

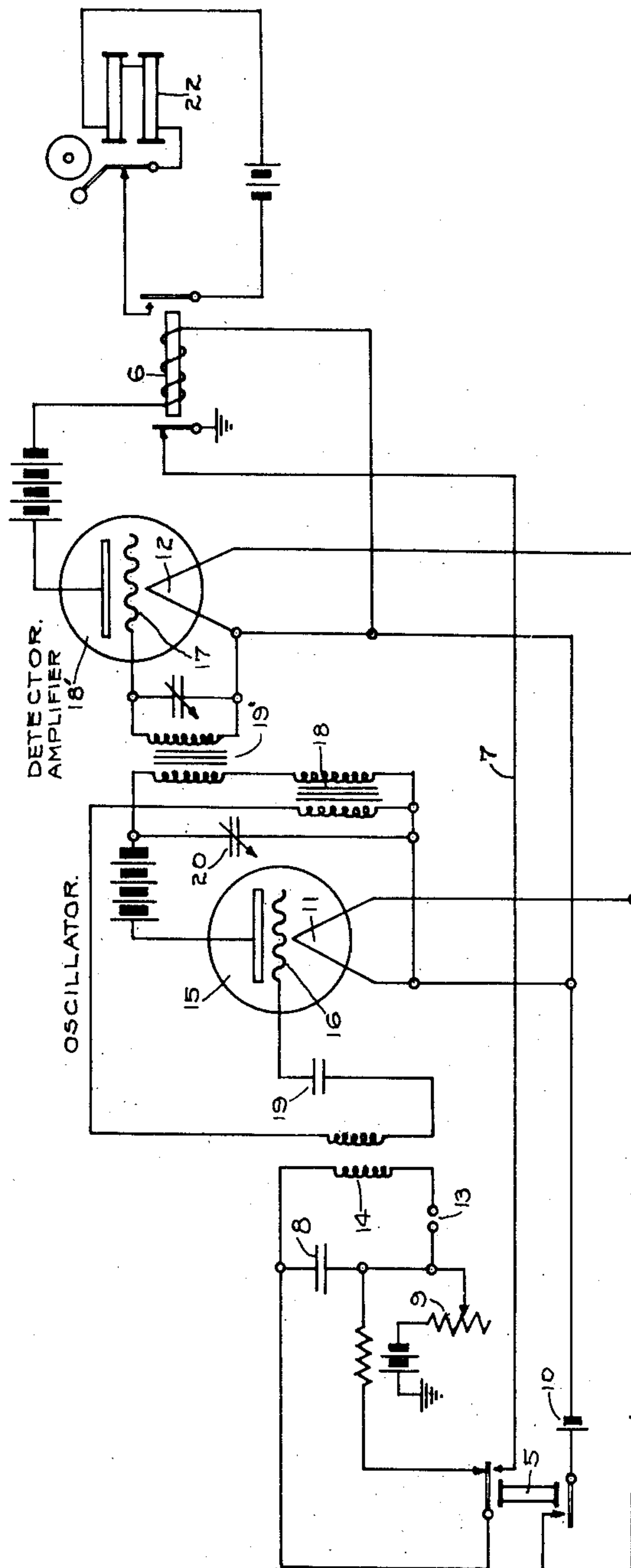
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TIME MEASURING DEVICE

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UNITED STATES PATENT OFFICE.

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TIME-MEASURING DEVICE.

Application filed April 17, 1922. Serial No. 554,005.

This invention relates to a time measuring device and more particularly to the use of such a device in a telephone system.

In telephone systems and particularly automatic telephone systems it becomes necessary to provide means for locating apparatus which has failed to function properly and to indicate the location of such apparatus by the actuating of a suitable alarm or indicating mechanism. Particularly in automatic telephone systems the apparatus such as switches are arranged to operate in a certain predetermined interval of time and in the event that they fail to complete their operation in that time interval this failure means that the apparatus is in an abnormal condition. Various forms of time measuring devices have been suggested such as the use of sluggish relays which may be slow in operating or slow in releasing, and it has also been suggested that a series of such relays be provided to measure a relatively long interval of time. These devices, however, have not been entirely satisfactory, due to the inertia of their mechanical parts and due to the difficulty in constructing relays that are properly sluggish in operation.

