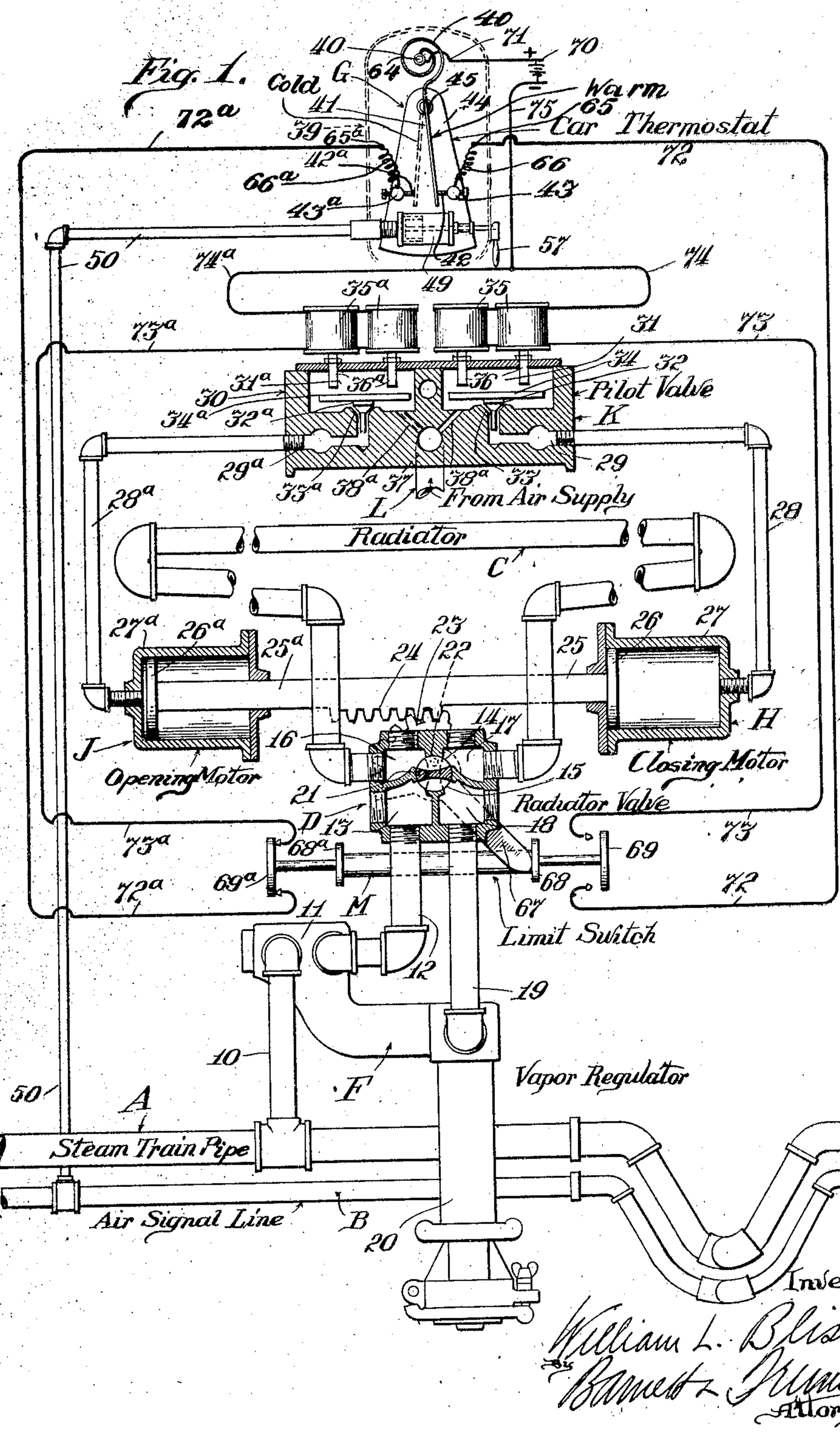
Jan. 2, 1923. 1,440,655

W. L. BLISS.
CAR HEATING SYSTEM.
ORIGINAL FILED SEPT. 9, 1918. 3 SHEETS-SHEET 1

Fig. 1.



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3 SHEETS-SHEET 2

Fig. 4.

