Dec. 9, 1924. 1,518,894

W. L. BLISS

STEAM REGULATING MEANS

Filed Feb. 8, 1918 2 Sheets-Sheet 1

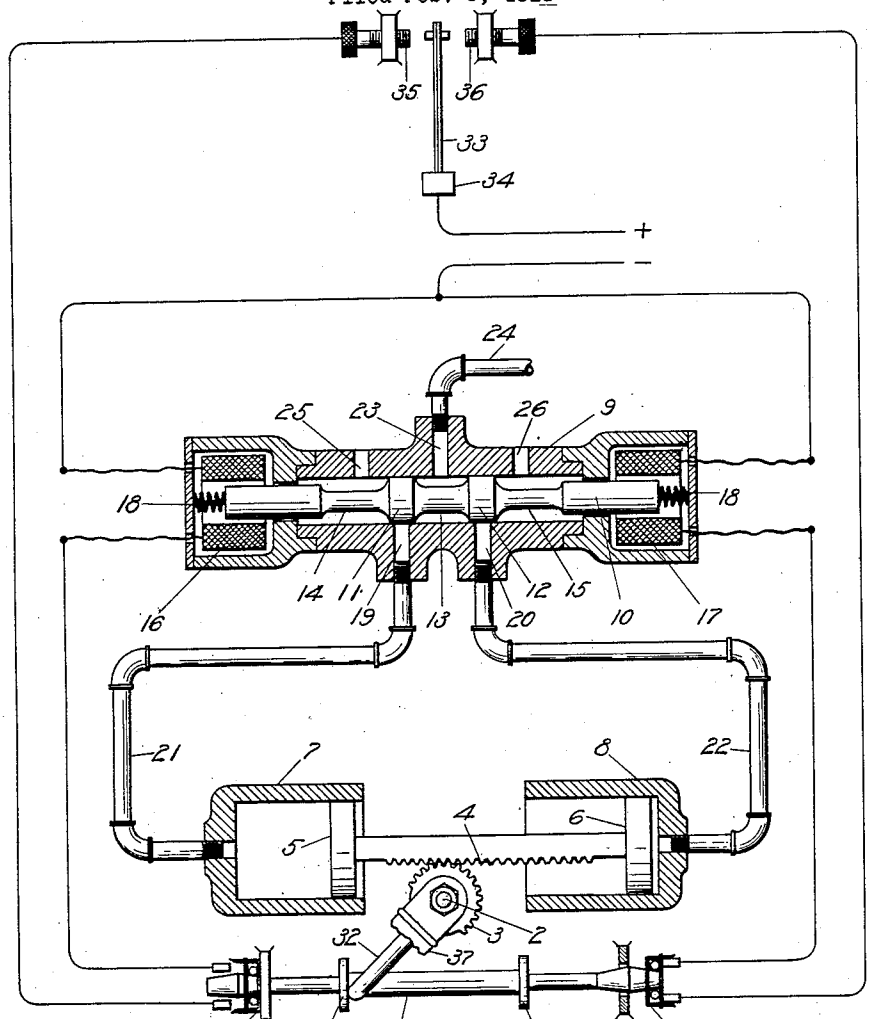

Fig. 1

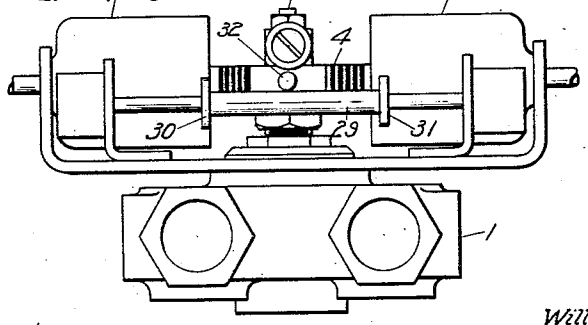

Fig. 2

WITNESS:

Romaine A. Tinnie

Ralph Munden

INVENTOR.

