

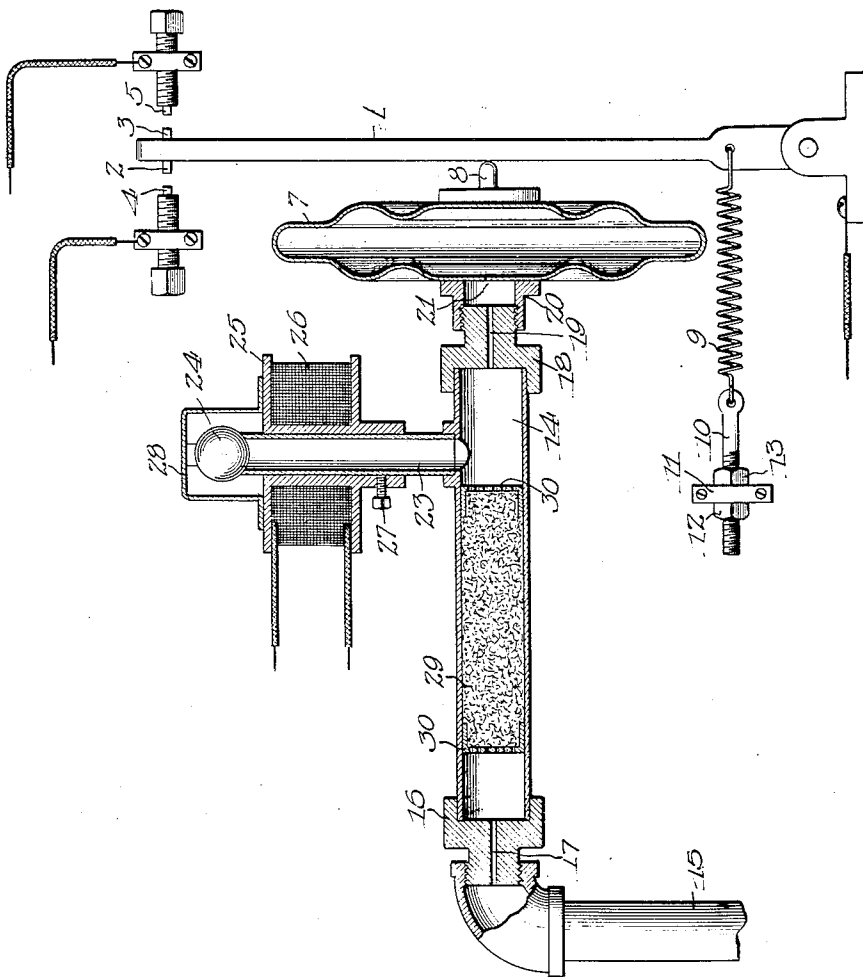
W. L. BLISS.

RELAY.

APPLICATION FILED DEC. 26, 1908.

1,232,456.

Patented July 3, 1917.



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UNITED STATES PATENT OFFICE.

WILLIAM L. BLISS, OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS,
TO U. S. LIGHT & HEAT CORPORATION, OF NIAGARA FALLS, NEW YORK, A CORPORATION OF NEW YORK.

RELAY.

1,232,456.

Specification of Letters Patent.

Patented July 3, 1917.

Original application filed January 6, 1905, Serial No. 239,924. Divided and this application filed December 26, 1908. Serial No. 469,418.

To all whom it may concern:

Be it known that I, WILLIAM L. BLISS, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Relays, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawing, forming a part of this specification.

My invention relates to improvements in relays for controlling electric circuits.

The object of my invention is to provide an electro-responsive relay which will be sensitive enough to respond to slight variations in the electrical conditions and which will be stable in operation.

According to the preferred form of my invention, I provide a fluid pressure responsive device for actuating certain instrumentalities, and electromagnetically operated means for regulating the pressure upon said fluid pressure responsive device. The pressure upon the fluid pressure device depends upon the strength of the operating magnet of the regulating means, and is varied according to variations in the strength of said magnet, thereby causing the relay to respond upon variations in the electrical conditions to which the electromagnet is subjected.

My present application is a division of a former application, filed by me on January 6, 1905, and bearing Serial No. 239,924, which has matured into Patent No. 1,025,559.

