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SWITCHING ARRANGEMENT

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Fig. 1

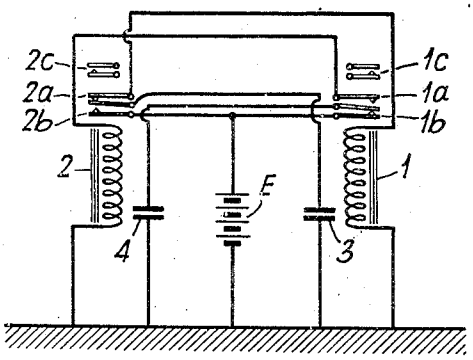
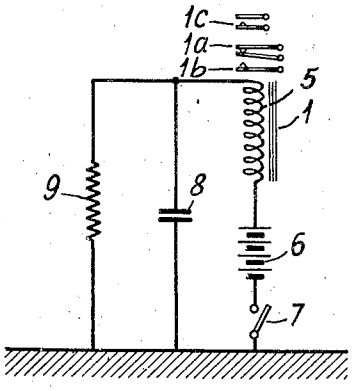



Fig. 2




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## SWITCHING ARRANGEMENT

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3 Claims. (Cl. 175—373)

This invention relates to a novel switching system particularly useful for generating impulses of predetermined frequency and length.

In a great many practical fields of the electrical arts, and more particularly in signalling work, it is often necessary to put upon a certain line impulses of predetermined length in uniform or in variable intervals of time. As a general rule, impulses of this kind are handled with rotating distributors or switches. However, these involve serious drawbacks. They require constant attendance and maintenance; they are subject to wear so that it is desirable to work with stationary equipment. Double-throw switches of the type here dealt with may be used, for instance, in the telephone arts in order to control call or ring signals, or in light advertising to produce the required switch motions. Moreover, circuit schemes of this kind may be employed in alarm systems, say, air raid alarms in which impulses of varying pitch to produce a howling noise are generated. If in such instances a tone-frequency generator is used for the production of the alarm signals, then double or multi-throw switches may be employed to govern and actuate the frequency-governing elements of the generator corresponding to the various frequencies.

Now, such a switching arrangement according to the present invention comprises two relays in such a way that to each of these relays is co-ordinated a condenser, the control of charge and discharge of the condenser being effected by causing the discharge current of one of the relays to flow through the double-throw contact of the other relay.

Now, the operation of the arrangement shall be explained in more detail by reference to the appended drawing in which Fig. 1 shows the fundamental circuit organization and Figure 2 illustrates an additional circuit usable with the circuit of Figure 1 for starting purposes. Co-ordinated to relay 1 of Figure 1 is the condenser 3, the corresponding make and break contacts being indicated at 1*a* and 1*b*. The working contact is indicated at 1*c*. Similarly, the condenser 4 is co-ordinated to the relay 2, whose make and break contacts are denoted by 2*a* and 2*b* and the working contact by 2*c*. The source supplying the charge current for the condensers is designated by E. The relays 1 and 2 provided each with a resting contact 1*a* and 2*a*, respectively, are so connected that in the inoperative positions, in parallel relation to the winding of the relay 1, by way of resting contact 2*a* of relay 2, is connected a condenser 3, while in parallel to the winding of the relay 2 through a similar contact 1*a* is connected the condenser 4. Suppose, then, that the condenser 3 of relay 1 has been charged and that it becomes discharged through contact 2*a* of relay 2 by way of the winding of relay 1. By this discharge current of the condenser 3 the winding of relay 1 is energized, with the result that the contacts of this relay are actuated, that is to say, the resting or back contact 1*a* is pulled off and the front contact 1*b* and working contact 1*c* are closed. As a result, the condenser 4 of the relay 2 is separated from the relay winding 2 (the contact 1*a* is opened) and connected by way of contact 1*b* to the direct current source of supply E. The working contact 1*c* closes the circuit to be subjected to control action, say, a ringing signal circuit. Hence, the condenser 4 becomes charged at this instant. As soon as the condenser 3 has become discharged through the relay 1, the magnetic field therein collapses. As a consequence, the relay contacts 1*b* and 1*c* are allowed to be released, and the resting contact 1*a* is closed again. The condenser 4 of the relay 2 then discharges by way of the resting contact 1*a* of relay 1 and as a result the winding of relay 2 is traversed by the discharge current resulting in closure of contacts 2*b* and 2*c*, while idle contact 2*a* is opened. As a result, condenser 3 is impressed with charge potential E so that it is enabled to become recharged. After condenser 4 of the relay has been discharged, the switching cycle is repeated. The desired change-over time may be secured by choosing suitable dimensions for the condensers and for the relay winding. Change-over times of two seconds or over are readily obtainable. The condensers then used are of an order of magnitude of around 1000 uF. Capacities of this order may be obtained by the use of electrolytic condensers.

Now, certain difficulties are encountered to start a circuit arrangement as shown in Fig. 1 to operate inasmuch as in the inoperative state contacts 1*a* and 2*a* are closed which means that both condensers 3 and 4 are discharged. In order that this relay combination may be started to operate upon switching in the potential, the core of the relay is provided additionally with a switching-in coil or starting coil which is connected in a manner as shown in Fig. 2. Relay coil 5 has one end connected with a source of potential 6 which may be turned on by switch 7. The other end of the said coil 5 is grounded both by way of a condenser 8 as well as by a resistance 9. Coil 5 acts upon the same bank of contacts

1a, 1b, 1c as coil 1 in Fig. 1. If, then, the circuit is closed by the agency of switch 7 and the relay is energized, the charge current of condenser 8 flows by way of relay winding 5. Inasmuch as the charge current of the condenser decays exponentially, the relay is transiently caused to attract and is thereby enabled to initiate a switching cycle. In parallel relation to the condenser 8 is connected a comparatively high resistance 9 which consumes only a small idle current. If battery 6 is disconnected, the condenser discharges across resistance 9. In other words, when the battery is re-connected it may become charged again with resumption of the switching cycle. In actual operation, the condenser practically takes no energy at all for it will be seen that only the current required to cover dielectric dissipation need be supplied.

The additional relay arangement for connection or starting of the relay combination shown in Fig. 1 will be found useful not only with an arrangement as here shown, but wherever the problem is to initiate a definite switching cycle which is unable to start spontaneously by a mere connection of the potential.

What is claimed is:

1. A timing circuit including a pair of relays each having an actuating winding and front and back contacts, a condenser associated with each of said relay windings, means for charging each condenser from a source of current through the front contacts of the other relay and means for discharging each condenser through its associated relay winding through the back contacts of the other relay, each of said relays having an ancillary set of contacts adapted to be connected into controlled circuits.

2. Arrangement adapted to initiate switching cycle in a circuit organization as claimed in claim 1, characterized in that one of the relays is furnished with an additional winding acting upon the same contact assembly as the main winding, one end of said winding being connected with a source of current, while the other end thereof is connected to a condenser, means for completing said circuit so that the charge current of the condenser traverses said additional relay winding thereby momentarily actuating the contacts of said relay.

3. An arrangement adapted to initiate switching cycle in a circuit organization, as claimed in claim 1, characterized in that one of said relays is furnished with an additional winding acting upon the same contact assembly as the main winding, one end of said additional winding being connected with a source of current while the other end thereof is connected to a condenser, means for connecting said condenser to said source of current so that the charged current of the condenser traverses said additional relay winding thereby momentarily actuating the contacts of said relay and a discharge resistance connected in parallel with said last mentioned condenser.

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