T. W. GARDNER.

TIME SIGNAL FOR TELEPHONE MESSAGES.

APPLICATION FILED NOV. 15, 1909.

997,250. Patented July 4, 1911.

Fig. 1.

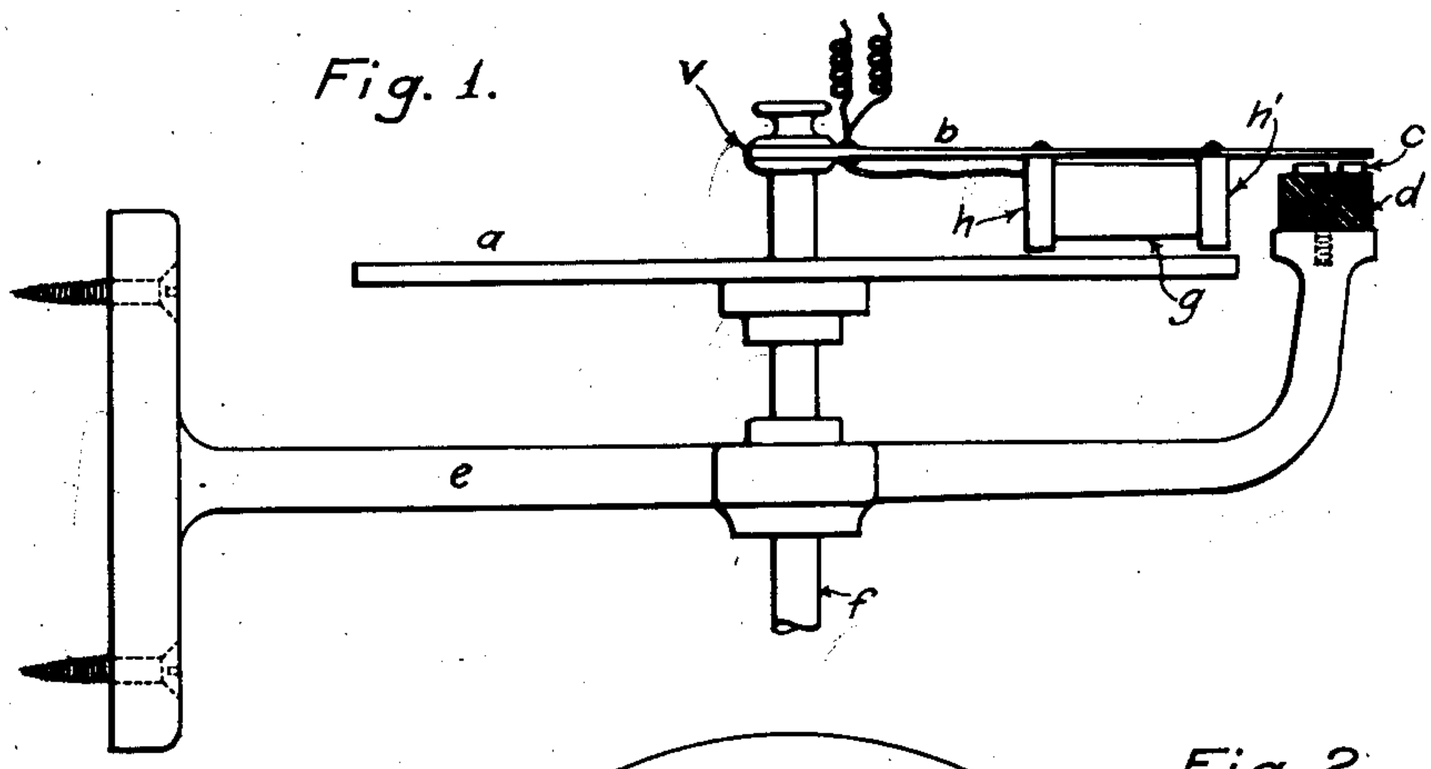


Fig. 2.