In my said former application the relay is employed to control the operation of an automatic regulator for regulating the voltage impressed upon a lamp circuit. Of course, the relay may be used in other relations.

The relay is especially adapted to be employed for controlling the operation of automatic electric regulators for car lighting systems, as the operation thereof is so stable that it is capable of being subjected to vibrations which exist upon railroad cars without the operation thereof being deranged.

For the purpose of more clearly disclosing my invention, I have illustrated one embodiment thereof in the accompanying drawing. Of course my invention is susceptible of various modifications.

According to the preferred form of my invention I provide a relay switch 1, pivoted at one end to a suitable support. At its

other end the switch 1 carries contacts 2 and 3 adapted to engage stationary contacts 4 and 5, respectively, according to the direction in which the switch 1 is moved. The operating means for the switch 1 preferably comprises a diaphragm or expansible casing 7, which carries on the front a pin 8 adapted to engage the switch 1. A spring 9, connected at one end to the switch 1 and at its other end to the eye of a bolt 10, tends to hold the switch 1 against the pin 8. The bolt 10 passes through a post 11 and carries a nut 12, by means of which the same may be adjusted to vary the tension on the spring 9. The bolt 10 is also preferably provided with a jam-nut 13. The diaphragm 7 is preferably so constructed as to expand on very slight variations in pressure. It may be assumed that, under normal conditions, sufficient pressure is exerted upon the diaphragm to hold the relay switch in an intermediate position, as illustrated, so that neither of the contacts carried thereby engage their corresponding stationary contacts. If the pressure in the diaphragm be increased, the relay switch will be moved so as to cause the contact 3, carried thereby, to engage the stationary contact 5, while if it be decreased the relay switch will be moved by the spring 9 to bring the contact 2, carried thereby, into engagement with the stationary contact 4. The fluid which operates the diaphragm is preferably delivered to the pressure chamber 14 through a pipe 15, which may be connected to a supply pipe, or to the pressure chamber supplying the operating fluid for brakes when the relay is used upon a car. Upon one end of the chamber is preferably mounted a head 16, which is connected to the pipe 15, said head being provided with a passage 17. Upon the other end of the chamber 14 is mounted a head 18 which is connected to a socket 20, preferably mounted upon the back of the diaphragm 7. The head is provided with a passage 19, which communicates with an aperture or port 21 in the back of the expansion diaphragm. The pressure chamber is preferably provided with an escape vent, through which the fluid entering said chamber may escape, said vent being in communication with a pipe 23. The escape of the fluid from the pressure chamber is preferably controlled by a valve 24, which may rest upon a

seat formed in the end of the escape pipe 23. The escape valve preferably comprises a ball composed of magnetic material. Mounted upon the frame 25, surrounding the escape pipe 23, is an electromagnetic winding 26. The frame 25 is preferably provided with a set screw 27, for holding the same in place upon the escape pipe. Mounted upon the magnet frame is a cage 28, which surrounds the valve 24 and prevents the casual displacement of the same. The purpose of the magnet 26 is to attract the escape valve 24 to the seat therefor, provided at the end of the escape pipe 23. The pressure chamber is preferably provided with a fluid resistance 29, of cotton, wool, or other suitable material, through which the fluid entering the pressure chamber percolates, said fluid resistance preferably being arranged between foraminous partitions 30. The resistance 29 tends to prevent variations in the pressure upon the diaphragm upon slight variations in the pressure of the fluid entering the pressure chamber. If the operating fluid be delivered to the pressure chamber at a moderate rate, and also at a fairly uniform pressure, the pressure upon the diaphragm will be substantially constant, so long as the rate at which the fluid escapes from the pressure chamber through the escape pipe remains unchanged. Upon variations in the strength of the controlling magnet 26, the rate at which the fluid escapes from the pressure chamber will be varied, thereby varying the pressure upon the diaphragm. For instance, if the strength of the controlling magnet is increased, the valve is more tightly held against its seat and the pressure upon the diaphragm is increased, while if the strength of said controlling magnet is decreased, the pressure upon the diaphragm is likewise decreased. Upon an increase of pressure upon the diaphragm said diaphragm will be expanded and the relay switch moved to bring the contact 3 into engagement with the contact 5, while if the pressure upon the diaphragm is decreased below normal, said diaphragm will contract and said switch be moved under the influence of the spring so as to bring the contact 2, carried thereby, into engagement with the stationary contact 4. While the current, which flows through the controlling magnet, remains normal the relay switch 1 will stand in an intermediate position out of engagement with both of the contacts 4 and 5, as illustrated.