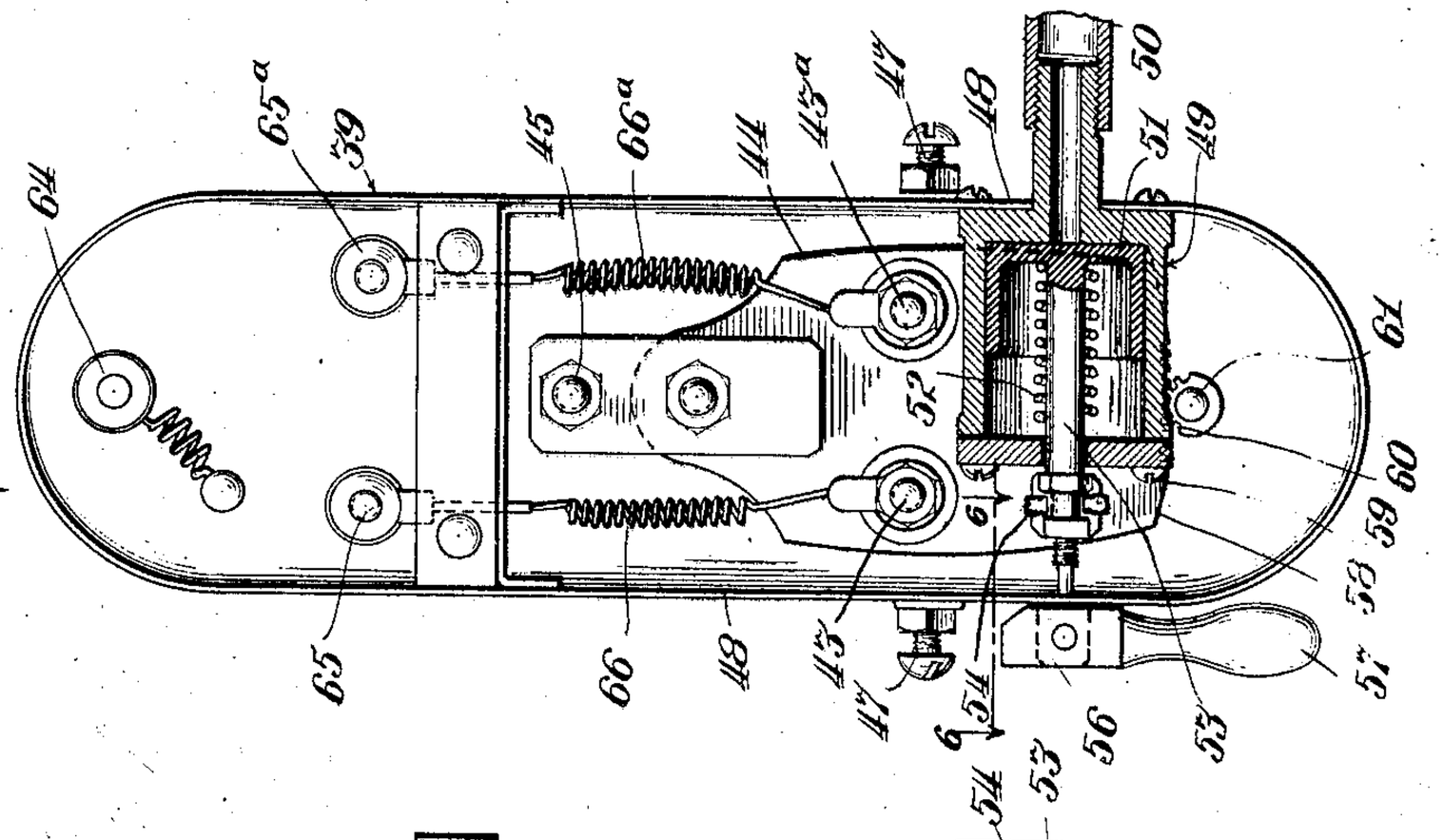


Fig. 3.

