July 20, 1926. 1,593,222

E. A. RUSSELL

CONTROLLING DEVICE FOR ELECTRIC CIRCUITS

Original Filed Dec. 31, 1920

Fig. 1.

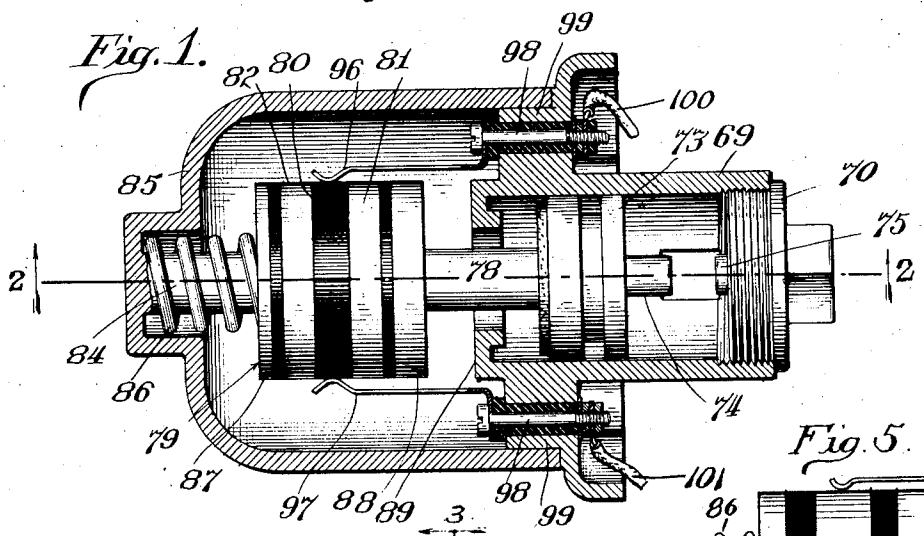


Fig. 5.

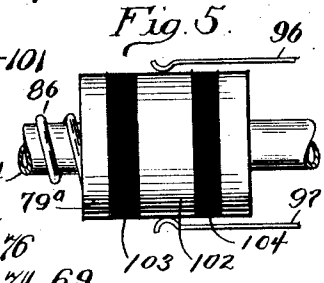


Fig. 2

Fig. 3.

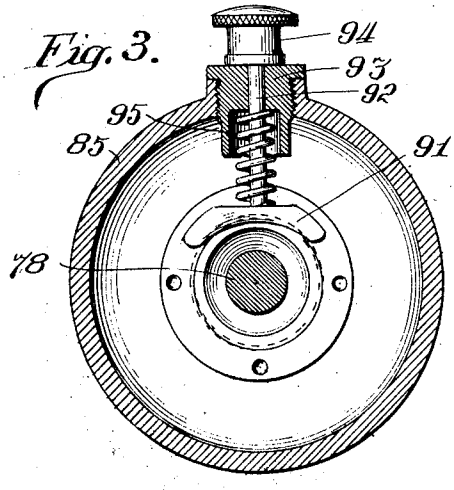
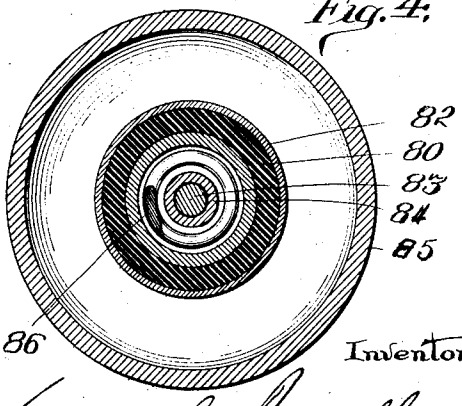


Fig. 4.



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Patented July 20, 1926. 1,593,222

UNITED STATES PATENT OFFICE.

EDWARD A. RUSSELL, OF CHICAGO, ILLINOIS, ASSIGNOR TO VAPOR CAR HEATING COMPANY, INC., OF CHICAGO, ILLINOIS, A CORPORATION OF NEW YORK.

CONTROLLING DEVICE FOR ELECTRIC CIRCUITS.

Original application filed December 31, 1920, Serial No. 434,179. Divided and this application filed August 1, 1921. Serial No. 489,000½.

My invention relates to a device for controlling the flow of current over an electric circuit, and one of the principal objects of the invention is to provide a new and improved device of this sort for operation by fluid pressure, whereby the closing, or the opening, of the controlled circuit will depend upon the presence or absence of fluid pressure in a conduit or enclosed space which at certain times is under pressure and at other times free from such pressure.