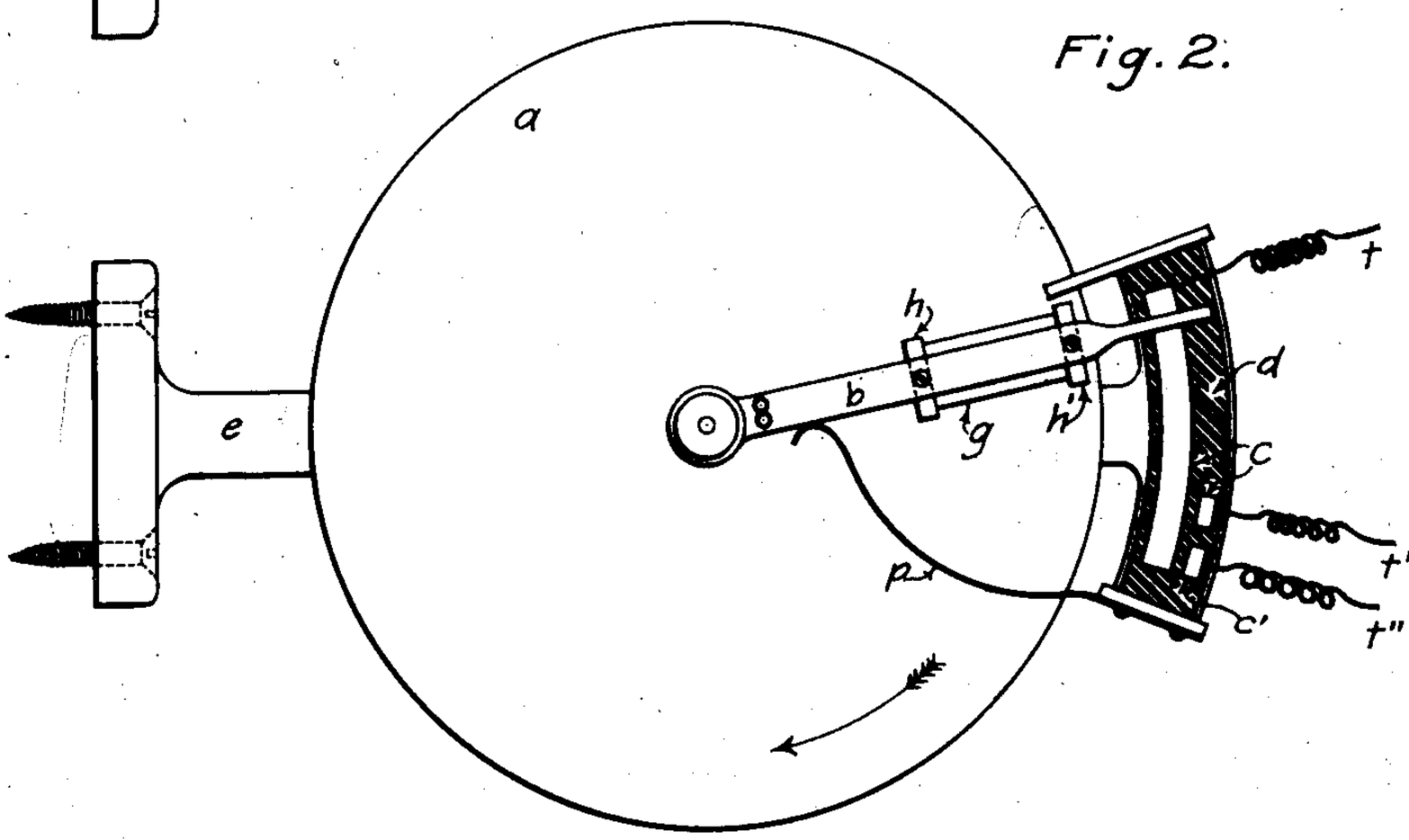
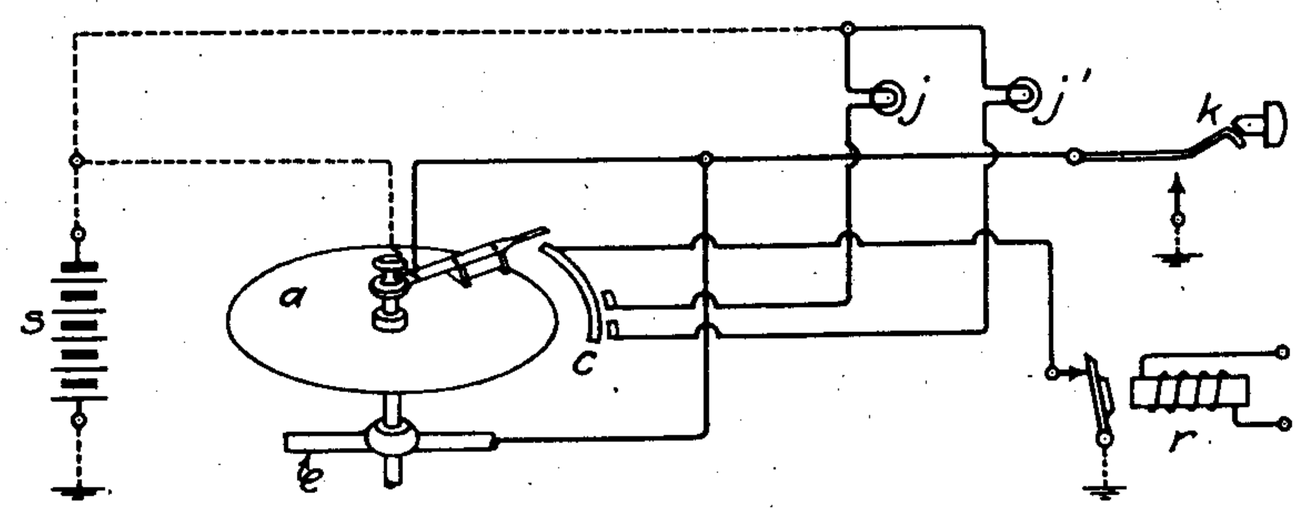