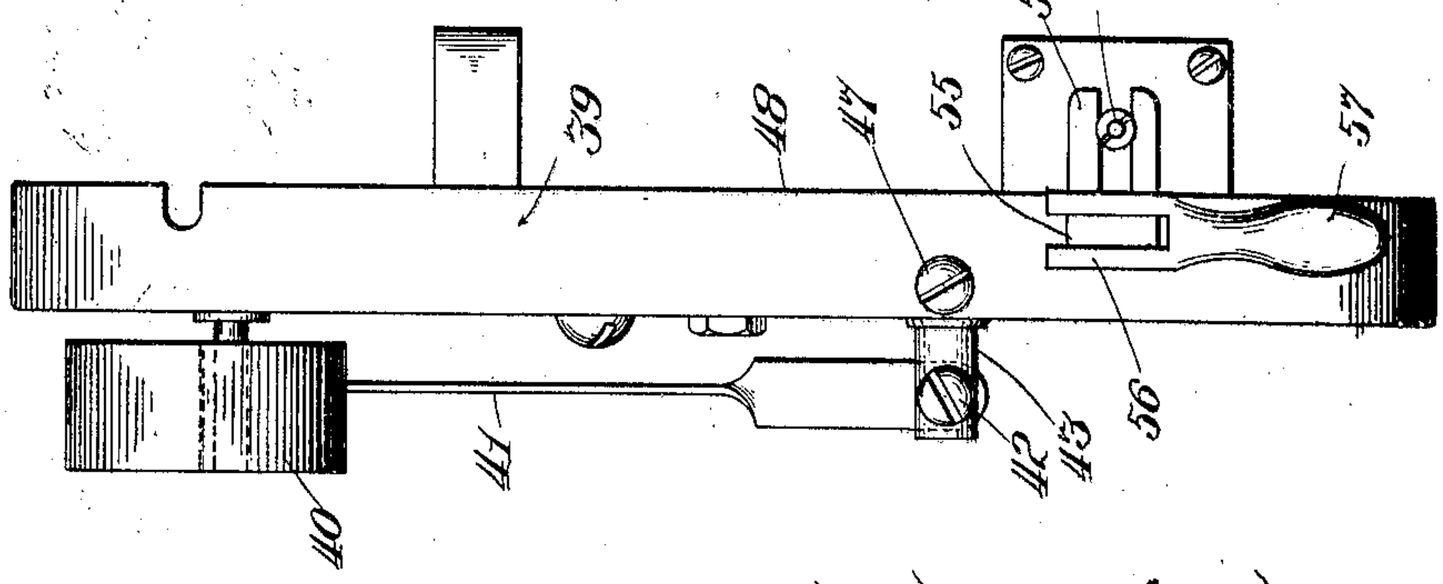
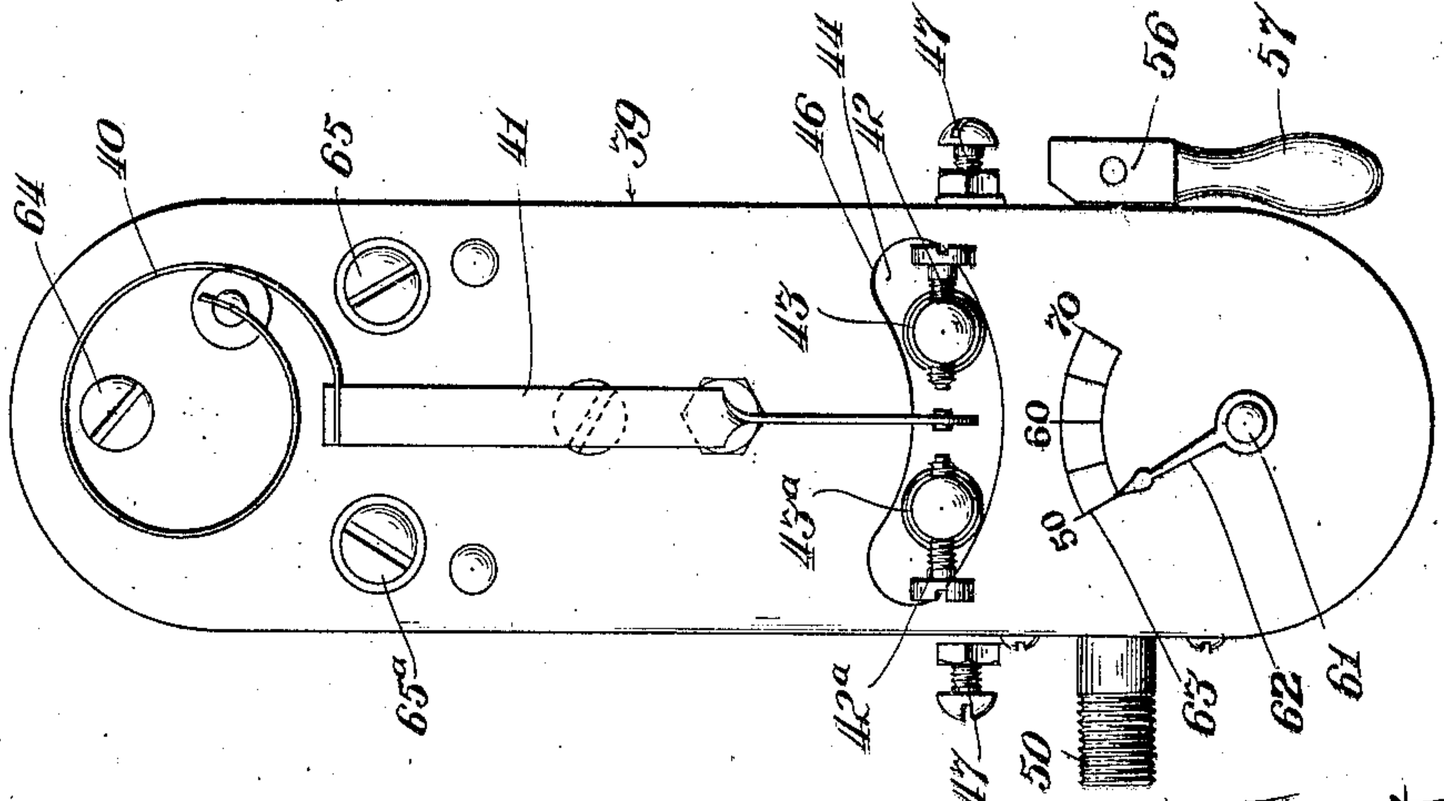


Fig. 2.