This application is a division of my copending application Serial No. 434,179, filed December 31, 1920, (patented January 2, 1923, No. 1,440,701) for automatic car heating system, in which the device which is the subject matter of the present application is arranged so as to be subject to air pressure in the signal train pipe of the car and is operated when the car is connected with the locomotive and its signal line filled with compressed air, to select a thermostat functioning at a high temperature which, when thus put in control of the heating system, maintains the car atmosphere at a relatively high temperature; the device operating, on disappearance of pressure from the signal train pipe, consequent upon the detachment of the car from the locomotive, to bring about the selection of a low temperature thermostat, that is to say, a thermostat functioning at a temperature lower than the first mentioned thermostat, which when it is thus put in control of the system, maintains the car atmosphere at a relatively low temperature but one high enough to prevent freezing of the water pipes, and the like.

A further object of the invention is to provide a "selector" switch of the type above mentioned which may be set at such times as the device is not under pressure to a position other than its normal position, meaning by "normal" the position assumed by the movable switch member when not subject to the fluid pressure, but which on return of the pressure will again be subject exclusively to control by such pressure, the switch member thereafter moving to one position or the other according to whether or not the pressure be exerted against the device.

The invention consists of the novel and improved constructions, arrangements and devices to be hereinafter described and claimed for carrying out the above stated objects and such other incidental objects as will be mentioned in the following description of the preferred embodiment of the invention shown in the accompanying drawing.

In the drawing,

Fig. 1 is a longitudinal sectional view of the controlling device on line 1—1 of Fig. 2.

Fig. 2 is a sectional plan on line 2—2 of Fig. 1.

Figs. 3 and 4 are cross sectional views on lines 3—3 and 4—4, respectively, of Fig. 2, and

Fig. 5 is a fragmentary view of a modified form of switch member.

Referring first to Figs. 1 to 4 inclusive, 69 is a cylinder closed at its outer end by a cap piece 70 and formed with a boss 71 to which is connected a pipe 72 leading from a source of supply of pressure fluid for example, assuming the use of the device mentioned above, the signal train pipe of the car. Within the cylinder is a piston 73 having a stud 74 adapted to bear against a stud 75 on the cap piece 70. The piston is formed on the other side with a recess 76 into which extends the rounded end 77 of the stem portion 78 of a cylindrical switch member 79. The switch member 79 carries an annular body of insulation 80 into which are set the spaced contact rings 81, 82. 83 is a stem formed on the interior of the switch member at its forward end which is adapted to be guided in a boss 84 inwardly projecting from the end of the casing member 85 to which cylinder 69 is secured. 86 is a spring interposed between the casing 85 and the switch member. At its outer end the switch member has a flange 87 and the body of insulation 80 is held against this flange by means of a nut 88. The inner end of the cylinder 69 is formed with an inturned stop flange 89 for piston 73, the piston being preferably provided with a rubber gasket 90 to bear against such flange. Arranged in the space between the end of the cylinder 69 and the switch member 79 is a curved lock or blocking member having a stem 92 extending through a pivot 93 set into the casing 85 and provided with a knob 94. Spring 95 is interposed between the locking device 91 and the fitting 93. A pair of contact

springs 96, 97, secured to binding posts 98, extending through a flange 99 on the cylinder, are adapted to bear either against one or other of the contact rings 81, 82, or against the insulating body between such rings.

Operation.—With the parts of the device in the position shown in Figs. 1, 2, 3 and 4, the electric circuit represented by wires 100, 101 is broken at 96, 97. There is no fluid pressure back of piston 73. Spring 86 holds the switch member against the blocking device 91, that is to say, in the intermediate or normal position of the switch member. When fluid pressure is exerted against the piston 73 the switch member is moved to the left (Figs. 1 and 2) bringing the contact ring 81 into place between the contact springs 96, 97. This closes the circuit 100, 101. As soon as the fluid pressure disappears the switch member is returned to its first position. The circuit 100, 101 may be closed, (assuming no pressure in cylinder 69) by raising the blocking device 91. When this is done spring 86 forces the switch member to its extreme position to the right so as to bring the contact ring 82 between contact springs 96, 97. As soon, however, as the pressure returns to the cylinder the switch member is moved to its other extreme position, the blocking device 91 sliding over the switch member and dropping down behind it in readiness to block the switch member in its intermediate position as soon as the pressure in the cylinder disappears. The hand control of the device is, therefore, subordinate to the control through appearance and disappearance of fluid pressure behind piston 73. If, in the absence of pressure, the device has been set by hand to close the circuit, on the re-appearance of pressure the switch member will be moved to such position that thereafter it will automatically respond to control exclusively by the fluid pressure.

