansion which have heretofore been frequently used. It may also be noted that not only is the action of valve 18 free under all conditions, but the expansion of pipe 22 does not tend to cramp any of the piping as it slides freely within the stuffing-box 27.

It will thus be seen that an apparatus is provided in which the aims of this invention are achieved and the above noted advantages gained.

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 heating apparatus, in combination, fluid conducting means forming a complete circuit whereby the fluid may be circulated and recirculated therein and having an outlet for water of condensation, a connection in said conducting means substantially in alinement with the portions of said conducting means which it joins adapted to permit one of said portions to expand with relation to the other, a source of fluid supply for said conducting means, a valve controlling the entry of fluid from said source to said conducting means, said valve being formed and mounted to slide over and beyond the port which it controls, and a connection between said valve and said expanding portion of said conducting means whereby said valve is controlled in accordance with the expansion thereof.

2. In heating apparatus, in combination, fluid conducting means forming a complete circuit whereby the fluid may be circulated and recirculated therein and having an outlet for water of condensation, a sliding joint in said conducting means whereby a portion thereof may expand with relation to another portion thereof, a source of fluid supply for said conducting means, a valve controlling the entry of fluid from said source to said conducting means, and a connection between said valve and said expanding portion of said conducting means whereby said valve is controlled in accordance with the expansion thereof.

3. In heating apparatus, in combination, fluid conducting means forming a complete circuit whereby the fluid may be circulated and recirculated therein and having an outlet for water of condensation, a sliding joint in said conducting means whereby a portion thereof may expand with relation to another portion thereof, a source of fluid supply for said conducting means, a valve controlling the entry of fluid from said source to said conducting means, a connection between said valve and said expanding portion of said conducting means whereby said valve is controlled in accordance with the expansion thereof, and an injector positioned within

said fluid conducting means one portion of which is formed to receive fluid from said source and the other portion of which is formed to receive fluid from said expanding portion of said conducting means.

4. In heating apparatus, in combination, a system of piping having an outlet for water of condensation, an injector connected at one end of said system, a source of fluid supply for said system, an inlet valve controlling the entry of fluid from said source to one portion of said injector, a sliding connection between the other end of said system and said injector, whereby said system is formed to discharge fluid into the remaining portion of said injector, and a connection between said valve and the discharge portion of said system whereby said valve is controlled in accordance with the expansion thereof.

5. In heating apparatus, in combination, fluid conducting means forming a complete circuit whereby the fluid may be circulated and recirculated therein and having an outlet for water of condensation, a connection in said conducting means substantially in alinement with the portions of said conducting means which it joins adapted to permit one of said portions to expand with relation to the other, a source of fluid supply for said conducting means, a valve controlling the entry of fluid from said source to said conducting means, and a connection between said valve and said expanding portion of said conducting means whereby said valve is controlled in accordance with the expansion thereof.

6. In heating apparatus, in combination, a source of fluid supply, fluid conducting means having an outlet for water of condensation and forming a complete circuit whereby fluid may be circulated and recirculated therein and comprising an injector one portion of which is connected to receive fluid from a portion of said conducting means and the other portion of which is connected to receive fluid from said source of supply, a connection between two substantially alined portions of said conducting means arranged substantially in alinement with said portions and adapted to permit expansion of one of said portions with respect to the other thereof, a valve controlling the entry of fluid from said source to said injector, and a connection between said valve and said expanding portion of said conducting means whereby said valve is controlled in accordance with the expansion thereof.

7. In heating apparatus, in combination, a radiator having an outlet for water of condensation, an inlet valve controlling the admission of steam to said radiator, adjustable thermostatic means controlling said valve, a source of steam supply, means leading from said source of supply to said inlet

valve, a valve interposed between said inlet valve and said source of steam supply, and common means adapted to actuate said last valve and adjust said thermostatic means.

5 8. In heating apparatus, in combination, a radiator having an outlet for water of condensation, an inlet valve controlling the admission of steam to said radiator, adjustable thermostatic means controlling said valve,
10 a source of steam supply, means leading from said source of supply to said inlet valve, a valve interposed between said inlet valve and said source of steam supply, and means adapted simultaneously to actuate
15 said last valve and adjust said thermostatic means.

9. In heating apparatus, in combination, a source of fluid supply, fluid conducting means forming a complete circuit whereby
20 the fluid may be circulated and recirculated therein and having an outlet for water of condensation, a connection between two portions of said conducting means whereby one portion thereof may expand with relation
25 to the other, a valve controlling the entry of fluid from said source to said conducting means and having a threaded connection with said expanding portion of said conducting means, whereby it is controlled in
30 accordance with the expansion thereof, and means extending laterally through the walls of said conduit and formed and mounted to adjust said threaded connection.

10. In heating apparatus, in combination,
35 a radiator having an outlet for water of condensation, an inlet valve controlling the admission of steam to said radiator, adjustable thermostatic means controlling said valve and comprising a rotatable sleeve
40 through which adjustment is effected, a source of steam supply, means leading from said source of supply to said inlet valve, a valve interposed between said source of steam supply and said inlet valve, a spindle
45 connected with and controlling said last valve, a member bearing a worm co-acting with said sleeve to rotate the same as said member is turned, and a flexible connection between said spindle and said last member.

50 11. In heating apparatus, in combination, a radiator having an outlet for water of condensation, an inlet valve controlling the admission of steam to said radiator, adjustable thermostatic means controlling said
55 valve and comprising a rotatable sleeve through which adjustment is effected, a source of steam supply, means leading from said source of supply to said inlet valve, a valve interposed between said source of
60 steam supply and said inlet valve, a spindle connected with and controlling said last valve, a member bearing a worm co-acting with said sleeve to rotate the same as said member is turned, and a flexible connection
65 between said spindle and said last member,

said flexible connection comprising a universal joint telescopically related to one of the members which it connects.

