Jan. 5, 1937. H. DÖHLE 2,066,614

RELAY CIRCUIT

Filed June 17, 1935

FIG. 1

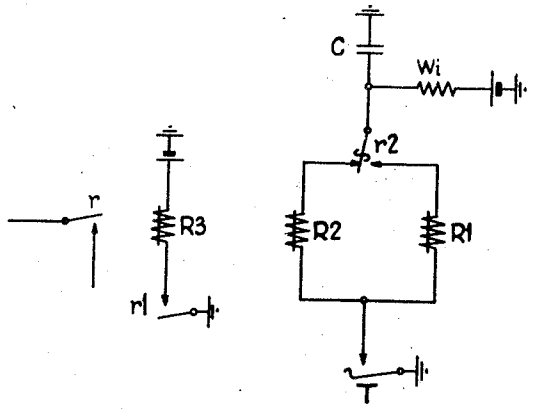
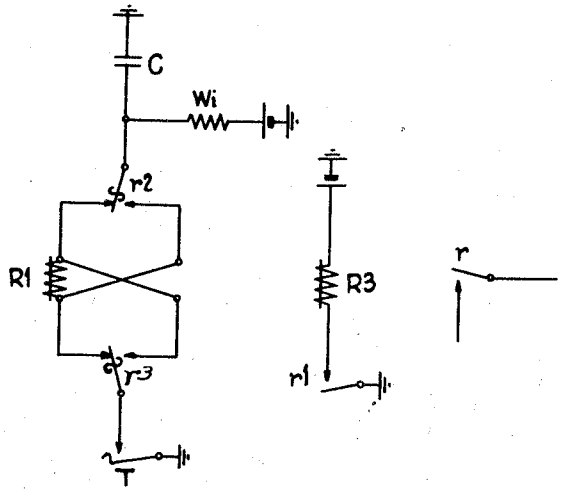


FIG. 2



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RELAY CIRCUIT

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14 Claims. (Cl. 179—16)

The present invention relates to a circuit arrangement in which a switching operation is both stored and released by the same characterizing operation.

For this purpose it was previously necessary to employ two relays, one of which stored the switching operation and prepared the circuit for a second which on the receipt of the release characteristic brought down the first relay and thus restored conditions to normal.

According to the invention it is possible to employ only a single relay in connection with a condenser of large capacity (about 4 m. f.).

The arrangement according to the invention will be described in more detail in connection with the two embodiments shown in Figs. 1 and 2.

The contact or key controlling the arrangement is designated T; the controlled contact for closing a required circuit is designated *r*. Upon the operation of the control contact T the condenser C, which has previously been charged over the high resistance W*i*, is discharged in the following circuit:

(1) Earth, C, *r*2, R2, T, earth.

The discharge current operates relay R and at its contact *r*1 it closes the following locking circuit for the relay R:

(2) Earth, battery, R3, *r*1, earth.

Contact *r* is also closed and the relay remains energized after the contact or key T is released. Condenser C is again charged through the high resistance W*i*.

The make-before-break contact *r*2 which is used to prevent the giving of a supplementary impulse, prepares the release circuit of the arrangement over winding R1 of the relay which is equal to winding R2 and in opposition to the windings R2 and R3. While T is still closed and in the event that its operation is longer than momentary, current flows through R1 and W*i* in series. But, R1 is not effectively energized at this time, because of the relatively high resistance of W*i*.

When contact T is opened, condenser C charges through resistance W*i*.

Contacts *r*2 are preferably make-before-break contacts to prevent charging of condensers C through W*i* while the lever contact is passing from one contact to the other.

When the control contact T is again operated to closed position, the condenser C discharges over winding R1 in the following circuit:

(3) Earth, C, *r*2, R1, T, earth.

Since the winding R1 opposes the operating winding R2 it also opposes the holding winding R3. The relay R is therefore demagnetized and releases. The contact *r*1, which connected up the holding winding R3, and also the contact *r* are opened.

In the arrangement according to Fig. 2, a single winding is employed for effecting both the energization of the release of relay R.

On the operation of the control contact T the condenser C discharges in the following circuit:

(4) Earth, C, *r*2, R1 *r*3, T, earth.

Contact *r*1 connects up the holding winding R3 and the controlled contact *r* is closed. In the operating circuit of relay R the make-before-break contacts *r*2 and *r*3 are operated. This changeover, is, however, only effective when the control contact T is again operated whereupon the following discharge circuit is completed for the condenser C:—

(5) Earth, C, *r*2; R1 (in the reverse direction to the first operation of contact T), *r*3, T, earth.

By the reversal of magnetization of relay R, the relay is released and the *r*-contacts return to their normal position.

Having described the invention, what is considered to be new and is desired to be protected by Letters Patent will be set forth in the following claims.