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3 SHEETS-SHEET 3

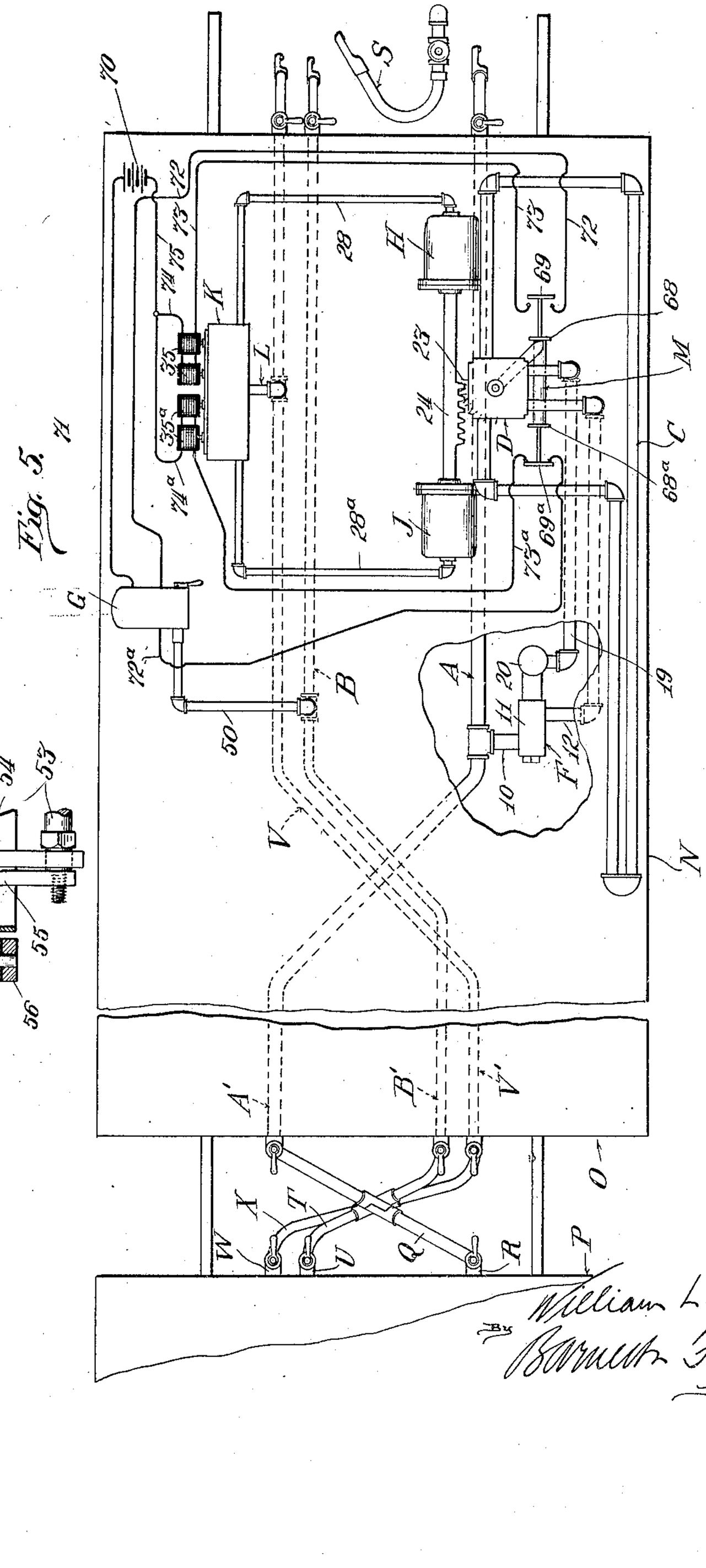

Fig. 5.

Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM L. BLISS, OF NIAGARA FALLS, NEW YORK, ASSIGNOR TO VAPOR CAR HEATING COMPANY, INC., OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

CAR-HEATING SYSTEM.

Original application filed September 9, 1918, Serial No. 253,162. Divided and this application filed February 23, 1921. Serial No. 447,165.

To all whom it may concern:

Be it known that I, WILLIAM L. BLISS, a citizen of the United States, residing at Niagara Falls, in the county of Niagara and State of New York, have invented certain new and useful Improvements in Car-Heating Systems, of which the following is a specification.

My invention relates to a heating system intended primarily for railway cars, and more especially to a heating system employing steam as the heating medium.

When railway cars are not in service, and hence are not connected with a locomotive, it is customary during cold weather to keep their heating systems supplied with steam from a yard or terminal steam line in order to prevent freezing of pipes and fittings containing water, and to obviate other damage to the car which would be likely to result if the cars were allowed to stand without heat. No adequate arrangements, however, have heretofore been devised for regulating the quantity of heat supplied to railway cars under these circumstances; and as a matter of fact, the cars are usually heated to as high a temperature when they are out of service as when in service. This is entirely unnecessary and involves a very great waste of fuel, particularly since as a rule railway cars are unoccupied on the average for more of the time than they are occupied. During periods when a car is not in service it is quite sufficient to keep the car at a temperature just enough above the freezing point to give a margin of safety.

The primary object of the invention is to effect an economy in the heating of rail way cars by providing certain controlling devices for a railway car heating system which become effective without care or attention on the part of the trainmen as soon as the car is disconnected from its locomotive, and which operate automatically to prevent supply of heating medium to the system in excess of that which is necessary to maintain a determinate low temperature in the car.

A further object is to so construct and arrange the controlling means for the system that it will operate also to automatically maintain a higher temperature during periods of occupancy and will become effective for that purpose, automatically, when the car is connected with the locomotive.

A further object is to provide means whereby the high temperature control may be substituted for the low temperature control by a manual setting of the controlling apparatus at such times as the car is not connected with the locomotive, and is, therefore, normally subject to the low temperature control; and further, to provide an arrangement whereby this manual setting of the apparatus is nullified as soon as the connection of the car with the locomotive is made. The purpose of this feature of the controlling apparatus is to allow the temperature of the car to be brought up to the temperature of occupancy at such times as the car is standing at a station before the locomotive is connected to the train. It is the usual practice in making up trains at terminal stations, for example, to bring the cars into the station by means of a switch engine and to attach the locomotive which is to pull the train only a short time before the time of departure.

The invention is illustrated, in a preferred embodiment, in the accompanying drawings wherein

Fig. 1 is a diagrammatic view illustrating the controlling apparatus of my invention applied to a low pressure or vapor car heating system.

Fig. 2 is a front view of a thermostat adapted to be located so as to be responsive to changes in temperature in the atmosphere within the car.

Fig. 3 is a side elevation of the thermostat,

Fig. 4 is a rear elevation with certain parts in section.

Fig. 5 is a diagram to illustrate particular connections between the steam and air train pipes of a car furnished with the heating system of my invention and the corresponding pipes on adjacent cars and on the locomotive, together with the station steam supply pipe; and Fig. 6 is a detail sectional plan view of a part of the car thermostat, the view being taken on line 6—6 of Fig. 4.

