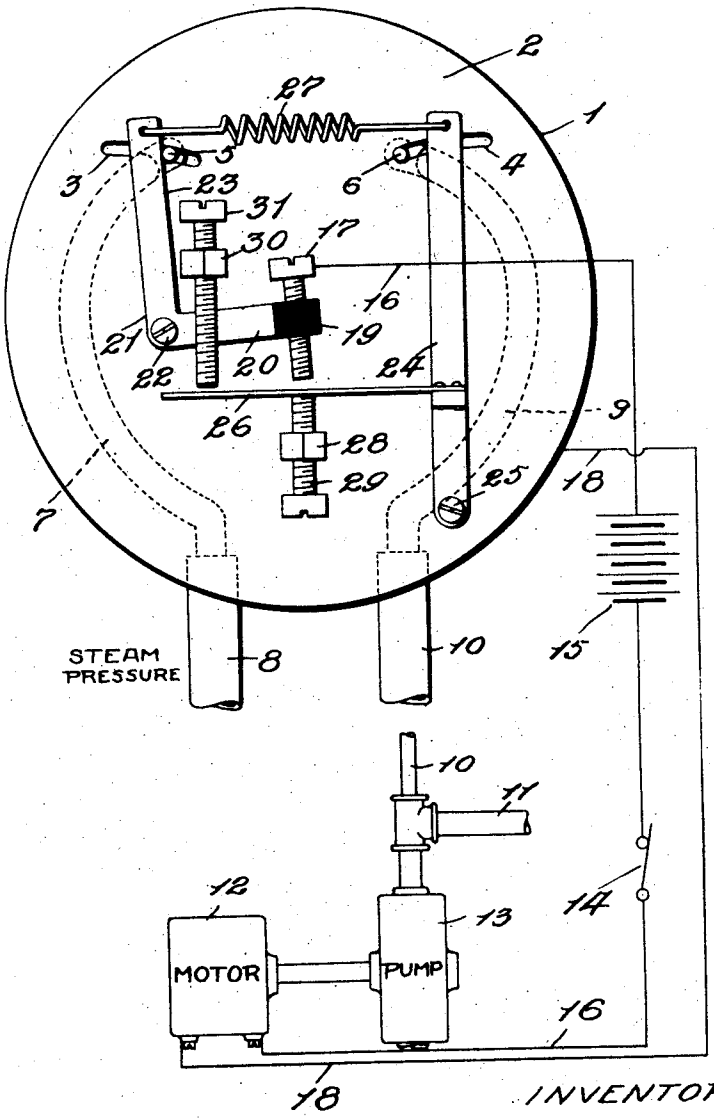
E. C. NEWCOMB AND L. L. SCOTT.

CONTROLLING DEVICE FOR ELECTRIC CIRCUITS.

APPLICATION FILED JAN. 31, 1919.

1,352,212. Patented Sept. 7, 1920.



INVENTORS

EDWARD C. NEWCOMB

AND LEWIS L. SCOTT,

By Bruce A. Elliott ATTORNEY

UNITED STATES PATENT OFFICE.

EDWARD C. NEWCOMB, OF SCITUATE, MASSACHUSETTS, AND LEWIS L. SCOTT, OF ST. LOUIS, MISSOURI, ASSIGNORS TO STANDARD ENGINEERING COMPANY, OF ST. LOUIS, MISSOURI, A CORPORATION.

CONTROLLING DEVICE FOR ELECTRIC CIRCUITS.

1,352,212. Specification of Letters Patent. Patented Sept. 7, 1920.

Application filed January 31, 1919. Serial No. 274,222.

To all whom it may concern:

Be it known that we, EDWARD C. NEWCOMB and LEWIS L. SCOTT, citizens of the United States, residing in the town of Scituate, county of Plymouth, and State of Massachusetts, and city of St. Louis and State of Missouri, respectively, have invented new and useful Improvements in Controlling Devices for Electric Circuits, of which the following is a specification.

This invention relates to a controlling device for electric circuits, and has for its broad object to provide novel means actuated by variations in pressure affecting said device to break said circuit at a given pressure and to automatically close the circuit at a lower pressure.

Two independent forces are utilized for actuating the circuit controlling mechanism whereby a differential action in the operation of said mechanism may readily be obtained.

A desirable embodiment of the invention is shown in the drawing to comprise a duplex gage in which the movements of the two Bourdon tubes constituting the two independent forces, are utilized to provide a differential make-and-break contact for an electric circuit. This is only one of many embodiments of which the invention is susceptible, however, and we, therefore, wish it to be understood that we do not limit ourselves to the particular manner of practising the invention herein shown and described, except in so far as the same may be embodied in certain of the appended claims directed to the particular application of the invention shown in the drawing.