By the construction illustrated and described, it will be apparent that the effects of variations of fluid pressure in the pipe 15 will be minimized. Any variations in the supply pressure will merely operate the ball valve 24, leaving the diaphragm 7 responsive only to those changes in pressure due to the action of the magnet 26. Due to the restricted passage through the passage 19 and

aperture 21, any variations due to ununiform pressure supply are still further minimized.

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

What I claim as new and desire to secure by Letters Patent is:—

1. In a relay device, in combination, a fluid pressure responsive device, an exhaust valve biased to closed position but movable to open position by pressure within said device, electromagnetic adjusting means controlling the sensitiveness of the exhaust valve, whereby the rate of flow and thereby the pressure on said fluid pressure device is regulated, and a switch controlled by the operation of said fluid pressure device.

2. In a relay device, in combination, a relay switch, a fluid pressure responsive device for actuating said switch and provided with an escape vent, an adjustable one way valve controlling the escape of fluid through said vent to regulate the flow through said device and consequently the pressure upon said fluid pressure responsive device, a seat for said valve, said valve being movable from said seat by the pressure of the fluid escaping through said vent, and an electromagnet for actuating said valve in the opposite direction to vary the adjustment thereof and thereby varying the pressure upon said fluid pressure responsive device.

3. In a relay device, in combination, a relay switch, a fluid pressure motive power device operating said switch and provided with an escape vent, an adjustable valve controlling the escape of fluid through said vent to regulate the pressure upon said fluid pressure responsive device, a seat for said valve, said valve being movable from said seat by the pressure of fluid escaping through said vent, and an electromagnet arranged to attract said valve toward the seat thereof.

4. In a relay device, in combination, a relay switch, a fluid pressure responsive device operating said switch and provided with an escape vent, a ball valve controlling the escape of fluid through said vent to regulate the pressure upon said fluid pressure responsive device, a seat for said valve arranged around said vent, said valve being adapted to be moved from said seat by the pressure of the fluid escaping through said vent, and an electromagnet arranged to attract the ball valve toward the seat thereof to vary the pressure upon said fluid pressure responsive device.

5. In a relay device, in combination, a relay switch, a fluid pressure responsive diaphragm, a pressure chamber communicating

with said diaphragm, and provided with an escape vent, an adjustable valve controlling the escape of fluid through said vent, said valve being biased to closed position but movable to open position by pressure within said chamber, a source of fluid pressure supply communicating with said pressure chamber, a fluid resistance arranged within said pressure chamber and tending to prevent fluctuations in the pressure of said source of supply from producing fluctuations in the pressure upon said diaphragm, and an electromagnet for controlling the adjustment of said valve to vary the pressure within said pressure chamber.

6. In a relay device, in combination, a relay switch, a fluid pressure responsive diaphragm for actuating said switch, a pressure chamber provided with an escape vent, a source of fluid resistance arranged within said pressure chamber and tending to prevent fluctuations in the pressure of said source of supply from producing fluctuations in the pressure upon said diaphragm, a valve seat arranged around said escape vent, a ball valve arranged upon said seat and adapted to be moved therefrom by the pressure of the fluid escaping through said vent, and an electromagnet attracting said ball valve toward said seat.

7. An electrical switch and means for con-

trolling the operation thereof, said means including a fluid pressure responsive device tending to move said switch in one direction, said device being provided with an exhaust port, a valve provided with a seat adapted to close said exhaust port, said valve being adapted to be moved from its seat by the pressure within said device, and electromagnetic means tending to hold said valve to its seat to vary the pressure within said device.

8. A fluid-operated relay device provided with a chamber and an exhaust port communicating with said chamber, a valve adapted to close said port, said valve being adapted to be moved from its seat by the pressure within said chamber, and electromagnetic means tending to hold said valve to its seat, a movable member in communication with said chamber, said communication being through a relatively small passage compared to the dimensions of said chamber.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

WILLIAM L. BLISS.

Witnesses:

FRANK H. HUBBARD,
SHEPLER W. FITZ GERALD.