Fig. 5 illustrates a modified form of switch member 79^a calculated to reverse the operations of the controlling device. That is to say, the switch member 79^a is provided with a single contact ring 102 against which the contact springs 96, 97 bear when the switch member is in its normal or intermediate position. When the switch member is moved to either extreme position the contact springs bear upon the insulating bodies 103 or 104 as the case may be. In other words, the control circuit is normally closed and is open either when fluid pressure is introduced into the cylinder or when blocking member 91 is raised.

I claim:

1. An electric circuit controlling mechanism comprising a movable switch member adapted to move to either of two extreme positions to effect one control of said circuit and to an intermediate position to effect a different control, a fluid pressure actuated device which when subject to fluid pressure moves the switch member to one of said positions, means for moving the switch member in the opposite direction, when the device is free from fluid pressure and manually operable means whereby said member, when moved by said last named means, may either be stopped in the intermediate positions or allowed to move to the other extreme position.

2. An electric circuit controlling mechanism comprising a movable switch member adapted to move to either of two extreme positions to effect one control of said circuit and to an intermediate position to effect a different control, a fluid pressure actuated device, which when subject to fluid pressure, moves the switch member to one extreme position, means for moving the switch member to the intermediate position when free from pressure, a stop member for limiting movement of the switch member to this intermediate position, the stop member being manually removable to permit movement of the switch member to the other extreme position.

3. An electric circuit controlling mechanism comprising a movable switch member adapted to move to either of two extreme positions to effect one control of said circuit and to an intermediate position to effect a different control, a fluid pressure actuated device which when subject to fluid pressure moves the switch member to one of said positions and which comprises a spring that moves the switch member to another position, and manually operated means whereby the switch member may be moved by said spring to a third position.

4. An electric circuit controlling mechanism comprising a movable switch member adapted to move to either of two extreme positions to effect one control of said circuit and to an intermediate position to effect a different control, a fluid pressure actuated device which when subject to pressure moves said switch member in one direction to one of said positions and which comprises means for moving said switch member to another position, and a blocking device the position of which determines the extent of movement of said switch member in assuming said other position.

5. An electric circuit controlling mechanism comprising a movable switch member adapted to move to either of two extreme positions to effect one control of said circuit and to an intermediate position to effect a different control, a fluid pressure actuated device which when subject to pressure moves said switch member in one direction to one of said positions and which comprises means for moving said switch member in the other direction to another position, and a blocking device which in its normal posi-

tion limits the movement of the switch member in said other direction but can be moved to allow said switch member to move further in the same direction to a third position.

6. An electric circuit controlling mechanism comprising a movable switch member, a fluid pressure actuated device for moving the switch member to a certain position to effect one control of said circuit and which comprises means tending to move the switch member to another position to effect a like control, and a blocking member which, in the absence of fluid pressure normally arrests the switch member at an intermediate position but is retractable to allow the same to be moved to said second named position.

7. An electric circuit controlling mechanism comprising a movable switch member, a fluid pressure actuated device for moving the switch member to a certain position to effect one control of said circuit which comprises a spring tending to move the switch member to another position to effect a like control, and a blocking member which, in the absence of fluid pressure normally arrests the switch member at an intermediate position, and is retractable to allow the same to be moved to said second named position.

8. An electric circuit controlling mechanism comprising a movable switch member, a fluid pressure actuated device for moving the switch member to a certain position to effect one control of said circuit, means which tends to move the switch member to another position to effect a like control, and a blocking member which, in the absence of fluid pressure normally arrests the switch member at an intermediate position but is retractable to allow the same to be moved to said second named position, said blocking member being slidable over said switch member when the latter is moved away from said second named position under the influence of fluid pressure.

9. An electric circuit controlling mechanism comprising a longitudinally movable switch member adapted to assume either of two extreme positions to effect one control of said circuit and to assume an intermediate position to effect a different control, a fluid pressure actuated device for moving the same to one extreme position comprising a spring which tends to move the switch member to the other of said extreme positions, and a retractable blocking device which normally prevents the movement of the switch member under action of the spring and holds the same in said intermediate position.