The main feature of the present invention is the provision of means including a device operating in a predetermined interval and cooperating with one or more thermionic devices for indicating time periods. Other features of the invention will appear from the detailed description and appended claims.

The drawing diagrammatically represents the operating circuits of an oscillating vacuum tube, a detector tube and a suitable alarm. It is assumed that the present invention is employed in an automatic telephone system in which, when a certain portion of this mechanism is in operation a relay such as 5 attracts its armatures. This relay may be assumed to be connected to the right hand armature of relay O in the disclosure of the patent to Sperry No. 1,406,236 granted February 14, 1922. As soon as relay 5 is operated a circuit is closed from ground, armature and back contact of relay 6, conductor 7, lower front contact and armature of relay 5, condenser 8, variable resistance 9 to grounded battery. With this circuit closed the condenser 8 will begin to charge, and since the variable resistance and

the capacity of the condenser are properly proportioned the condenser 8 will continue to charge for a predetermined interval which is longer than the period necessary for the proper operation of the switch mechanism, also when relay 5 is operated the filament battery 10 is connected to the filament 11 of an oscillating tube and to the filament 12 of a detector tube to cause these filaments to emit electrons.

If the switch fails to complete its operation in the predetermined time interval the relay 5 will hold its armatures attracted, thereby completing a charging circuit for the condenser 8 until it becomes fully charged, whereupon it discharges through the spark gap 13. This discharge causes a wave train of high frequency oscillations in the primary winding 14 of the transformer, which causes the oscillator tube 15 to oscillate by varying the potential on the grid 16 and this in turn varies the flow of plate current in the out-put circuit. The variation in plate current induces a voltage across the secondary of coil 18 which is impressed on the grid 16 through condenser 19. The oscillator tube thus continues to oscillate as long as the relay 5 is operated and its frequency depends on the value of the inductances 18 and 14 and the variable condenser 20.

The output circuit of the oscillator is coupled by means of the iron core transformer 19' to the in-put circuit of the detector tube 18', so that an alternating voltage is impressed on the grid 17 of the detector tube 18'. By operating the detector tube on the lower bend of its characteristic curve only the positive complement of this grid voltage is effective to amplify the plate current in this detector tube to cause an amplified uni-directional current to flow through the winding of the relay 6. Relay 6 is thus operated and as long as it remains energized it closes an alarm circuit which is here represented as that of a vibrating bell 22.

What is claimed is:—

1. In a timing device, means for marking the beginning of a time interval, mechanism to be operated at the close of said time interval, a time measuring structure including a condenser and a spark gap, means controlled by said first means for slowly charging said condenser and for discharg-

ing it across said spark gap, and means controlled by said condenser discharge for operating said mechanism.

2. In a timing device, means for marking
5 the beginning of a time interval, mechanism
to be operated at the close of said time interval, a condenser and a spark gap, means controlled by said first means for slowly charging
10 said condenser and for discharging it
across said spark gap, and means including
an oscillator and detector controlled by said
condenser discharge for operating said
mechanism.

3. In a timing device, means for marking
15 the beginning of a time interval, mechanism
to be operated at the closing of said interval, a condenser and a spark gap, means controlled by said first means for slowly
charging said condenser and for discharging
20 it across said spark gap, and means including
a vacuum tube oscillator and a vacuum
tube detector controlled by said condenser
discharge for operating said mechanism.

4. In a timing device, means for marking
25 the beginning of a time interval, mechanism

to be operated at the close of said time interval, a condenser and a spark gap, means controlled by said first means for slowly charging said condenser and for discharging
30 it across said spark gap, means including a
vacuum tube oscillator and vacuum tube detector controlled by said condenser discharge
for operating said mechanism, and means
controlled by said first means for energizing
said oscillator and said detector.

5. In a timing device, means for marking
35 the beginning of a time interval, mechanism
to be operated at the close of said interval, a condenser and a spark gap, a circuit controlled by said first means over which said
40 condenser is slowly charged, conductors for
discharging said condenser across said spark
gap, means controlled by said condenser discharge
for operating said mechanism, and
45 means controlled by said mechanism for disabling said circuit.

In witness whereof, I hereunto subscribe
my name this 12th day of April A. D. 1922.

WINFRED T. POWELL.