William L. Bliss

BY

Raymond H. Van Vleet

ATTORNEY.

Dec. 9, 1924. 1,518,894

W. L. BLISS

STEAM REGULATING MEANS

Filed Feb. 8, 1918 2 Sheets-Sheet 2

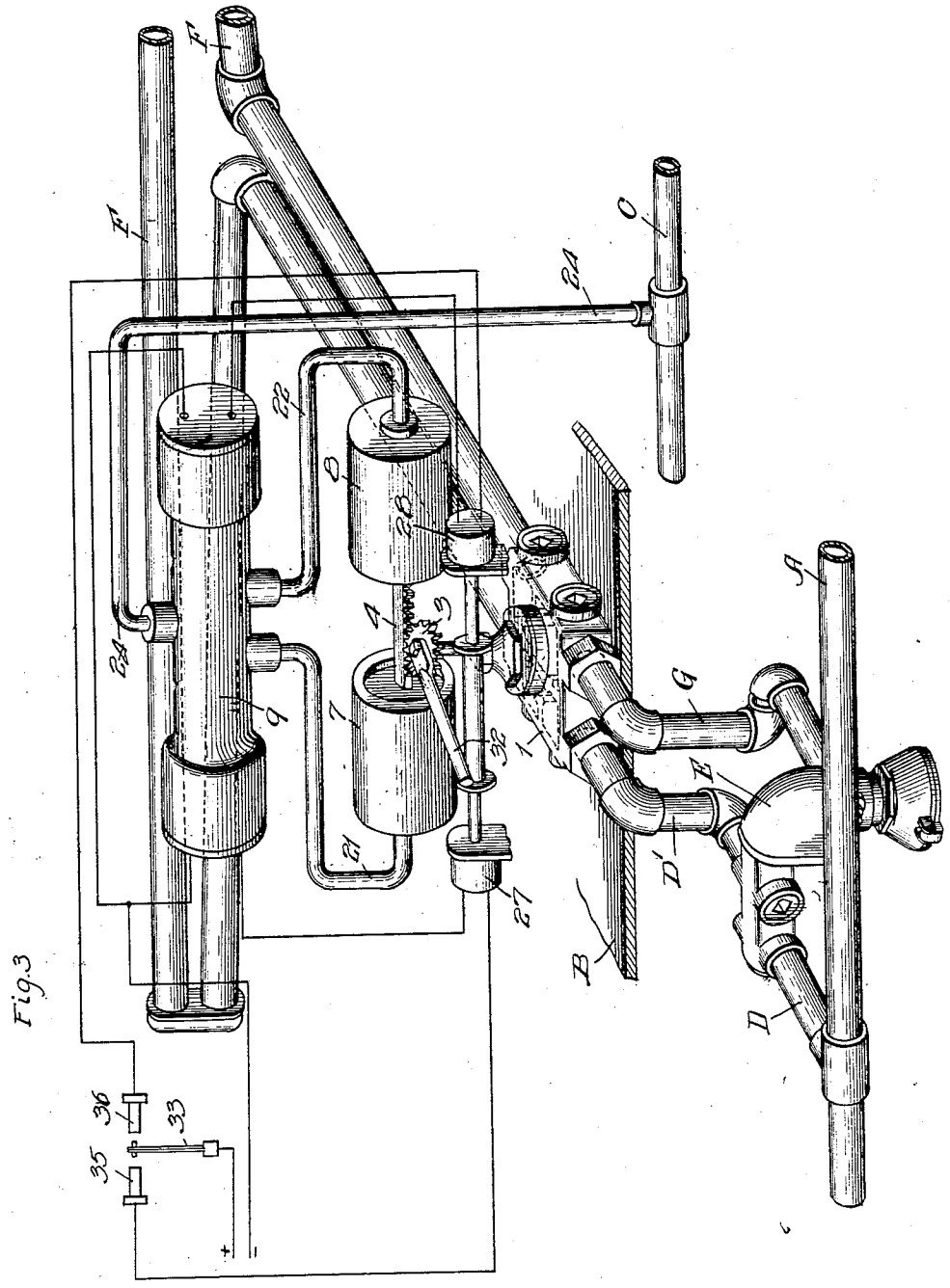

Fig.3

Witnesses:
W. F. Kilroy
Harry R. Lechner

Inventor:
William L. Bliss
By Barnett & Brennan
Attys.