The invention is more particularly designed for use in a combustion system for steam automobiles, such as described in the pending application of Lewis L. Scott, Serial No. 241,590, filed June 24th, 1918, wherein a movable member of a kerosene pressure gage is used for controlling the circuit of the spark-plug, and the two movable members of a duplex gage, the two sides of which are operated, respectively, by steam temperature and steam pressure, are utilized to control electric circuits; the one including a solenoid-valve for controlling, in turn, the pressure of the kerosene, and the other the motor, which governs the operation of the entire feeding and generating system. In this system the Bourdon tube of the steam pressure gage is arranged to break the circuit to the motor when the steam pressure exceeds a pre-determined amount, say 600 lbs., and thereby stop the feed of kerosene and air to the burner, and of water to the generator, thus stopping further generation of steam until the pressure falls again to 600 lbs., when the circuit is closed and the system again placed in operation. It has been found desirable, however, to provide for reëstablishing the contact at a lower pressure than the critical one, (600 lbs.), in order to prevent too rapid alternations in operation. Thus, in the present invention, we have arranged to break the circuit to the motor when the steam pressure exceeds 600 lbs., and to close it again when, and not before, the steam pressure has fallen below the critical pressure, say to 500 lbs. In this way the possibility of rapid fluctuations in the operation of the system is prevented.

To accomplish this purpose, we have combined the kerosene pressure gage with the steam pressure gage to form a duplex gage, and utilize the Bourdon tube of the kerosene gage to provide a movable contact cooperating with a contact member carried by the Bourdon tube of the steam gage to secure a differential make-and-break contact.

It is to be noted, however, that broadly considered, the invention comprises the utilization of two independent forces for actuating the circuit controlling mechanism whereby we are enabled to procure a positive and accurate differential control of the circuit and that the Bourdon tubes are to be considered as illustrations of any two independent forces which may be utilized for the purposes of this invention.

In the present embodiment of the invention we have selected the kerosene gage to cooperate with the steam pressure gage, for the reason that this gage acts in advance of the steam gage, as there can be no steam generated until the pressure of kerosene has been built up by the operation of the pump actuated by the motor, and the retractive movement of the gage is quite rapid, as soon as the pressure of the kerosene falls. On the other hand, the retractive movement of the steam gage is relatively slow, depending on the rate at which the excess steam is used, which in all cases would be after the indi-

cator of the kerosene gage had moved back to the zero position. As this position determinates the time of reëstablishing the circuit in the retractive movement of the indicator of the steam gage, it follows that the circuit cannot be closed till the indicator of the steam gage has moved, under falling pressure of steam, to the position indicating 500 lbs. pressure, at which point a contact member controlled by the Bourdon tube of the steam gage will form contact with a contact member controlled by the Bourdon tube of the kerosene gage.

The invention is illustrated in the accompanying drawing, in which the figure is a diagrammatic view showing the manner of controlling an electric circuit by the Bourdon tubes of a duplex gage, the latter being shown in rear elevation.

It may be stated that the gage shown is one of well-known construction and operation, and no description thereof in detail is deemed necessary.

Referring to the drawings, the numeral 1 indicates a duplex gage and 2 the back plate thereof, through curved slots 3, 4 in which project posts 5, 6 carried by the respective Bourdon tubes of the gage, the post 5 being on the Bourdon tube 7 of the steam gage, which tube is subject to steam pressure in a pipe 8 communicating with the generator; and the post 6 being in the Bourdon tube 9 of the kerosene gage, which tube is subject to kerosene pressure in a pipe 10 communicating with a pipe 11 leading to the effective point of application of the kerosene, such as the spray nozzle in the Scott system referred to. The numeral 12 indicates an electric motor which drives the kerosene pump 13. The motor is in a circuit including a hand switch 14 and a battery 15, a wire 16 from the battery leading to a contact screw 17 and a wire 18 from the motor being grounded in the frame of the gage 1. The contact screw 17 is adjustably mounted in an insulating block 19 carried at the end of an arm 20 of a bell-crank lever 21 which is pivotally mounted at 22 on the back plate of the gage, the other arm 23 of said bell-crank being in the path of outward movement of the post 5. The numeral 24 indicates an arm which is pivotally mounted at its lower end on the back plate of the gage, as indicated at 25, and has secured toward its lower end one end of a flexible contact bar 26, which extends parallel with the back plate 2 and at right-angles to the arm 24. The upper end of the arm 24 is in the path of outward movement of the post 6. A spring 27 connects the upper ends of the arms 23 and 24. The numeral 28 indicates a bracket on the back plate 2, in which is mounted a set screw 29, the upper end of which is adapted to limit the downward movement of the contact bar 26. In like manner a bracket 30 has mounted in it a set screw 31, the lower end of which limits the upward movement of the contact arm 26.