Referring first to Figs. 1 and 5, A designates the steam train pipe of a railway car, shown at N in Fig. 5 as the last car of the train. The forward car of the train is designated O in the figure and the locomotive as

P. The steam train pipe A' of car O is connected by coupling Q to a steam supply pipe R on the locomotive. S designates a steam supply pipe in the station (Fig. 5, assuming that the train is standing at a terminal station) which may be connected with steam train pipe A. B is the air signal pipe on car N which contains air under pressure at such times as the cars of the train are connected with the locomotive. Pipe B is connected by suitable couplings between the cars of the train and the signal train pipes of the intervening cars with signal train pipe B' of the forward car O, which is coupled, by coupling T, with the air signal pipe U on the locomotive. V designates the air brake train pipe on car N, and V' the corresponding pipe on car O, the latter being coupled to the locomotive air pipe W by coupling X. C represents the radiator of the car N, D the valve for controlling the circulation of heating medium through the radiator, and F the vapor regulator. The function of the vapor regulator, it will be understood, is to throttle inflow of steam to the radiator as soon as steam begins to escape through the open outlet of the system so that by the balancing of the vapor regulator valve the car radiator is kept filled with steam at atmospheric pressure. This is the ordinary operation of a vapor regulator but in the present system this operation is modified by the action of thermostat G located in the car which under certain circumstances will bring about the closing of valve D so as to prevent the car temperature from exceeding certain selectively determined maxima. H is an air motor for closing valve D. J is a similar motor for opening valve D. K is a pilot valve operated electrically through the instrumentality of the car thermostat G for controlling the flow of motive fluid to motors H and J. L is a pipe for conducting compressed air to pilot valve K from any suitable source of supply such as the air brake train pipe V.

In the embodment of the invention herein shown, the thermostat G in one position brings about a control of valve D which will maintain the car at a subnormal temperature, say 50° Fahrenheit, that is to say, when the car is standing disconnected from the locomotive the thermostat G will function to maintain this relatively low temperature. The thermostat, however, is automatically set so that it will function to maintain the car at a normal temperature of occupancy, for example, at 70° Fahrenheit, as soon as the locomotive is attached to the train. This adjustment or setting of the thermostat takes place through application of air pressure to a movable part of the thermostat mechanism, the air pressure being derived from the signal line, preferably, which is filled with compressed air on attachment of the locomotive to the train. When the locomotive is detached from the train the pressure in the signal line disappears and thermostat G is re-set for the low temperature control. A limit switch M is provided which is operated by movement of the revoluble valve body of valve D for the purpose of making and breaking certain electrical circuits, as will be hereinafter set forth.

The details of the apparatus will now be described. 10 is a pipe leading from the steam train line to the valve chamber 11 of the vapor regulator F. 12 is a pipe leading from the low pressure side of valve chamber 11 to chamber 13 of valve D which latter is shown as a four-way valve having a revoluble valve body comprising an upright web 14 and a disk 15. A valve of this type is in common use in connection with railway car heating apparatus and is shown in the patent to Gold No. 925,692 dated June 22, 1909, and need not be described in all its details.

Assuming the valve to be open (dotted line position Fig. 1) the steam will pass from chamber 13 into chamber 16 and then into the radiator C. Water of condensation passes out of the radiator C through chambers 17 and 18 of valve D and through pipe 19 to the thermostat chamber 20 of the vapor regulator. The vapor regulator is also in common use in car heating systems. A typical form of the regulator is disclosed in the patent to Gold, No. 902,575, dated November 3, 1908.

Valve D is closed by turning valve body 14 to the position shown in full lines in Fig. 1. When this is done steam from pipe 12 passes through chambers 13 and 18 and through pipe 19 to the thermostat chamber. The steam is, therefore, short circuited to the thermostat of the vapor regulator in just sufficient quantities to keep the thermostat warm. In the closed position of the valve a drain port 21 in disk 15 registers with a port 22 in the bottom of the valve casing so as to open outlet from the radiator for water of condensation.

As a matter of convenient diagrammatic illustration the rotatable valve body 14 is shown as provided with a pinion 23 which is in mesh with a rack 24, the ends of which 25, 25ª constitute piston rods for the pistons 26, 26ª of the closing and opening motors H and J, the cylinders 27, 27ª of which are connected by pipes 28, 28ª with ports 29, 29ª in the casing 30 of pilot valve K. The ports 29, 29ª lead to chambers 31, 31ª in casing 30. In these chambers are arranged poppet valves 32, 32ª cooperating with seats 33, 33ª formed at the upper ends of the ports 29, 29ª. The valves are connected with armatures 34, 34ª of a pair of electro-magnets 35, 35ª. The pole pieces 36, 36ª extend into chambers 31, 31ª. Compressed air from

pipe L enters chambers 31, 31ª through a duct 37 and branch ducts 38, 38ª.