10. In an electric circuit controlling device, the combination of a cylinder adapted to receive a pressure fluid, a piston in said cylinder formed with a recess in its front face, a casing associated with said cylinder, a switch member guided for longitudinal movement in said casing, and formed at one end with a stem extending freely into the recess in said piston, and a spring which bears against the other end of said switch member and holds the stem within the recess.

11. In an electric circuit controlling device, the combination of a cylinder adapted to receive a pressure fluid, a piston in said cylinder formed with a recess in its front face, a casing associated with said cylinder, a switch member guided for longitudinal movement in said casing formed at one end with a stem extending into the recess in said piston and formed at the other end with a guide stud, a boss on said casing to receive said stud, and a spring surrounding said boss and stud and interposed between the casing and switch member.

12. In an electric circuit controlling device, the combination of a casing, a cylinder at one end of said casing, a piston in said cylinder, a switch member engaged by said piston and supported for longitudinal movement in said casing to either of two extreme positions to effect one control of said circuit and to an intermediate position to effect a different control, a spring bearing against the other end of said switch member, and a retractable blocking device normally standing between the inner end of the cylinder and the switch member to retain the switch member in an intermediate position.

13. In an electric circuit controlling device, the combination of a casing, a cylinder at one end of said casing, a piston in said cylinder, a switch member engaged by said piston and supported for longitudinal movement in said casing to either of two extreme positions to effect one control of said circuit and to an intermediate position to effect a different control, a spring bearing against the other end of said switch member, and a spring pressed blocking device arranged in the casing to normally prevent the switch member from being moved to an extreme position by said spring which block is retractable to allow the switch member to be moved to such extreme position and is adapted to slide over said switch member when moved from said extreme position by fluid pressure.

14. In an electric circuit controlling device, the combination of a switch member formed at opposite ends with means for closing said circuit and adapted when in an intermediate position to open said circuit, means adapted to operate intermittently for moving the switch member in one direction to close said circuit, means effective constantly tending to move the switch member in the opposite direction to effect a like control of said circuit, and a retractable de-

vice which normally holds said switch member in said intermediate position as against the action of said last named means.

15. In an electric circuit controlling device, the combination of a switch member formed at opposite ends with means for closing said circuit and adapted to assume three different positions, means for moving said switch member in opposite directions, and a retractable device which normally prevents the switch member from being moved to an extreme position in one direction without preventing the same from being moved in an extreme position in the other direction.

16. In an electric circuit controlling device, the combination of a longitudinally movable switch member formed at opposite ends with means for closing said circuit and an intermittently actuated motor for moving the same in one direction, a spring tending to move the same in the opposite direction, and a retractable device which in its normal position holds the switch member in an intermediate position as against the tendency of the spring without preventing the movement of said switch member by said motor.

17. In an electric circuit controlling device, the combination of a casing formed at one end with a guide boss, a cylindrical, hollow switch member in said casing formed interiorly with a guide stud extending into said boss, a spring interposed between the end of the cylinder and a switch member, contact and insulating elements on said switch member, a pair of contact springs in the casing adapted to bear against the switch member, a cylinder arranged to extend into said casing, a piston in said cylinder, a stem on said switch member engaged with said piston, and a blocking device slidably arranged in said casing and adapted to extend between the end of the cylinder and said switch member, said blocking device being formed with a curved face for sliding contact with said switch member.

18. A pressure actuated selector switch comprising a casing, a cylinder associated with said casing, a piston in said cylinder, a switch member operated by the piston and actuated within the casing having contact members at opposite ends and insulation between the contact members, brushes to bear against said contact members and insulation, a spring which tends to force the switch member in the direction opposite to the direction of the movement imparted to said member by said piston when the cylinder is under pressure, a lock which normally prevents the switch member from being moved by the spring to its extreme position, and manually operated means for releasing the lock.

19. An electric circuit controlling mechanism comprising a movable switch member adapted to move to either of two extreme positions to effect one control of said circuit, and to an intermediate position to effect a different control, a fluid pressure actuated device which, when subject to fluid pressure, moves the switch member to one of said positions, means effective in the absence of fluid pressure, for moving the switch member to either of the other two positions, and a manually operable controlling member for determining which of the positions the switch member will be moved to by the last named means.

EDWARD A. RUSSELL.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,593,222, granted July 20, 1926, upon the application of Edward A. Russell, of Chicago, Illinois, for an improvement in "Controlling Devices for Electric Circuits," errors appear in the printed specification requiring correction as follows: Page 3, lines 16, 28, and 39, claims 6, 7, and 8, respectively, after the word "position" insert the words *to effect a different control;* and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 24th day of August, A. D. 1926.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.