H. J. RICHARDSON.

RELAY AIR VALVE.

APPLICATION FILED JAN. 30, 1908.

959,073. Patented May 24, 1910.

Fig. 1.

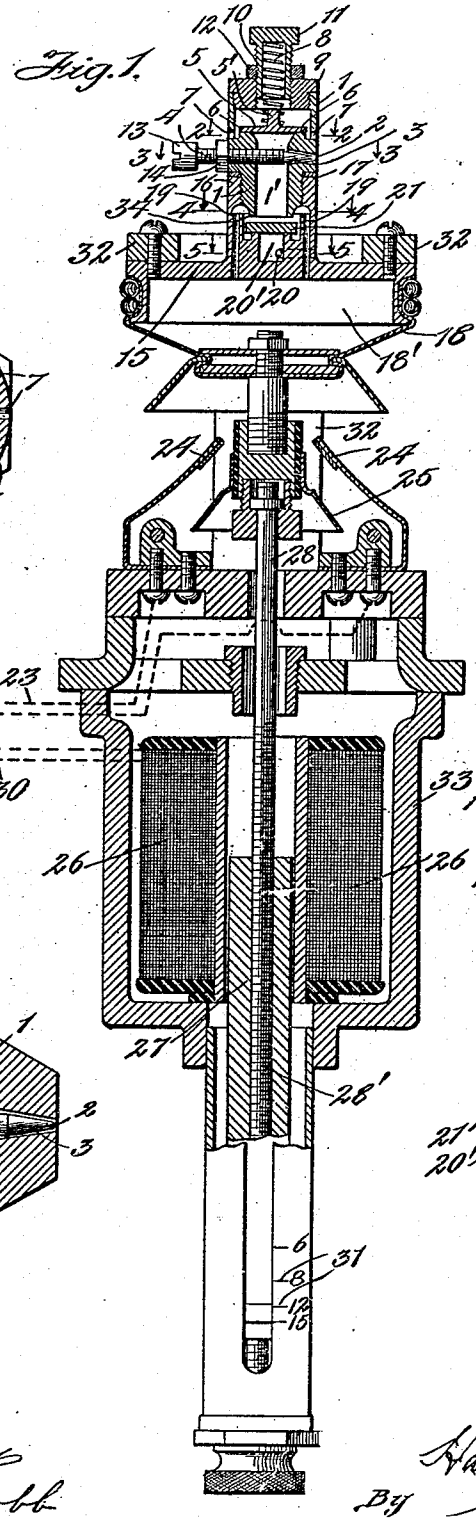


Fig. 2.

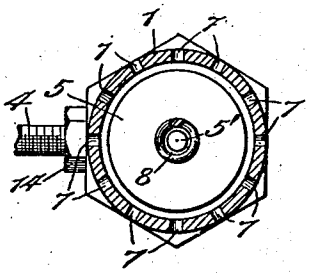


Fig. 4.

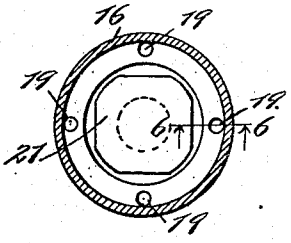


Fig. 5.

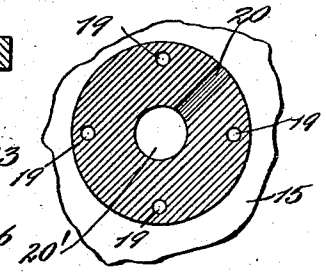


Fig. 3.

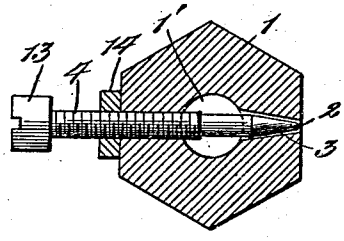
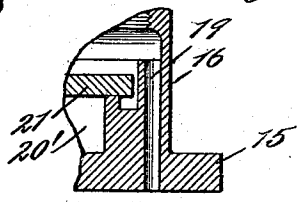


Fig. 6.



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HARVEY J. RICHARDSON, OF CHICAGO, ILLINOIS.

RELAY AIR-VALVE.

959,073. Specification of Letters Patent. Patented May 24, 1

Application filed January 30, 1908. Serial No. 413,349.

To all whom it may concern:

Be it known that I, HARVEY J. RICHARDSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Relay Air-Valves, of which the following is a description.

