

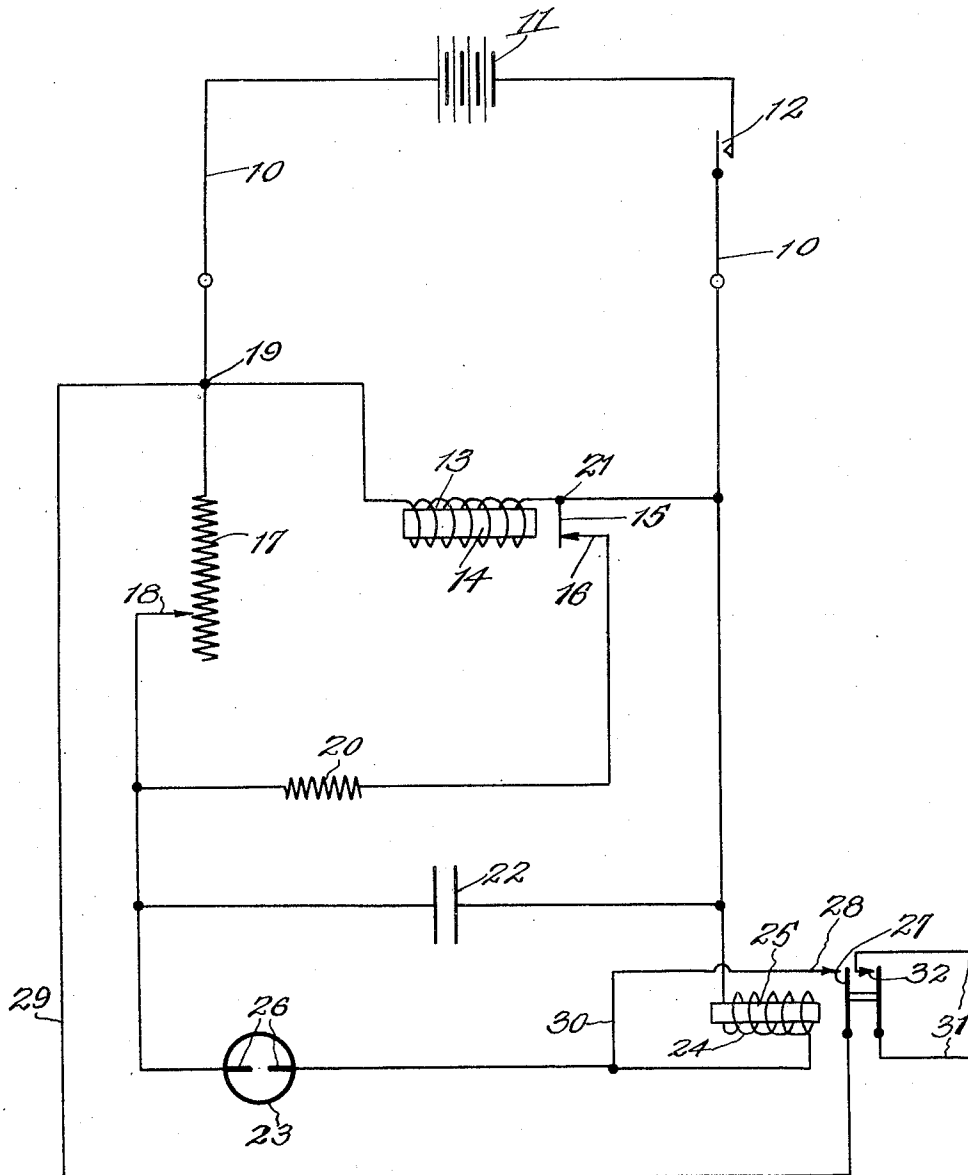
May 16, 1933.

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1,909,471

ELECTRICAL TIMING APPARATUS

Filed Sept. 22, 1928



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ELECTRICAL TIMING APPARATUS

Application filed September 22, 1928. Serial No. 307,734.

This invention relates to an electrical timing method and apparatus, and, more particularly, to a method of and means for producing movement at a definite interval after the completion of an electric circuit.

It is a general object of the present invention to provide a novel method of and means for producing a predetermined time delay by static electric means.

One of the features of the invention comprises effecting a definite time delay by the rate of charging of a condenser from a predetermined electromotive force.

Another feature of the invention comprises effecting the operation of a translating device by the discharge of a condenser at a predetermined time after the initiation of a charging circuit for the condenser.

A further feature of the invention comprises the method of determining a time interval by charging a condenser through a resistance and causing a discharge of the condenser when its voltage reaches a predetermined threshold value, said discharge effecting the operation of a translating device at an interval after the closing of the condenser charging circuit determined by the value of the said resistance.

An important object of the invention consists in the provision of the necessary apparatus and circuits for carrying out the aforementioned methods.

Other and further features and objects of the invention will be more apparent to those skilled in this particular art upon a consideration of the accompanying drawing and following specification wherein is disclosed a single exemplary embodiment of the invention; it being understood, however, that such changes may be made therein as fall within the scope of the appended claims without departing from the spirit of the invention.

The single figure of the drawing is a schematic and diagrammatic representation

of the apparatus and circuits for carrying out the invention.

In a large number of arts it is often necessary and highly desirable to be able to effect the operation of a translating device or the closing of a particular electrical circuit at a definite time interval after a certain happening. It is desirable that this time interval be always the same under any predetermined set of conditions and that it be adjustable within reasonable limits in a simple manner. The present invention provides a simple method of and apparatus for producing this result and is illustrated simply as means for closing one circuit at a desired interval after the closing of another circuit. Obviously, the first mentioned of these circuits may operate any desired apparatus and the second mentioned may be closed in any desired manner.