Fig. 3.



Witnesses.

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UNITED STATES PATENT OFFICE.

THOMAS W. GARDNER, OF NASHVILLE, TENNESSEE, ASSIGNOR OF ONE-HALF TO CHARLES L. MEYERS, OF NASHVILLE, TENNESSEE.

TIME-SIGNAL FOR TELEPHONE-MESSAGES.

997,250. Specification of Letters Patent. Patented July 4, 1911.

Application filed November 15, 1909. Serial No. 528,227.

To all whom it may concern:

Be it known that I, THOMAS WEST GARDNER, a citizen of the United States, and a resident of Nashville, in the county of Davidson and State of Tennessee, have invented certain new and useful Improvements in Time-Measuring Devices for Telephones and the Like, of which the following is a specification.

My invention relates to an improved time-measuring device whereby certain predetermined intervals of time may be indicated, and is especially applicable to telephone switchboards where a certain charge is made for the use of the telephone lines according to the length of time it is in use.

The object of my invention is to provide a device which will measure off certain predetermined intervals of time and give a signal, visual or audible, or both, to the switchboard attendant at the close of such interval of time. I attain these objects by the arrangement of apparatus and connecting wires illustrated in the accompanying drawing in which:

Figure 1 is a longitudinal elevation. Fig. 2 is a view from above. Fig. 3 is a diagrammatic view showing the device with connecting wires and associate apparatus.