12. In heating apparatus, in combination, conducting means forming a complete circuit whereby fluid may be circulated and re-
70 circulated therein and having an outlet for water of condensation, a sliding joint in said conducting means whereby a portion thereof may expand with relation to another portion thereof, a member connected
75 in said conducting means and formed to provide an inlet port, a valve formed and mounted to slide over and beyond said port and close the same, and a connection between
80 said valve and said expanding portion of said conducting means whereby said valve is controlled in accordance with the expansion thereof.

13. In heating apparatus, in combination,
85 a source of fluid supply, a system of piping having an outlet for water of condensation, an injector connected to one end of said system, an inlet valve controlling the entry of fluid from said source to one portion of
90 said injector, a sliding connection between the other end of said system and said injector, whereby said system is formed to discharge fluid into the remaining portion of said injector, said injector being positioned
95 to inject said discharged fluid again into said system, and a connection between said valve and the discharge portion of said system whereby said valve is controlled in accordance with the expansion thereof, said
100 valve being formed and mounted to slide over and beyond the port with which it co-acts.

14. In heating apparatus, in combination, fluid-conducting means forming a complete
105 circuit whereby fluid may be circulated and recirculated therein and having an outlet for water of condensation, an injector fitting connected in said conducting means, through one portion of which fitting said fluid is
110 circulated, a source of fluid supply, means adapted to lead fluid from said source of supply to the other portion of said injector fitting, a valve mounted to slide over and beyond its seat and positioned to control
115 the fluid passing from said source of supply into said conducting means, means adapted to hold said conducting means fixed at one point, and means connected with said valve and with said conducting means at another
120 point adapted to utilize the expansion and contraction of the intermediate portion of said conducting means in controlling said valve.

15. In heating apparatus, in combination,
125 fluid conducting means forming a complete circuit whereby the fluid may be circulated and recirculated therein and having an outlet for water of condensation, a source of fluid supply, a sliding joint in said conduct-
130

ing means whereby a portion thereof may expand with relation to another portion thereof, a valve controlling the entry of fluid from said source to said conducting means, a connection between said valve and said expanding portion of said conducting means whereby said valve is controlled in accordance with the expansion thereof, said connection comprising a threaded member held against rotation and an internally threaded sleeve mounted thereon within said conducting means, and a member passing through said conducting means and co-acting with said sleeve to rotate the same.

16. In heating apparatus, in combination, fluid conducting means forming a complete circuit whereby the fluid may be circulated and recirculated therein and having an outlet for water of condensation, a source of fluid supply, a sliding joint in said conducting means whereby a portion thereof may expand with relation to another portion thereof, a valve controlling the entry of fluid from said source to said conducting means, a connection between said valve and said expanding portion of said conducting means whereby said valve is controlled in accordance with the expansion thereof, said connection comprising a spindle upon said valve extending through the sliding portion of said conducting means, a sleeve threaded upon said spindle and rotatably mounted within said conducting means, a worm bearing member extending through said conducting means and intermeshing with co-acting parts upon said sleeve and means adapted to prevent rotation of said spindle.

17. In heating apparatus, in combination, fluid conducting means forming a complete circuit whereby the fluid may be circulated and recirculated therein and having an outlet for water of condensation, certain portions of said conducting means being formed and mounted to permit a relative movement, an inlet valve mounted within one of said relatively movable portions and connected with and controlled in accordance with the expansion of the other of said relatively movable portions, a supply conduit leading to said conducting means and controlled by said valve, a second valve in said conduit, adjusting means for said first valve upon the expanding portion of said conducting means, and means connected with and controlling said last valve and flexibly connected with said adjusting means to actuate the same.

18. In heating apparatus, in combination, an inlet valve, a conduit having an outlet for water of condensation and adapted to

receive fluid from said valve and connected to itself to permit the fluid to recirculate therein, an internally threaded sleeve positioned within said conduit, a member leading from said valve within said conduit and threaded within said sleeve, means adapted to prevent rotation of said last member, means passing through said conduit and connected to rotate said sleeve, a source of steam supply, a connection leading from said source of supply to said inlet valve, a valve controlling said connection between said source of steam supply and said inlet valve, and common means adapted to actuate said last valve and said sleeve.

19. In heating apparatus, in combination, conducting means forming a complete circuit whereby fluid may be circulated and recirculated therein and having an outlet for water of condensation, a sliding joint in said conducting means whereby a portion thereof may expand with relation to another portion thereof, a member connected in said conducting means and formed to provide an inlet port, a valve formed and mounted to slide over and beyond said port and close the same, and a connection between said valve and said expanding portion of said conducting means whereby said valve is controlled in accordance with the expansion thereof, said connection being adjustable with respect to said conducting means to vary the position of said valve.

20. In heating apparatus, in combination, a system of piping having an outlet for water of condensation, a source of fluid supply, an injector connected to one end of said system, an inlet valve controlling the entry of fluid from said source to one portion of said injector, a sliding connection between the other end of said system and said injector, whereby said system is formed to discharge fluid into the remaining portion of said injector, said injector being positioned to inject said discharged fluid again into said system, and a connection between said valve and the discharge portion of said system whereby said valve is controlled in accordance with the expansion thereof, said valve being formed and mounted to slide over and beyond the port with which it co-acts and said connection being adjustable with respect to said conducting means to vary the position of said valve.

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

EDWARD C. SOFIO.

Witnesses:

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E. E. ALBEE.