Referring to the drawing, there is shown at 10 a circuit including a source of electric power 11 of constant E. M. F. and a switch 12 for closing this circuit. Included in this circuit is the winding 13 of a relay 14. The relay has an armature 15 normally closed against a stationary contact 16 when no current is flowing in the winding 13. When the switch 12 is closed, the circuit including the relay 14 is completed and the winding 13 of the relay is energized so that the armature 15 separates from the stationary contact 16.

A resistance 17 variable by means of a suitable adjustable contact 18 has one end connected at 19 to the circuit 10 between the source of power 11 and the relay winding 13. The other end of the resistance 17 is connected by means of a resistance 20 to the stationary contact 16. The armature 15 of the relay 14 is connected to the circuit 10 at 21 between the other end of the winding 13 and the opposite side of the source of electrical energy 11 so that the resistances 17 and 20 shunt the relay winding when no current is

flowing in the coil 13. A condenser 22 is connected between the end of the resistance 17 which is connected to the resistance 20 and that side of the circuit 10 connected to the armature 15. The condenser is thus in shunt with the resistance 20 through the contacts of the relay 14.

When the switch 12 is closed, the coil 13 is energized, the contacts 15 and 16 are separated, and current from the source 11 is applied to the condenser 22 through the resistance 17. The voltage across the condenser begins to build up from zero and approach that of the source 11, which is assumed to be constant, at a definite rate determined by the voltage of the source 11, the capacity of the condenser 22 and the resistance of 17.

The condenser is shunted, by a glow tube 23, through the winding 24 of a relay 25. This tube is of well known construction and comprises a sealed bulb containing a suitable gas into which the electrodes 26 extend. It has such a characteristic that it is normally non-conducting, but, when the voltage across its terminals reaches a certain critical or threshold value, the gas ionizes and becomes a good electrical conductor and will not become non-conducting again until this voltage has dropped considerably below the critical ionizing voltage. The voltage of the source 11 is greater than the critical voltage of the tube 23. When the voltage across the condenser has built up to the critical voltage of the tube, the tube suddenly becomes conducting, causing a current to flow momentarily from the condenser through the tube and the winding 24, causing the relay 25 to draw its armature 27 against a stationary contact 28. This would effect only a momentary closure of the relay were it not for the locking circuit 29—30, which, upon the closure of the contacts 27 and 28, places the winding 24 of the relay directly across the source of current 11, excluding the resistance 17 and locking the relay shut.

The time interval between the closing of the switch 12 and of the relay contacts 27—28 is that desired for the operation of any suitable mechanism which may be controlled by the circuit 31. Associated with circuit 31 is a switch device 32, which is adapted to be moved by the armature 27. If desired, this circuit 31, or at least the apparatus operated thereby, may be arranged in series in the locking circuit 29—30 and thus operated by the source of current 11.

To reset the apparatus the circuit closer 12 is opened, which de-energizes the coil 24 of the relay 25 and allows the armature 27 to drop away from the contact 28. At the same time the winding 13 of the relay 14 is de-energized and the contacts 15—16 place

the resistance 20 in shunt to the condenser 22 to completely discharge the same, thus placing the apparatus in condition for a second operation identical with the first. The complete draining of the condenser after each operation is to allow it to start from zero potential so that the time intervals of succeeding operations will be identical. The rate of charge of the condenser under a given set of conditions can be varied by changing the resistance 17.

It should be noted that, if the circuit maker 12 is opened after its initial closure before the expiration of the time interval effected by the apparatus, the full interval, and not only the remaining time, will be measured by the apparatus upon the next closure of the circuit maker 12.

I claim:

1. Apparatus of the type described including, in combination, a source of constant E. M. F., a condenser in series therewith, means to close the circuit through said source and condenser, a glow tube shunting said condenser and having a threshold conducting E. M. F., a relay winding in series with said tube, said relay being operable by current from said condenser, a second relay having a winding energized from said source of E. M. F. when said circuit is closed, a second resistance and means to connect said second resistance in shunt to said condenser through the contacts of the second relay to discharge the condenser when the second relay is de-energized.

2. Apparatus of the type described including, in combination, a source of constant E. M. F., a condenser in series therewith, means to close the circuit through said source and condenser, a glow tube shunting said condenser and having a threshold conducting E. M. F., a relay winding in series with said tube, said relay being operable by current from said condenser, a second resistance and means to shunt said second resistance around said condenser to completely discharge the same when said circuit is opened.

3. Apparatus for producing time delayed operations of mechanisms, comprising in combination, a condenser, a glow tube shunting said condenser and having a threshold voltage factor below which it is non-conducting, said tube when conducting discharging said condenser, a source of constant E. M. F. adapted to be connected to said condenser to initiate an interval of time, means operated by the condenser discharge when the condenser voltage reaches the threshold value of the tube and final means for discharging the condenser whenever the source of E. M. F. is removed, said discharging being independent of the time required for the condenser voltage to reach the threshold value.

4. A timer including a tube, a condenser
arranged in parallel therewith, a source of
current supply connected to said condenser
and tube and having a voltage in excess of
5 the operating voltage of the latter, control-
ling means responsive to the operation of
said tube, a resistance, and means acting up-
on interruption of said current supply to
said condenser and tube to connect the lat-
10 ter in series with said resistance whereby to
effect discharge of said condenser.

In testimony whereof I affix my signature.

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