In the above mentioned drawing, "*a*" is a disk or smooth wheel of soft iron; "*e*" forms a bearing and support for shaft "*f*"; disk "*a*" is firmly attached to shaft "*f*"; shaft "*f*" may be driven at any desired speed by any suitable means such, for example, as by an ordinary clock movement (not shown), in the direction indicated by the arrow and makes one complete revolution in an hour; "*g*" is an electric magnet, of a type well known to the art, having a soft iron core, and block pole pieces *h* and *h'*; "*b*" is a supporting arm for magnet "*g*", made of brass or any suitable non-magnetic metal and is mounted loosely on shaft "*f*", but with wide bearings at "*v*" so that magnet "*g*" will be normally held close to, but away from contact with the revolving disk "*a*". Arm "*b*" has sufficient flexibility, however, to allow magnet "*g*" to come in contact with disk "*a*" when magnet "*g*" is enegized by the passage of an electric current through its winding. A number of insulated contact pieces are provided at "*c*". These contacts are so placed that they are not normally in contact with arm "*b*" but come into contact when magnet "*g*" is energized and is drawn into contact with disk "*a*".

In the diagrammatic view Fig. 3, *j* and *j'* are lamps arranged as visual signals to the switchboard attendant; "*k*" is a key for starting the time period; "*s*" is a battery for lighting lamps *j* and *j'* and actuating the magnet "*g*". A spring "*p*" is provided to throw arm "*b*" back to normal position at the end of completed time period. A relay or switch "*r*" is provided; its purpose being to release arm "*b*" before the expiration of the period, if required.

The operation of the equipment is outlined in detail as follows: Switchboard attendant depressed key "*k*", thus closing battery circuit through magnet "*g*"; magnet "*g*" is attracted to revolving iron disk "*a*" and the extension of arm "*b*" bears on contact "*c*", which forms a by-pass for the current around key "*k*", thus keeping magnet "*g*" energized after pressure is removed from key "*k*"; magnet "*g*" is carried along with the motion of disk "*a*" thus sliding arm "*b*" over contact "*c*", which can be continuous or cut up in sections as desired. Our diagram shows that after passing a certain distance, arm "*b*" comes in contact with certain plates that causes lamps *j* and *j'* to light, each, by so doing indicating the termination of a time period. After arm "*b*" has been drawn past all contacts, the circuit through magnet "*g*" is thus automatically broken and spring "*p*" throws arm "*b*" back to normal position.

Although I have described the operation of my invention as a device for handling only one time-period at a time, it will in practice be desirable to have a separate disk for each pair of connecting cords on the switchboard or to employ a number of arms about one disk so that each connection operated through the switchboard will have its individual timing circuit. These modifications may be used within the scope of my invention. It may also be desirable to drive the disk "*a*" at a faster or slower rate of speed than one revolution per hour. This can be done within the scope of my invention:

I claim as my invention:

1. In a device of the character described, the combination with a rotating disk, of a fixed contact, an arm movably mounted above said disk, a contact carried by said

arm above and normally out of engagement with said fixed contact, and means for locking said movable arm to said disk, said means being adapted to draw the movable contact down onto the fixed contact.

2. In a device of the character described, the combination with a rotating magnetic disk, of an arm rotatively mounted about the axis of and independentlv of said disk, a fixed contact adjacent the periphery of said disk, a movable contact carried by said arm above and normallv out of engagement with said fixed contact, magnetic means mounted on said arm for locking the arm to said disk, said means being adapted to draw the movable contact into sliding engagement with the fixed contact, and means for returning said swinging arm to initial position from which it has been displaced.

3. In a device of the character described, the combination with a rotating disk, of a fixed contact adjacent the periphery of said disk, an arm mounted to swing relatively to and about the axis of said rotating disk, a contact carried by said arm above and normally out of engagement with said fixed contact, an electro-magnet carried by said arm and adapted when energized to draw the movable contact down onto said fixed contact and to lock said arm to said rotating disk, a signaling circuit provided with a fixed contact adapted to be slidably engaged by the movable contact during its movement with said disk, and means for breaking the circuit through said electro-magnet.