The thermostatic mechanism designated generally by the letter G is preferably constructed as follows (Figs. 2, 3 and 4): 39 is a base plate on which is supported the member 40 subject to deformation through changes of temperature. Secured to this thermostatic member is a contact arm 41 the lower end of which is adapted to move between a pair of contact screws 42, 42ª extending through studs 43, 43ª on a plate 44 mounted for oscillation on the pivot 45 on the back of base plate 39, the studs 43, 43ª extending through an arcuate slot 46 in the base plate. Set screws 47 may be provided for limiting the oscillatory movements of plate 44. Fixed to the flange 48 of the base plate is a cylinder 49 connected by pipe 50 with the air signal line B. A piston 51 is arranged in cylinder 49. The piston is normally held against the end of the cylinder with which pipe 50 is connected by means of a coiled spring 52. The stem or piston rod 53 of piston 51 engages an abutment 54 on the oscillating plate 44. To the outer end of piston rod 53 is secured a member 55 (Fig. 6) the extremity of which is flat and has pivoted thereto the forked end 56 of a cam lever 57 adapted to bear against the flange 48 of base plate 39. Preferably the lower edge 58 of the oscillating plate 44 is formed on the arc of a circle and is provided with teeth 59 adapted to engage the teeth of a pinion 60 secured to a spindle 61 mounted in the base plate 39 and carrying a pointer 62 adapted to cooperate with scale graduations 63 on the front face of the base plate. 64 is a binding post for the conductor connected with the thermostatic member 40, 41 and 65, 65ª the binding posts for the conductors leading from the contact studs 43, 43ª. Studs 43, 43ª are connected with their respective binding posts by flexible wire connections 66, 66ª.

The revoluble member 14 of valve D is shown as provided with a lever 67 adapted to engage with abutments 68 68ª on the limit switch M for the purpose of moving the limit switch alternately in opposite directions. The limit switch is provided at opposite ends with switch arms 69, 69ª.

The wiring of the apparatus will be described in connection with the

Résumé of operation.—Fig. 1 shows the parts of the controlling apparatus in the positions which they occupy when the car is disconnected from the locomotive and is at a temperature above the out-of-service temperature, 50° Fahrenheit, for example, the radiator valve D being closed. Steam train pipe A is, however, receiving steam from the yard or terminal steam supply line S (Fig. 5). The contact arm 41 on thermostatic member 40 will be against the contact 42. When the car temperature falls below that for which the thermostat (at the low temperature control) is set through adjustment of contact screw 42 in stud 43 the contact arm 41 will move away from the contact 42 against the contact 42ª. The gap between contact screws 42—42ª is considerably exaggerated, for clearer illustration, in Fig. 1. A circuit will now be closed through magnet 35ª as follows: battery (or other source of supply of electric current) 70, wire 71, thermostatic member 40, 41, contact 42ª, stud 43ª, flexible conductor 66ª, binding post 65ª, wire 72ª, limit switch arm 69ª, wire 73ª, magnet 35ª, wire 74ª and wire 75 to battery.

The magnet 35ª will attract its armature 34ª, raising valve 32ª and thereby admitting compressed air from pipe L through chamber 31ª, pipe 28ª to the cylinder 27ª of the valve opening motor J. The revoluble member 14 of valve D is moved to the opening position admitting steam to radiator C. At the same time limit switch M is moved to the left breaking the circuit between wires 72ª, 73ª. Arm 69 of the limit switch closes a corresponding circuit. The energization of magnet 35ª is momentary. As soon as valve D has been opened the limit switch breaks the magnet circuit so that electric current is not wasted.

When the temperature of the car exceeds 50° Fahrenheit arm 41 of the car thermostat G moves from contact 42ª against contact 42. A circuit is closed through the magnet 35 as follows: battery 70, wire 71, thermostatic member 40, 41, contact 42, stud 43, flexible connection 66, binding post 65, wire 72, limit switch arm 69 (the limit switch having been moved to the left when valve D was open) wire 73, magnet 35 and wires 74 and 75 to the battery.

Valve 32 is now raised and compressed air admitted to the closing motor H causing valve D to be closed so as to shut off steam from radiator C. The opening movement of valve D causes limit switch M to break the circuit at 69 and close the corresponding circuit at 69ª.

When the car is connected with its locomotive (as shown in Fig. 1) and the air signal line B put under pressure compressed air passes from the signal line through pipe 50 to cylinder 49 associated with the thermostatic mechanism G and piston 51 is moved against the pressure of spring 52, causing the oscillating plate 44 to be moved to the right (Figs. 1 and 2). That is to say, the contacts 42, 42ª are shifted laterally with respect to the thermostat arm 41 in a direction which will prevent the thermostat from functioning to close valve D until the car temperature has reached the desired temperature of occupancy, 70° for example. The thermostat will now operate as before, closing the valve D when the arm 41 is against

contact 42 and opening the same when the arm is brought to bear against contact 42ª, but these operations now take place at the higher temperature.

If it is desired to put the car under the high temperature control while it is standing at a terminal, for example, before the locomotive has been attached to the train, this can be accomplished by raising cam lever 57 so as to shift the oscillating plate 44 from the low temperature control position to approximately the high temperature control position. The end of the lever is made flat to bear against the flange 48 of base plate 39. The lever will be held in the horizontal position by spring 52. This movement of the lever, however, does not bring the piston 51 into contact with the outer head of cylinder 49 so that when the locomotive is attached to the train and piston 51 is subjected to signal line air pressure it is given a further movement so as to release lever 57 which falls to its normal position. By this arrangement the controlling apparatus, after being set by hand for high temperature control, at a time when the apparatus normally functions to effect the low temperature control, is restored to a condition making it subject to change of pressure in the air signal line as soon as the locomotive is attached to the train so that thereafter when the locomotive is detached from the train the low temperature control will be automatically restored.

It is fully realized that the basic principles of my invention might be embodied in a controlling apparatus quite different in its mechanical features from that shown and described herein. I, therefore, do not wish to be understood as limiting the invention to the particular constructions, arrangements and devices disclosed herein except so far as certain of the claims hereto appended may be by their terms specifically so limited. This application is a division of my co-pending application Serial No. 253,162 filed September 9, 1918 and is a continuation in part of my applications Serial No. 214,603 filed January 31, 1918 and Serial No. 365,438 filed March 13, 1920 as a division of the last mentioned application.