My invention belongs to that class of devices known as fluid or air valves, and is particularly adapted to be used in combination with that form of electrical apparatus know as a relay, or more particularly, a time limit relay. There are various styles and kinds of relays, that shown in the drawings being what is known as the "bellows type" of time limit overload relay. The function of this type of relay is to close the control circuit to the switch operating mechanism or circuit breaker, thereby opening the main circuit when the amperage in the same is greater than that which is desired and for which the relay is adjusted to operate. In the simple form of relay this operation would be substantially instantaneous. However, an overload which might be destructive if allowed to be carried for a time might not be injurious if carried for a comparatively shorter period, and therefore to permit an overload for an interval, relays commonly known as time limit relays are employed. The purpose of the time limit relay is to control the circuit breaker in the main circuit and break the main circuit after an interval of time; for instance, after one second or two seconds, or six seconds, etc., depending upon the adjustment of the relay, if the overload continues for the time for which the relay is set. As an example, if the same is set to operate at 100 per cent. overload in six seconds, and break the circuit at the expiration of that time if the overload continues, should the overload run up to about 500 per cent., it would require about 1-1/10 seconds before the circuit would be broken, during which time the system might be greatly injured. My device is designed to obviate this difficulty and is arranged to give a substantially instantaneous release at a slight increase over the overload for which the device is adjusted, and also to prevent any vibrating or "chattering" of the relay, which in itself would impair the usefulness of the relay. As an example, if the relay were set to operate with 100 per cent. overload in six seconds, with my device applied and adjusted to give a quick release at 150 per cent. over. at 500 per cent. overload the same woul lease in approximately 1/10 of a secon less, and break the main circuit. It is vious that the values given as exam may be varied to some extent one way or other, depending upon the particular apparatus and conditions. With short "kicks" or a slight overload not exceeding the point for which my device is set, the operation of the relay will be the same as before the application of the device, but with large overloads or anything equaling the value for which my device is adjusted, the time of operation of the relay will be greatly reduced.

My invention has for its objects the production of a simple, convenient and efficient valve of the kind described, adapted to be used in combination with any suitable form of relay or other apparatus upon which the same is applicable.

To this end my invention consists in the novel construction, arrangement, and combination of parts herein shown and described and more particularly pointed out in the claims.

In the drawings, wherein like reference characters indicate like or corresponding parts, my preferred form of device is shown as applied to a time limit overload relay of the bellows type.

Figure 1 is a sectional view of my preferred form of device and the relay, Fig. 2 is a cross sectional view of my device taken substantially on line 2—2 of Fig. 1, Fig. 3 is a cross sectional view of the same taken substantially on line 3—3 of Fig. 1, Fig. 4 is a cross sectional view taken substantially on line 4—4 of Fig. 1, Fig. 5 is a cross sectional view taken substantially on line 5—5 of Fig. 1, and Fig. 6 is a sectional view taken substantially on line 6—6 of Fig. 4.

Referring to the drawings 1 is a suitable shell or casing provided with a chamber 1^1 therein. The chamber 1^1 is provided with a port or outlet 2 which is controlled by any suitable form of valve, preferably a needle valve 3. This valve normally controls the amount of fluid discharged or the time in which the relay acts. As shown this is made adjustable and extends without the casing 1, being provided with a head 13 on the extended portion 4. A lock nut 14 may be arranged as shown if desired. Preferably in the upper part of the chamber 1 is

arranged a valve member 5 adapted to cooperate with the valve seat 6 within the shell or casing 1. Any suitable means may be employed to normally retain the valve member on its seat. As shown a spring 8 is provided for that purpose. In the preferred construction I arrange a removable top 9 for the shell 1 through which passes an adjusting screw member 11 which is chambered as shown and adapted to receive the resilient member 8 so that by adjusting the member the pressure on the valve member is increased or decreased as desired. The valve member 5 may be provided with an extended portion 5^1 adapted to guide the same, and a lock nut 12 as shown if desired. One or more outlets 7 controlled by the valve 5 are preferably provided in the shell 1 as shown.

In relays similar to that shown, which as above stated is known as the bellows type, 18 is the bellows and 18^1 the air or fluid chamber formed by the bellows 18 and the head or top 15. The top 15 is extended as at 16 and provided with one or more outlets or ducts 19 extending from the fluid chamber 18^1 to the interior of the extended portion 16 of the top 15, giving communication between the chamber 18^1 and the chamber 1^1 within the shell or casing 1. The top 15 is supported by means of the extended portion and brackets 32, which are secured to the relay casing 33.