Patented Dec. 9, 1924. 1,518,894

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.

STEAM-REGULATING MEANS.

Application filed February 8, 1918. Serial No. 216,104.

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 new and useful Improvements in Steam-Regulating Means, of which the following is a specification.

The present invention relates to steam regulating means.

More particularly the present invention relates to means for controlling the heating devices on railway cars, wherein steam is taken from the train line for heating purposes. In the systems now in use, a valve is ordinarily provided between the train line and the heating devices on a car, which valve may be turned on or off to provide the desired temperature. The present invention relates to mechanism whereby the operation of said valve may be accomplished automatically. Inasmuch as said valves must be packed to prevent the escape of steam to the atmosphere, they are sometimes hard to turn. A problem has been, therefore, to provide automatic operating means which will not occupy a prohibitive amount of space and yet be powerful enough to operate the valve.

An object of the present invention is to provide regulating means for operating a steam valve which will be automatic in its operation in response to the change in temperature in a car and which will occupy a minimum of space in and around the steam valve.

A further object is to provide automatic mechanism responsive to the temperature in a car which will utilize the energy stored up in the compressed air commonly provided on a train.

A further object is to provide automatic mechanism which is infallible in operation and which is as nearly proof against derangement as possible.

Further objects will appear as the description proceeds.

Fig. 1 represents schematically one embodiment of the present invention.

Fig. 2 represents in elevation a steam valve with the present invention applied thereto.

Fig. 3 is a diagrammatic, perspective view illustrating the application of the invention to a car heating system of familiar type.

A steam valve is indicated as a whole by the numeral 1. Said valve may be provided with suitably located parts whereby to be attachable to any of the lay-outs of steam pipes which may be provided. The steam valve 1 may be provided with a stem 2. Operation of said stem 2 in one direction will close the valve, while operation in the opposite direction will open the valve. Fixedly mounted upon the stem 2 is a gear 3 which may be driven by means of a rack 4, which rack 4 may be moved longitudinally by the pistons 5 and 6.

The pistons 5 and 6 are mounted to operate within cylinders 7 and 8 respectively, each of which cylinders 7 and 8 is adapted to be connected to a pilot valve 9. The pilot valve 9 is illustrated in the form of a cylinder and has a valve stem 10 reciprocable therein, portions of which are of magnetic material. The valve stem 10 has a pair of spaced enlarged portions 11 and 12 fitting within the cylinder 9. Between said enlarged portions 11 and 12 is a neck 13. On the opposite side of enlarged portion 11 is a neck portion 14, while on the opposite side of enlarged portion 12 is a neck portion 15. The valve stem is adapted to be drawn to the left, as viewed in Figure 1, by means of an electro-magnet 16, or to the right by an electro-magnet 17, when either of said electro-magnets is energized. Springs 18, 18, bias said valve stem 10 to a central position. On one side of the cylinder 9 is a pair of ports 19 and 20 spaced apart a distance equal to the distance between the centers of enlarged portions 11 and 12. Said ports 19 and 20 communicate with the cylinders 7 and 8 through the tubes 21, 22, respectively.

Located symmetrically with ports 19 and 20, but on the opposite side of the valve stem therefrom, is a port 23 which may have communication through tube 24 with any source of fluid supply, as, for instance, the air brake pipe line from the locomotive.