4. In a device of the character described, the combination with a rotating disk, of a fixed contact adjacent the periphery of said disk, an arm mounted to swing relatively to and about the axis of said rotating disk, a contact carried by said arm above and normally out of engagement with said fixed contact, an electro-magnet carried by said arm and adapted when energized to draw the movable contact down onto said fixed contact and to lock said arm to said rotating disk, a signaling circuit provided with a fixed contact adapted to be slidably engaged by the movable contact during its movement with said disk, means for breaking the circuit through said electro-magnet, and means for returning said arm to initial position when the arm is released from said disk.

5. In a device of the character described, the combination with a rotating disk, of a source of electrical energy, a signal circuit in electrical connection with said source and provided with a contact disposed adjacent said disk, an arm mounted to swing relatively to and about the axis of said disk, said arm being provided with a contact in electrical connection with said source of electrical energy, a normally grounded fixed contact, the relative positions of said fixed and grounded contacts being such as to adapt them to be electrically connected by said movable contact, and electro-magnetic means carried by said arm whereby it may be drawn down into locking engagement with said disk to partake of its movement, said movable contact being thereby adapted to close said signal circuit upon completion of a predetermined movement of said rotating disk.

6. In a device of the character described, the combination with a source of electrical energy, one pole of said source being grounded, of a rotating magnetic disk, a movable contact arm mounted to swing relatively to and about the axis of said disk, said contact arm being provided with a portion overhanging the periphery of said disk, a normally grounded fixed contact adjacent the periphery of said disk and normally out of engagement with the overhanging portion of said contact arm, a signaling circuit provided with a contact adjacent to said normally grounded contact, an electro-magnet mounted on said contact arm and adapted when energized to lock said contact arm to said disk and to provide electrical connection between said grounded and signaling contacts, and a normally open circuit whereby said magnet may be energized through said sources of electrical energy.

7. In a device of the character described, the combination with a source of electrical energy, one pole of said source being grounded, of a rotating magnetic disk, a movable contact arm mounted to swing relatively to and about the axis of said disk, said contact arm being provided with a portion overhanging the periphery of said disk, a normally grounded fixed contact adjacent the periphery of said disk and normally out of engagement with the overhanging portion of said contact arm, a signaling circuit provided with a contact adjacent to said normally grounded contact, an electro-magnet mounted on said contact arm and adapted when energized to lock said contact arm to said disk and to provide electrical connection between said grounded and signaling contacts, a normally open circuit whereby said magnet may be energized through said sources of electrical energy, and a circuit breaker interposed between said grounded contact and the ground.

8. In a device of the character described, the combination with a rotating magnetic disk, of a relatively extended fixed contact disposed along the periphery of said disk, said contact being normally grounded, a plurality of signaling circuits provided each with fixed contacts of relatively small extent arranged in series adjacent to said grounded contact, a contact arm mounted to swing relatively to and about the axis of said disk, said arm being provided with a portion overreaching said grounded contact and

fixed contacts on the signal circuits successively when moved by the rotating disk, a magnet mounted on said contact arm and adapted when energized to draw said arm down into locking engagement with said disk, the said overhanging portion of said arm being thereby displaced into a position in which it will slidably engage all of said fixed contacts in succession to energize said signal circuits, and means for energizing said magnet.

9. In a device of the character described, the combination with a rotating magnetic disk, of a relatively extended fixed contact disposed along the periphery of said disk, said contact being normally grounded, a plurality of signaling circuits provided each with fixed contacts of relatively small extent arranged in series adjacent to said grounded contact, a contact arm mounted to swing relatively to and about the axis of said disk, said arm being provided with a portion overreaching said grounded contact and fixed contacts on the signal circuits successively when moved by the rotating disk, a magnet mounted on said contact arm and adapted when energized to draw said arm down into locking engagement with said disk, the said overhanging portion of said arm being thereby displaced into a position in which it will slidably engage all of said fixed contacts in succession to energize said signal circuits, means for energizing said magnet, and means for electrically connecting said magnet with said source of electrical energy.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOS. W. GARDNER.

Witnesses:
ROY H. CUNNINGHAM,
J. U. LETTERER.