What is claimed is:

1. In a circuit arrangement, a controlled circuit, a circuit closer, a relay for closing and opening said control circuit responsive to successive operations of said circuit closer, a condenser discharged by the operation of said circuit closer to operate the relay for closing and opening the controlled circuit, said condenser being charged whenever said circuit closer is not operated.

2. In a circuit arrangement, a controlled circuit, an operating circuit, a circuit closer in said operating circuit, a normally charged condenser in said operating circuit discharged at each operation of said circuit closer, and means interposed between said condenser and said circuit closer in said operating circuit for operating and releasing said control circuit, said means operated and released by successive discharges of said condenser.

3. In a circuit arrangement, a controlled circuit, a circuit closer, a condenser and a resistance connected together so that said condenser is normally maintained charged, a relay for operating said controlled circuit connected between said condenser and said circuit closer, the operation of said circuit closer in one instance discharging said condenser through said relay to operate the same and close said controlled circuit, and in another instance discharging said condenser through said relay to restore the same and open the controlled circuit.

4. In a circuit arrangement, a controlled circuit, a circuit closer, a condenser normally in a

charged condition, a relay for opening and closing said controlled circuit having a winding connected to said condenser and said circuit closer, said relay operated and released by successive discharges of said condenser responsive to successive operations of said circuit closer.

5. In a circuit arrangement, a controlled circuit, a circuit closer, a resistance and a condenser connected together so that the condenser is normally maintained in a charged condition, a relay for opening and closing said controlled circuit, the winding of said relay connected to said condenser and said circuit closer, said relay operated by the discharge of said condenser responsive to one operation of said circuit closer, and means controlled by the operation of said relay for restoring said relay by the discharge of said condenser responsive to another operation of said circuit closer.

6. In a circuit arrangement, a controlled circuit, a circuit closer, a condenser, a resistance connected to said condenser to maintain it in a normally charged state, a relay for opening and closing said controlled circuit, said relay connected to said condenser and said circuit closer, said relay operated through the discharge of said condenser responsive to the operation of said circuit closer, and means controlled by the operation of said relay for altering the connections of said condenser and circuit closer with said relay so that on the next operation of said circuit closer said condenser discharges through said relay to restore the same.

7. In a circuit arrangement for closing and opening a control circuit, a condenser and a resistance, said condenser maintained normally charged through said resistance, a circuit closer, a relay having a winding connected to said circuit closer and to said condenser, means for discharging said condenser through said relay winding in one direction responsive to an operation of said circuit closer to operate the relay, and means operated by the relay for altering the connections of said relay winding with said condenser and said circuit closer so that responsive to another operator of said circuit closer said condenser is discharged through said relay winding in a different direction to restore the relay.

8. In a circuit arrangement as claimed in claim 7 in which the condenser is charged up between the operations of said circuit closer.

9. In a circuit arrangement as claimed in claim 7 in which the relay is maintained operated after the first operation of the circuit closer and until the next operation of the same, said condenser being charged up during the interval.

10. In a circuit arrangement for closing and opening a control circuit, a normally charged condenser, a circuit closer, a relay having two windings connected to said condenser and said circuit closer, means responsive to an operation of said circuit closer for discharging said condenser through one of said relay windings to energize the same and operate the relay to close the control circuit, and means operated by said relay for discharging said condenser through the other of said relay windings responsive to another operation of said circuit closer to restore the relay.

11. In a circuit arrangement as claimed in claim 10 in which the relay is provided with a third locking winding for holding it operated between the operations of the circuit closer.

12. In a circuit arrangement for closing and opening a control circuit, a condenser connected to a resistance and normally maintained charged thereover, a circuit closer, a relay having a pair of windings differentially arranged, means responsive to an operation of said circuit closer for discharging said condenser in a direction through one of said relay windings to operate the relay and close the control circuit, means responsive to a second operation of said circuit closer for discharging said condenser through said other relay winding in a direction opposite to said first winding to restore said relay, and a third winding on said relay for locking said relay in operated position after the first operation of said circuit closer and until the next operation of the same.

13. In a circuit arrangement for closing and opening a control circuit, a condenser, a high resistance connected to said resistance through which said condenser is normally maintained in a charged state, a circuit closer, a relay for controlling the control circuit having a pair of differentially arranged windings thereon connected to said circuit closer and to said condenser and resistance, means responsive to a momentary operation of said circuit closer for discharging said condensers through one of said windings to operate the relay and close the control circuit, a locking winding on said relay for maintaining it operated after said circuit closer is released, said high resistance thereafter again charging up said condenser, means operated by said relay for disconnecting the first winding from connection with said condenser and connecting said second winding therewith, the operation of said circuit closer thereby discharging said condenser through said second winding in a reverse direction from said first winding and said locking winding to restore said relay to normal and open said control circuit.

14. In a circuit arrangement as claimed in claim 13 in which in the event the circuit closer is held operated longer than momentary the high resistance renders said secondary winding ineffective to restore said relay and charges said condenser again after said circuit closer is released.

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