Located on either side of port 23 are ports 25 and 26. Ports 19 and 20 should be located so as to be covered by the enlarged portions 11 and 12 when the valve stem 10 is in its normal central position. When said valve stem 10 is drawn to the right, ports 19 and 20 should be uncovered, whereby communication will be had between ports 25 and 19 and between ports 23 and 20. At this time

port 26 will not have communication with any of the other ports. Similarly, when the valve stem 10 is drawn to the left, the port 20 will have communication with the port 26, while port 19 will have communication with the port 23, port 25, at this time, having no communication with any of the other ports.

A pair of switches 27 and 28 will be provided, which may be mounted upon a rod 29. The rod 29 may be provided with a pair of abutments 30, 31, adapted to co-operate with a finger 32, rigidly mounted upon valve stem 2. The parts should be so arranged that when valve stem 2 is thrown to one of its extreme positions by the rack 4, the finger 32 should engage the abutment 30 to move same to the left, whereas when said valve stem is thrown to its other extreme position, said finger 32 should engage the abutment 31 to throw the rod 29 to the right. The switches 27 and 28 have been illustrated diagrammatically as being mounted upon the rod 29 to form the well known hill and valley switch, whereby, when finger 32 urges the rod 29 to the right, switch 28 will be opened with a snap action and switch 27 will be closed substantially at the same time with a snap action. Similarly, when the finger 32 moves the rod 29 to the left, the switch 27 will be opened with a snap action and at substantially the same time, switch 28 will be closed with a snap action. No detailed description of the switch is necessary inasmuch as the details of the switch form no part of the present invention. Any other preferred form of switch may be used in place of the one illustrated, so long as movement of the finger 32 to the left will open switch 27, closing switch 28, and movement of the finger 32 to the right will open switch 28, closing switch 27.

A thermostatic reed 33 is illustrated as being fixed at the point 34. Said reed 33 may consist of two metals having different coefficients of expansion with temperature changes, said metals being fastened together, whereby change of temperature will cause said reed 33 to bend in one direction or the other, depending upon the direction of temperature change. Said reed 33 is adapted to co-operate with a pair of adjustable electrical contacts 35 and 36. When said reed is moved into a position to co-operate with contact 35, circuit will be completed from a source of electrical energy, such as the storage battery used for lighting the car, illustrated by the polarity signs plus and minus, through reed 33, contact 35, switch 27, (assuming said switch 27 to be closed) through electro-magnet 16, back to the source of electrical energy. When the reed 33 is moved to a position to co-operate with the contact 36, electrical circuits will be completed from the source of electrical energy, through the reed 33, contact 36, switch 28, (assuming switch 28 to be closed) through electro-magnet 17, back to the source of electrical energy.

A mode of operation of the above described embodiment of the present invention is substantially as follows. When the temperature within the car is such that reed 33 is in co-operative relation with neither contact 35 nor contact 36, magnets 16 and 17 will be de-energized and valve stem 10 will occupy its central position. Assuming that the temperature within the car changes in such a direction that the reed 33 will be bent into co-operative relation with the contact 36, circuit will be completed from the source of electrical energy through reed 33, contact 36, switch 28, electro-magnet 17, back to the source of electrical energy. Energization of the magnet 17 will draw the valve stem 10 to the right, whereby pressure from the tube 24 will be communicated through the port 23 around the neck portion 13, through port 20 and tube 22 to the piston 6 to move same in a left hand direction. Movement of the piston 6 will operate through rack 4 and gear 3 to move the valve stem 2. Valve 1 will thus be operated in response to the variation from the normal temperature. Movement of the valve stem 2 will have caused movement of the finger 32 which will strike against abutment 31 to move the rod 29 to the right. Such movement will operate in the manner well known to open switch 28 and close switch 27. Electrical circuit through the magnet 17 and contact 36 will thus be broken, whereby no live electrical circuit will be broken at contact 36 when the reed 33 bends away from co-operative relation therewith. Owing to this construction, only light material need be used in the construction of the reed 33 and contacts 35 and 36. Movement of the piston 6 to the left also causes movement of the piston 5 to the left. Movement of the piston 5 to the left within the cylinder 7 will force the air out of said cylinder 7 through tube 21, port 19, around the neck portion 14, through port 25 to the atmosphere.

