

March 1, 1927.

J. C. McDONALD

1,619,080

POLYPHASE RELAY

Filed March 24, 1924

Fig. 1.

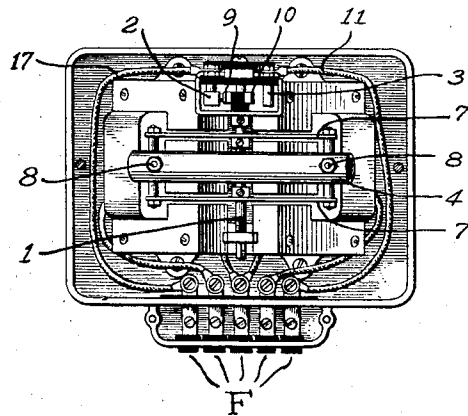


Fig. 2.

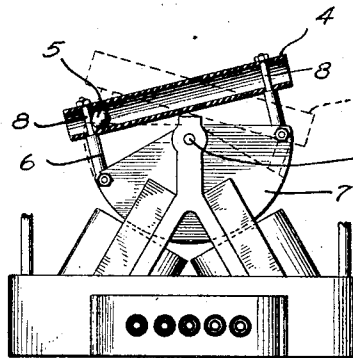


Fig. 4.

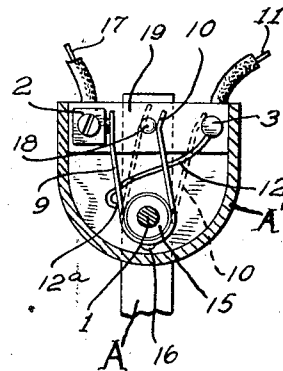
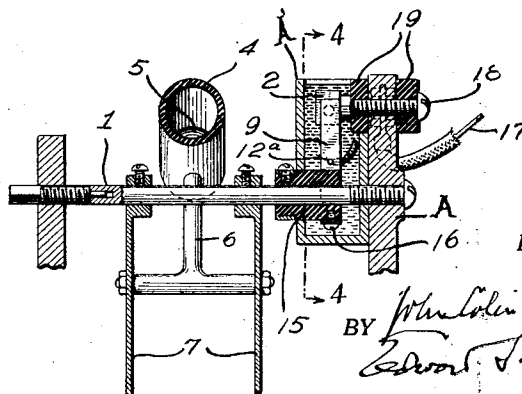


Fig. 3.



INVENTOR

BY *William C. McDonald*
Edmund J. Berch
ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN COLIN McDONALD, OF NEW YORK, N. Y., ASSIGNOR OF ONE-THIRD TO WILLIAM NORMAN WESTERLUND, OF NEW YORK, N. Y., AND TWENTY-SIX PER CENT TO EDWARD L. CORBETT, OF NEW YORK, N. Y.

POLYPHASE RELAY.

Application filed March 24, 1924. Serial No. 701,349.

This invention relates to polyphase relays. The relay herein described is shown but not claimed in my application Serial No. 633,555, filed April 20, 1923, for polyphase electrical control system.

The object of my present invention is to produce a polphase relay in which electric contacts when made are automatically and mechanically retained in contacting position during any desired interval, either momentarily or for many consecutive hours, and until a reversal of the phase; the relay being non-consumptive of electric energy during such interval.

In the accompanying drawings forming a part hereof and illustrating the invention,

Fig. 1 is a top plan view of my improved relay.

Fig. 2 is a side elevation thereof.

Fig. 3 is a sectional detail of the same at line 3—3 of Fig. 4.

Fig. 4 is a sectional elevation of the improved relay at line 4—4 of Fig. 2.

In the drawings, the rocker shaft 1 is freely rockable in either direction, clockwise or counter-clockwise. The relay electrode 2 and the thereto opposed, insulated stop 3 are both stationary. By my improvement, I mount in fixed relation to said rocker shaft, a tube 4 above and transversely of the rocker shaft; the tube projecting beyond each side of the rocker shaft. This tube is provided with a therein freely rollable ball 5 serving as a weight. Each opposite end portion of the tube is connected by an upstanding bracket 6 with each of two segmental vanes or armatures 7 which are spaced apart on the rocker shaft and are here shown dependent therefrom in a well-known manner.

An upper, end member 8 of each bracket extends through an end portion of the tube to keep the ball weight in the tube between the end members 8 of the bracket; each such end member being spaced apart from the rocker shaft so that the ball weight may roll to one or the other side of the rocker shaft, according to the inclination given to the tube by a rocking movement of the rocker shaft.