In operation, the switch 14 being closed the motor 12 is placed in operation to work the pump 13 and the pressure of kerosene immediately begins to build up. As the Bourdon tube 9 of the kerosene gage moves under the influence of this pressure, the post 6 will engage the side of the arm 24 and move it outward, thereby raising the contact bar 26 into contact with the lower end of the screw 31. The contact 17 will normally be in engagement with the bar 26 and the latter will, therefore, bend and be placed under slight tension in its upward movement by reason of such engagement. As steam is generated, the pressure in the pipe 8 produces movement of the post 5 by the Bourdon tube 7, which will cause the arm 23 to be moved outward to raise the contact 17, the latter being followed by the bar 26. This combined movement of the contact 17 and bar 26 permits the steam pressure to rise from a given low pressure to a given high pressure without breaking the electric circuit, and continues till the bar is straight and free from tension. The movement, of course, is very slight. If, now, the steam pressure rises above 600 lbs., the continued movement of the arm 23 will move the point of the contact 17 from the bar 26, which immediately breaks the circuit of the motor and stops the pump 13. The pressure of the kerosene thereupon falls and the Bourdon tube 9 moves the post 6 inward, or away from the arm 24, and the spring 27 draws said arm inward until it rests upon the set screw 29. This is the position of the parts as shown in the drawing, the contact 17 being still held in its elevated position by reason of the steam pressure in the pipe 8. As this pressure falls, however, the post 5 will be moved inward by its Bourdon tube and the spring 27 will draw the arm 23 inward, lowering the contact 17 until its point again rests upon the bar 26 and reëstablishes the circuit of the motor.

It will be seen that the position of the upper set screw 31 determines the pressure of steam at which the circuit shall be broken, while the position of the lower set screw 29 determines the pressure at which the circuit shall be again closed. By adjusting these screws these effective pressures may be varied at will.

We claim:—

1. A circuit-controlling device having two movable members actuated by forces developed by different agencies, a contact movable by one of said members, a co-acting contact movable by the other member, both of said contacts being movable against an opposed force, and an electric circuit including said contacts.

2. A circuit-controlling device having two movable members actuated by forces developed by different agencies, a contact movable by one of said members, a co-acting contact movable by the other member, both of said contacts being movable against an opposed force, an electric circuit including said contacts, and means for limiting the movement of one of said contacts in either direction, whereby to provide different planes of contact with the other contact member.

3. A circuit-controlling device having two movable members actuated by forces developed by different agencies, a contact movable by one of said members, a co-acting contact movable by the other member, both of said contacts being movable against an opposed force, an electric circuit including said contacts, and adjustable means for limiting the movement of one of said contacts in either direction, whereby to provide different and variable planes of contact with the other contact member.

4. A circuit-controlling device having two movable members actuated independently by forces developed by different agencies, a contact movable by one of said members, a co-acting contact movable by the other member, both of said contacts being movable against an opposed force, means for limiting the movement of one of said contacts in either direction, and an electric circuit including said contacts and controlling the action of the force affecting the movement of the contact of limited movement, whereby the breaking of the circuit by movement of the first-named contact will cause the last-named contact to vary its position with respect to the plane of separation.

5. A circuit-controlling device having two movable members actuated independently by forces developed by different agencies, co-acting contact members independently movable by said members, a stop for one of said contacts, means tending normally to draw the latter contact against said stop and the other contact into engagement therewith, an electric circuit including said contacts and controlling the action of the forces affecting the movement of said first-named contact, and a second stop for limiting the movement of said contact under the influence of said force.

6. A circuit-controlling device having two members actuated independently by forces developed by different agencies, an electric circuit controlling the action of one of said forces, and differential make-and-break contact mechanism for said circuit actuated by said members and regulated by said controlled force.

7. A duplex gage having two movable members actuated, respectively, by steam and kerosene pressures, a contact movable by the steam-actuated member, a second contact co-acting therewith and movable by the kerosene-actuated member, means for limiting the movement of said second contact in either direction, said limits of movement determining different pressures of steam at which the first contact will coöperate in its movements with the second contact, and an electric circuit including said contacts and controlling the application of pressure to said kerosene-actuated member.

8. In combination with a power-actuated device, an electric circuit controlled thereby, and circuit closing mechanism, actuated differentially by independent forces, associated with said device and functioning automatically in the operation thereof to break said circuit at a given pressure operative in said device and to close it at a different pressure.

9. In combination with a power-actuated device, an electric circuit controlled thereby, and circuit closing mechanism, actuated differentially by independent forces, associated with said device and functioning automatically in the operation thereof to break said circuit at a given pressure operative in said device and to close it at a lower pressure.

In testimony whereof, we have hereunto set our hands.

EDWARD C. NEWCOMB.
LEWIS L. SCOTT.