Inasmuch as the switch 27 is now closed, the parts are in proper relation, whereby reed 33 may close circuit to energize electromagnet 16, through contact 35. If, due to a change in temperature brought about by the operation of the valve 1 above described, the reed 33 should move into co-operative relation with the contact 35, electro-magnet 16 will become energized to draw the valve stem 10 to the left, whereby pressure from within tube 22 will be communicated through port 23 around neck portion 13, port 19 and tube 21 to move the plunger 5 to the right, which will again operate the valve 1 in a direction opposite to that described above. Air will be exhausted from cylinder 8 through tube 22, port 20, around

neck 15, through port 26 to the atmosphere. The finger 32 will be moved to engage with abutment 30 on rod 29 whereby to open switch 27 and close switch 28, thereby moving the mechanism back into the position illustrated in Figure 1, whereby the reed 33 may bend out of co-operative relation with contact 35 without breaking a live electrical circuit.

It will be evident that the reed 33 is alternately operative to open and close the valve 1, whereby to maintain the temperature constant within adjustable limits.

The reed 33 and the pilot valve 9 may be located at convenient points in the car, remote from the cylinders 7 and 8 and the valve 1, if desired. Only relatively small structures need be mounted adjacent to the valve 1, whereby space may be economized.

A handle 37 may be provided on the valve stem 2 whereby said valve stem may be manually operated if it should be necessary to disconnect the pilot valve 9 from the cylinders 7 and 8.

Fig. 3 illustrates the application of my invention to a well known system of car heating employing vapor or low pressure steam as a heating medium. In this figure, A designates the train pipe of the car usually arranged beneath the flooring which is shown at B, and C the air brake line forming part of the compressed air system of the car. The four-way valve 1, which is of the type commonly used in railway car vapor heating apparatus, is connected with a train pipe by an intermediate pipe D, D′ between the sections of which is arranged a vapor regulator E. Valve 1 is of the four-way butterfly type. The inlet and return ends of the radiating coil F are connected with the valve, the inlet end opposite inlet pipe section D′ and the outlet end opposite a pipe G which conducts the heating medium largely in the form of water of condensation to the thermostat chamber of the vapor regulator E. These arrangements will be familiar to those skilled in this art and do not require specific illustration or description. The pipe 24 above referred to, is connected with the air brake line C. The other parts of the apparatus, as shown in Fig. 3, are the same as illustrated in detail in Figs. 1 and 2.

One embodiment of the present invention has been described in detail. Many modifications will occur to those skilled in the art. It is intended in this patent to cover all such modifications that come within the scope of the invention as defined in the appended claim.

What I claim as new and desire to secure by Letters Patent of the United States is—

In a steam heating system, the combination of a rotatable steam valve, an electrically actuated mechanism for operating said valve comprising a solenoid for effecting the opening and a solenoid for effecting the closing of the valve, contacts in circuit with said solenoids respectively, a circuit making- and breaking-member movable in the direction of its length and cooperating with said contacts to close said solenoid circuits alternately, opening the other circuit in each instance, a member on said valve which engages said circuit making-and-breaking member and moves the same in the direction to close the circuit of the valve opening solenoid when the valve has been rotated to its closed position, and which moves said circuit making-and-breaking member in the opposite direction to close the circuit of the valve closing solenoid when the valve has been rotated to its open position, and a circuit-making-and breaking thermostat the operation of which in co-operation with the first named circuit making-and-breaking member governs the energization of said solenoids.

In witness whereof, I have hereunto subscribed my name.

WILLIAM L. BLISS.