One end of the rocker shaft is provided with a thereon fixed, and insulated, U-shaped, upstanding switch one arm 9 of which constitutes an electrode and another arm 10 which constitutes a stop arm. A lead 11 is in electrical connection with said stop

3 and another lead 12 is in electrical connection with said stop 3 from which the lead 12 extends to and is in electrical connection at 12^a with the switch arm 9. There is no electric current through the stop arm 3 and the arm 10 when they are in contact because they are at the same potential. The U-shaped switch is insulated from the rocker shaft at 15 and is secured to said insulation by a screw 16. A lead 17 is in electrical connection with said electrode 2 which forms a contact for the switch arm 9. The leads 11 and 17 are parts of a circuit exterior to the relay, the lead or conductor 11 being the feed-in conductor and the lead or conductor 17 being the conductor for outgoing current. The relay itself is energizable by the polyphase current fed in through the electrodes F, as usual. A clamp screw 18 holds to the relay frame opposite insulation blocks 19 which carry the electrode 2 and the stop 3.

Whenever the rocker shaft is rocked in one direction during operation of the relay, the weight carrying tube is tilted downwardly in the downwardly rocking direction of the movement of the rocker shaft and the ball rolls in the tube to the depressed end portion of the latter and functions as a weight to hold the contacted members on that side of the relay in contacted position until a reversal of the phase in the relay. On such reversal, the rocker shaft is rocked in a counter direction, the tube being correspondingly tilted and the ball rolling to the other end of the tube beyond the axis of the rocker shaft and holding the contacted members on that side in contacting position until a reversal of the phase. The phase reversals act through the field magnets of said armatures to effect a rocking in reverse directions of the armatures and the consequent rocking of the rocker shaft and movement of the weight carrying tube fixed to the armatures.

In relays such as described, in said patents, and in relays purporting to be manufactured under said patents, the rocker shaft is provided with a coil spring one end of which is connected to the rocker shaft and the other end of which is connected to a stationary frame part. In the present improved relay, neither the spring or any equivalent thereof is used and by the omission of such a mechanical restraint on the rocking movement

of the rocker shaft, such shaft is freely and unrestrainedly rockable either clockwise or counter-clockwise, as may be required.

Relays embodying this invention are useful for positively holding the electric contacts engaged in electrically functioning positions for such lengths of time as may be desired and for positively holding the engageable, electric contacts out of electric connection, as a consequence of phase reversal, for such lengths of time as may be desired.

The relay frame is partially indicated by A. Said U-shaped switch, the electrode 2 and the stop 3 are preferably carried in a container 8' which forms a part of the relay casing, being carried by the casing member A. The container, when and if used, may be supplied with oil whereby the electrode and the stop may be submerged, when and if desired. When an end of the weight carrying tube is tilted downwardly, as shown in Fig. 2, to bring the switch arm 9 into contact with the stationary, relay conductor 2, as shown in Fig. 4, the weight 5 rolls to the down-tilted end portion of tube. Such down tilting movement of the tube is effected by a momentary phase on the vanes or armature plates 7 in one phase direction; but as such phase is merely momentary, the down-tilted end of the tube with its weight serves to hold the switch arm 9 in electric contact with the relay electrode 2 after the down-tilting phase energy has expired and during any length of time between the exertion of that phase and a reversal of the phase for breaking said

contact and for rocking the switch arm 9 away from the electrode 2 and moving the switch arm 10 against its stop 3. During such interval between exerted phases in the reverse directions, no polyphase current is supplied to or required in the relay through its intake electrodes F. Marked economy of expense for polyphase current results. During said interval, the current is through the in-feed lead or conductor 11 to the switch arm 9, through the latter to the relay electrode 2 and thence through the line or outgoing current conductor 17.

What I claim is:

A polyphase relay comprising a polyphase actuator, an unrestrainedly rockable shaft member controlled by said polyphase actuator, a circuit closer operated by said shaft member, said polyphase actuator including a pair of bridge members adjacent opposite ends thereof, a tubular member carried by said polyphase actuator, said tubular member being supported with respect to said polyphase actuator by means which close the ends of said tubular member, a rolling weight located within said tubular member and having a free path of gravitation toward either of said supporting means upon reversal of phase sequence with respect to said polyphase actuator for effecting an opening or closing of said circuit closer.

Signed at New York city in the county of New York and State of New York this 10th day of March A. D. 1924.

JOHN COLIN McDONALD.