I claim:

1. In combination with the heating apparatus of a railway car, a controlling mechanism therefor which automatically maintains the car atmosphere at a relatively low temperature when the car is detached from the locomotive and its heating system connected with another source of supply of heating medium and which maintains the car atmosphere at a higher temperature when the car is attached to the locomotive.

2. In combination with the heating apparatus of a railway car, a controlling mechanism therefor which is made effective automatically to maintain the car at a determinate temperature below the normal temperature of occupancy when the car is detached from the locomotive.

3. The combination with a railway car, its heating apparatus and a conduit adapted to contain compressed air, of a controlling mechanism for the heating apparatus which automatically maintains the car atmosphere at a determinate temperature below the normal temperature of occupancy in the absence of pressure in said conduit.

4. The combination with a railway car, its heating apparatus and a conduit adapted to contain compressed air, of a controlling mechanism for the heating apparatus which automatically maintains the car atmosphere at a relatively low temperature in the absence of pressure in said conduit, and at a higher temperature when said conduit is under pressure.

5. The combination with a railway car, its signaling system and heating apparatus, of a controlling mechanism for the heating apparatus adapted to maintain the car at a determinate temperature below the normal temperature of occupancy when the signaling system is inoperative.

6. The combination with a railway car, its signaling system and heating apparatus, of a controlling mechanism for the heating apparatus adapted to maintain the car at a relatively low temperature when the signaling system is inoperative and to maintain a higher temperature in the car when the signaling system is in condition for operation.

7. The combination with a railway car, its signal air train pipe and heating apparatus, of a controlling mechanism for the heating apparatus adapted to maintain a determinate temperature in the car below the normal temperature of occupancy in the absence of pressure in the air train pipe.

8. The combination with a railway car, its signal air train pipe and heating apparatus, of a controlling mechanism for the heating apparatus adapted to maintain a relatively low temperature in the car in the absence of pressure in the air train pipe and a higher temperature when said train pipe is under pressure.

9. In combination with the heating apparatus of a railway car, an automatic control mechanism therefor adapted to maintain the car atmosphere at determinate high or low temperatures dependent on the car being connected with or disconnected from the locomotive, and means whereby said mechanism may be manually set for the high temperature control when the car is unattached to the locomotive, which means is made ineffective when the car is attached to the locomotive.

10. In combination with a railway car, a radiator therein, a vapor regulator, a shut-off valve interposed between the vapor regu-

lator and radiator, and mechanism for operating the shut-off valve to selectively produce high or low temperatures in the car, which mechanism is actuated automatically to produce the high temperature when the car is connected with the locomotive and the low temperature when the car is disconnected therefrom.

11. In combination with a railway car, a conduit thereon adapted to contain air under pressure, a radiator in the car, a vapor regulator, a shut-off valve interposed between the vapor regulator and radiator, and mechanism for operating the shut-off valve to selectively produce high or low temperatures in the car in accordance with the presence or absence of pressure in said conduit.

12. In combination with a railway car and its signal mechanism, a radiator in the car, a vapor regulator, a shut-off valve interposed between the vapor regulator and radiator, and mechanism for operating the shut-off valve to selectively produce high or low temperatures in the car dependent upon whether said signalling mechanism is in condition for operation or is inoperative.

13. In combination with a railway car, a radiator therein, a valve to control circulation of heating medium through the radiator, thermostatic mechanism sensitive to car atmosphere temperatures, and means made effective automatically when the car is disconnected from the locomotive for causing said thermostatic mechanism to maintain a relatively low temperature in the car, which means operates automatically when the car is connected with the locomotive, to cause said thermostatic mechanism to maintain a higher temperature in the car.

14. In combination with a railway car and a conduit adapted to contain air under pressure, a radiator in the car, a valve to control the circulation of heating medium through the radiator, thermostatic mechanism sensitive to car atmosphere temperatures, and means made effective automatically on disappearance of pressure in said conduit for causing said thermostatic mechanism to maintain a relatively low temperature in the car, which means operates automatically on reappearance of pressure in said conduit to cause the thermostatic mechanism to maintain a higher temperature in the car.

15. In combination, a railway car, a radiator therein, means for controlling the circulation of heating medium through the radiator, and a fluid pressure actuated device which when subject to high pressure sets the controlling means to maintain a high temperature in the car and which at reduced pressure sets said means to maintain a low temperature in the car.

16. In combination, a railway car, a radiator therein, means for controlling the circulation of heating medium through the radiator, a fluid pressure actuated device which when subject to high pressure sets the controlling means to maintain a high temperature in the car and which at reduced pressure sets said means to maintain a low temperature in the car, and manually operable means for setting the controlling means for the high temperature control.

17. In combination, a railway car, a radiator therein, means for controlling the circulation of heating medium through the radiator comprising thermostatic mechanism located in the car, a shut-off valve for the radiator, operating means for the valve governed by said thermostatic mechanism, and a fluid pressure actuated device for automatically setting said controlling means to maintain, selectively, either a high or a low temperature in the car.

18. In combination, a railway car, a radiator therein, means for controlling the circulation of heating medium through the radiator comprising a thermostatic device located in the car, a shut-off valve for the radiator, a pair of motors to move the valve in opposite directions, the application of motive power to which is governed by the thermostatic device, and a fluid pressure actuated device for automatically setting said controlling means to maintain, selectively, either a high or low temperature in the car.