The bellows 18 is operated and the fluid thereby discharged from the chamber 18^1 by means of the rod 28 to which is secured the core 27, which is operated by the solenoid 26—26. When the amperage in the conductors 29 and 30 to the solenoid 26 rises above the point for which the relay is adjusted, the core 27 is raised, raising the rod 28 and the switch member 25, thus closing the circuit between the contact points 24, 24, so that there is a closed circuit through the conductors 22 and 23, thus operating a suitable switch or circuit breaker in the main line circuit and breaking the main circuit.

In the form of relay shown, the core 27 is adjustable for different amperages on the rod 28, a scale being provided as at 31 to indicate the adjustment of the same. As the core is raised, the air or fluid in the chamber 18^1 is forced out and passes through the ducts 19 into the chamber 1^1 in the casing, and thence normally out through the port 2, the position of the needle valve 3 controlling the time required to expel the air and close the circuit between the points 24, 24.

In my improved device the valve 5 is normally closed, but should the overload in the main circuit run up to a point beyond that for which the valve 5 is adjusted, the same will be raised by the increased pressure of the contained fluid, giving a substantially instantaneous release or substantially instantaneous discharge of the fluid and acceleration of the relay so that the circuit through the contact points 24, 24 is substantially instantly closed and the main circuit at once broken. To facilitate rapid return of the bellows 18 to normal position as the amperage in the conductors 29 and 30 returns to normal, an inlet duct 20 is provided as shown, the valve 21 being arranged to prevent the duct 20 acting as an outlet. As the bellows 18 is released, the air enters the duct 20, raises the valve 21 and passes through the ducts 19 into the chamber 18^1. As shown the preferred construction is to extend the shell 1 as at 34 so that the same acts as a stop for the valve member 21.

It might be noted that with the preferred construction, if at any time it is not desired to use the instantaneous release, the adjustable member 10 may be screwed down, locking the valve 5 on its seat so that the discharge of the fluid or operation of the relay would be controlled solely by the valve 3. Or, on the other hand, if desired the valve 3 might be closed and the relay controlled by the valve 5.

Having thus described my invention, it is obvious that various immaterial modifications may be made in the form, design or arrangement of parts shown and described, or that the same may be used in combination with other forms of relays or controlling mechanism upon which the same might be applicable without departing from the spirit of my invention, hence I do not wish to be understood as limiting myself to the exact form, construction, arrangement or combination of parts herein shown and described.

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

1. In a device of the kind described, controlling mechanism comprising a fluid chamber, and means for controlling the gradual discharge of fluid therefrom, in combination with auxiliary means adapted to permit the substantially instantaneous discharge of fluid therefrom when the pressure reaches a predetermined amount, and instrumentalities whereby either or both of said means may be rendered inoperative.

2. In a device of the kind described, an electrical relay provided with means for controlling the time of operation thereof, said means comprising a fluid chamber, means for forcing the contained fluid therefrom, and means for controlling the time of discharge of fluid from said chamber, in combination with independent means adapted to permit the substantially instantaneous operation of said relay when the fluid pressure in said chamber reaches a predetermined value, and instrumentalities whereby either or both of said means may be rendered inactive.

3. In a device of the kind described and

in combination, a casing provided with an inlet and outlets, means for normally controlling the discharge of fluid from said casing, and means adapted to substantially instantaneously permit the discharge of fluid therefrom when the pressure therein reaches a predetermined value, comprising a movable valve member and means for normally retaining the same in the closed position, and means whereby the valve may be locked against movement.

4. In a device of the kind described and in combination, a casing provided with an inlet and outlets, means for normally controlling the discharge of fluid from said casing, and means adapted to substantially instantaneously permit the discharge of fluid therefrom when the pressure therein reaches a predetermined value, comprising a movable valve member and adjustable resilient means for normally retaining the same in the closed position, and means whereby the valve may be locked against movement.

5. In a device of the kind described, a relay controlling mechanism for electrical circuits, said means comprising a casing constituting a fluid chamber, means for forcing the content fluid therefrom, and means for controlling the discharge of fluid from said chamber including an outlet in the side wall of said casing and a valve for the outlet having an adjusting stem projecting through the side wall of the casing, in combination with independent means adapted to permit the substantial instantaneous operation of said relay when the fluid pressure in said chamber reaches a predetermined flow, the same including an auxiliary outlet in the side wall of the casing, a valve for controlling the same and adjusting mechanism for the latter projecting through the top of the casing.

In testimony whereof, I have hereunto signed my name in the presence of two subscribing witnesses.

HARVEY J. RICHARDSON.

Witnesses:
ROY W. HILL,
CHARLES I. COBB.