19. In combination, a railway car, a radiator therein, means for controlling the circulation of heating medium through the radiator comprising a circuit making and breaking thermostat located in the car, a shut-off valve for the radiator, motors to move the valve in opposite directions, the application of motive power to which is governed by said thermostatic mechanism, a limit switch operated by said valve to break the thermostat circuits at the end of each valve movement, and a pressure actuated selecting device to set said controlling means for the maintenance of either a high or low temperature in the car.

20. In combination, a railway car, a radiator therein, means for controlling the circulation of heating medium through the radiator comprising a circuit making and breaking thermostat located in the car, a shut-off valve for the radiator, motors to move the valve in opposite directions, the application of motive power to which is governed by said thermostatic mechanism, a limit switch operated by said motors to break the thermostat circuits at the end of each valve movement, and a selecting device which operates automatically to set the controlling means for the maintenance of either a high or low temperature in the car.

21. In combination, a railway car, a radiator therein, means for controlling the circulation of heating medium through the radiator comprising a circuit making and breaking

ing thermostat located in the car, a shut-off valve for the radiator, motors to move the valve in opposite directions, the application of motive power to which is governed by said thermostatic mechanism, a limit switch operated by said motors to break the thermostat circuits at the end of each valve movement, a selecting device which operates automatically to set the controlling means for the maintenance of either a high or low temperature in the car, and means whereby said controlling means may be set, manually, to maintain the high temperature.

22. In combination with a railway car, its signal air train pipe and radiator, mechanism for controlling the circulation of heating medium through the radiator comprising the radiator valve D, motors H and J, car thermostat G, pilot valve K and limit switch M in circuit with the thermostat and magnets of the pilot valve, substantially as described.

23. In combination with a railway car and its heating apparatus comprising a train pipe adapted to be supplied with heating medium from the locomotive and from another source of supply when the car is disconnected from the locomotive, controlling means which operates automatically to supply the car with a relatively small quantity of heat when the car is disconnected from the locomotive and said train pipe connected with said other source of supply, and with a larger quantity when the car is operatively connected with the locomotive and the train pipe receiving heating medium from the locomotive.

24. In combination with a railway car and its heating apparatus comprising a train pipe adapted to be supplied with heating medium from the locomotive and from another source of supply when the car is disconnected from the locomotive, controlling means which operates automatically to supply the car with a relatively small quantity of heat when the car is disconnected from the locomotive and said train pipe connected with said other source of supply, and with a larger quantity when the car is operatively connected with the locomotive and the train pipe receiving heating medium from the locomotive, and a manually actuated device whereby the controlling means may be set when the car is disconnected from the locomotive to give the larger heat supply, which device is made ineffective when the car is connected with the locomotive.

25. In combination with a railway car, its heating apparatus, and compressed air signal line, controlling means which operates to automatically supply the car with a relatively small quantity of heat when pressure is absent from the signal line, and with a larger quantity when the signal line is under pressure.

26. In combination with a railway car, its heating apparatus and compressed air signal line, controlling means which operates to automatically supply the car with a relatively small quantity of heat when pressure is absent from the signal line, and with a larger quantity when the signal line is under pressure, and a manually actuated device whereby the controlling means may be set when pressure is absent from the signal line to give the larger heat supply, which device is made ineffective when pressure re-appears in said signal line.

27. The combination with a railway car having a conduit for air under pressure and a heating system, of controlling means for the heating system which operates automatically to supply the car with a relatively small quantity of heat in the absence of pressure in said air conduit and with a larger quantity of heat when the air conduit is under pressure.

28. The combination with a railway car having a conduit for air under pressure and a heating system, of controlling means for the heating system which operates automatically to supply the car with a relatively small quantity of heat in the absence of pressure in said air conduit and with a larger quantity of heat when the air conduit is under pressure, and means whereby, in the absence of air pressure in said conduit, the controlling means may be set to supply the car with the larger quantity of heat, which means is made ineffective on reappearance of air pressure in said conduit.

29. The combination with a railway car, its signaling system and heating apparatus, of a controlling device which operates when said signaling system is disabled to supply the car with a relatively small quantity of heat and when said signaling system is in operative condition to supply the same with a larger quantity of heat.

30. The combination with a railway car, its signaling system and heating apparatus, of a controlling device which operates when said signaling system is disabled to supply the car with a relatively small quantity of heat and when said signaling system is in operative condition to supply the same with a larger quantity of heat, and means for setting said controlling device to effect the larger supply of heat when the signaling system is disabled, which means is made ineffective when said signaling system is put into operative condition.

31. In combination with a railway car, a heating system adapted for control to produce either high or low temperature in the car, and regulating means whereby the high temperature operation takes place automatically when the car is connected with the locomotive and the low temperature opera-

tion when the car is disconnected from the locomotive.

32. In combination with a railway car, a signaling system therefor, a heating system adapted for control to produce either high or low temperature in the car, and regulating means whereby the high temperature operation takes place automatically when the signaling system is in operative condition and the low temperature operation when the signaling system is inoperative.

33. In combination with a railway car provided with a conduit adapted to be supplied with air under pressure, a heating system adapted for control to produce either high or low temperature in the car, and a regulating device actuated in accordance with the presence or absence of pressure in the air conduit for determining whether the high or low temperature operation takes place.

WILLIAM L. BLISS.