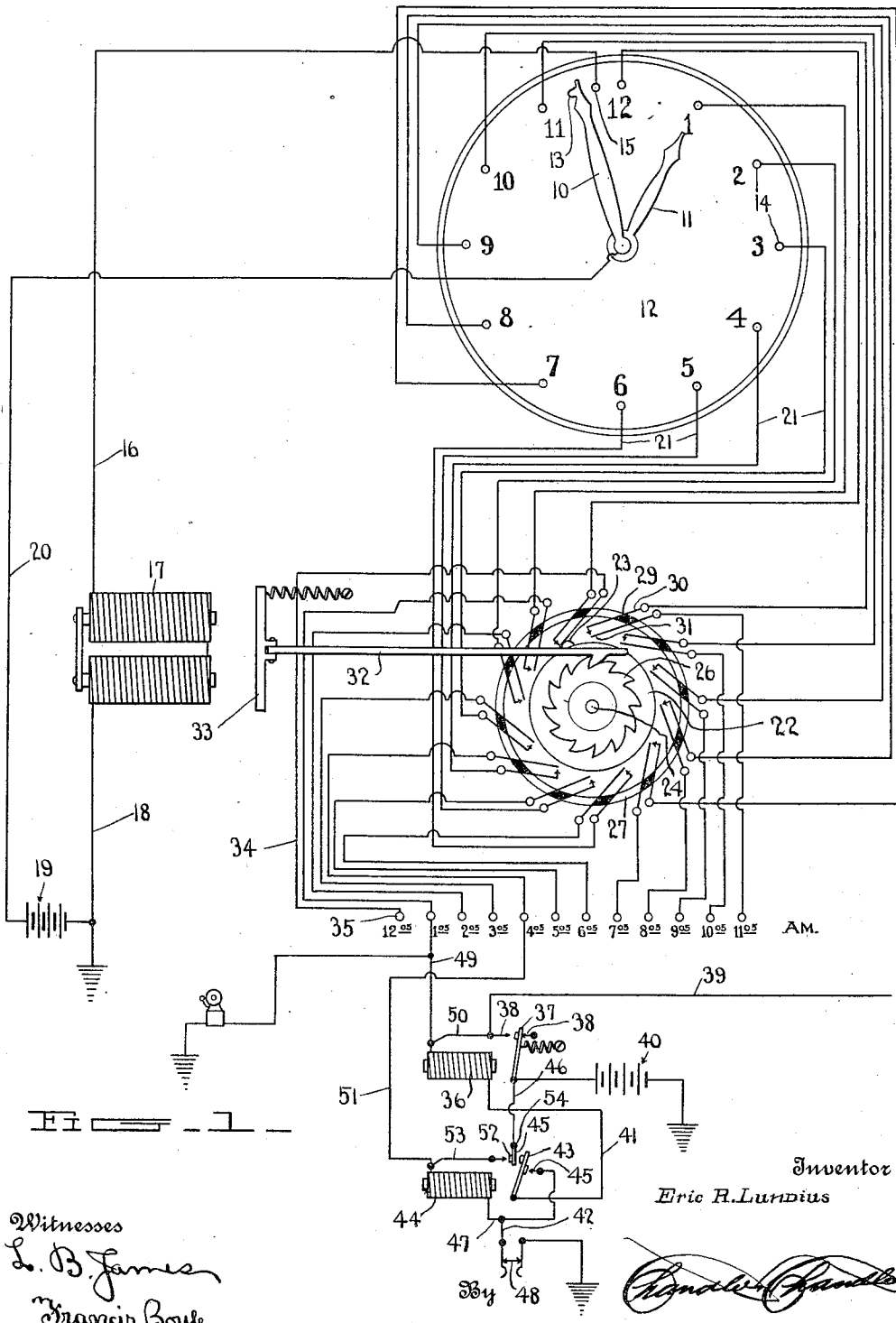


E. R. LUNDIUS.
ELECTRIC SIGNALING SYSTEM.
APPLICATION FILED MAR. 9, 1911.

1,064,976.

Patented June 17, 1913.

3 SHEETS—SHEET 1.



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3 SHEETS-SHEET 2.

Fig. 2 -

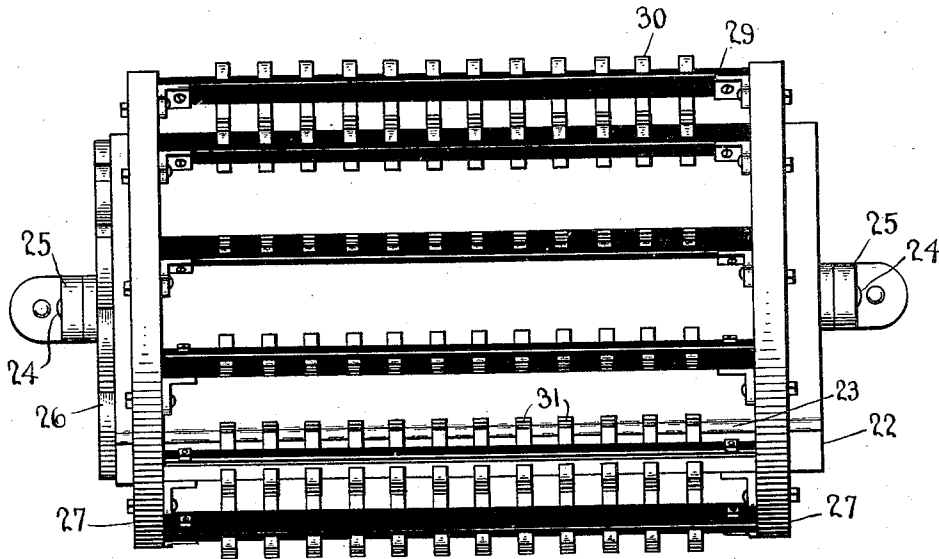
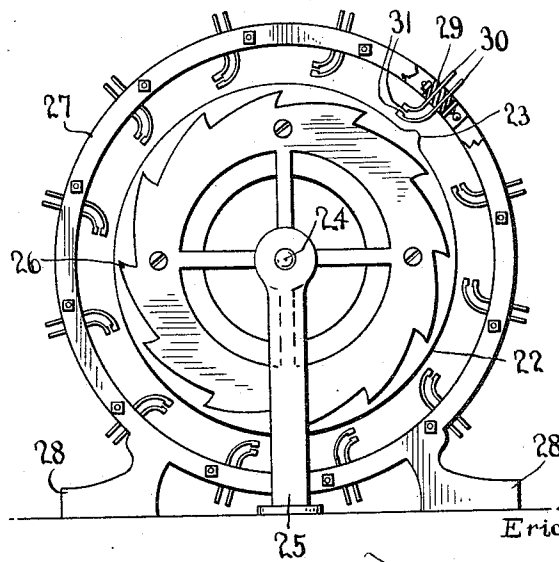


Fig. 3 -



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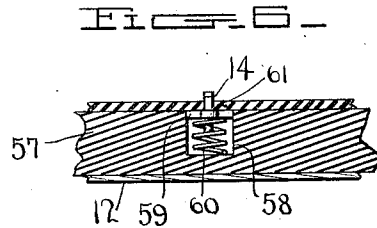
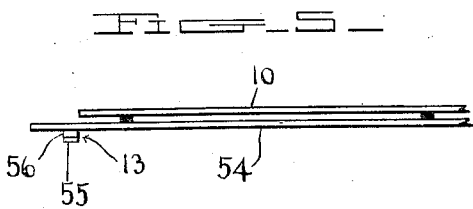
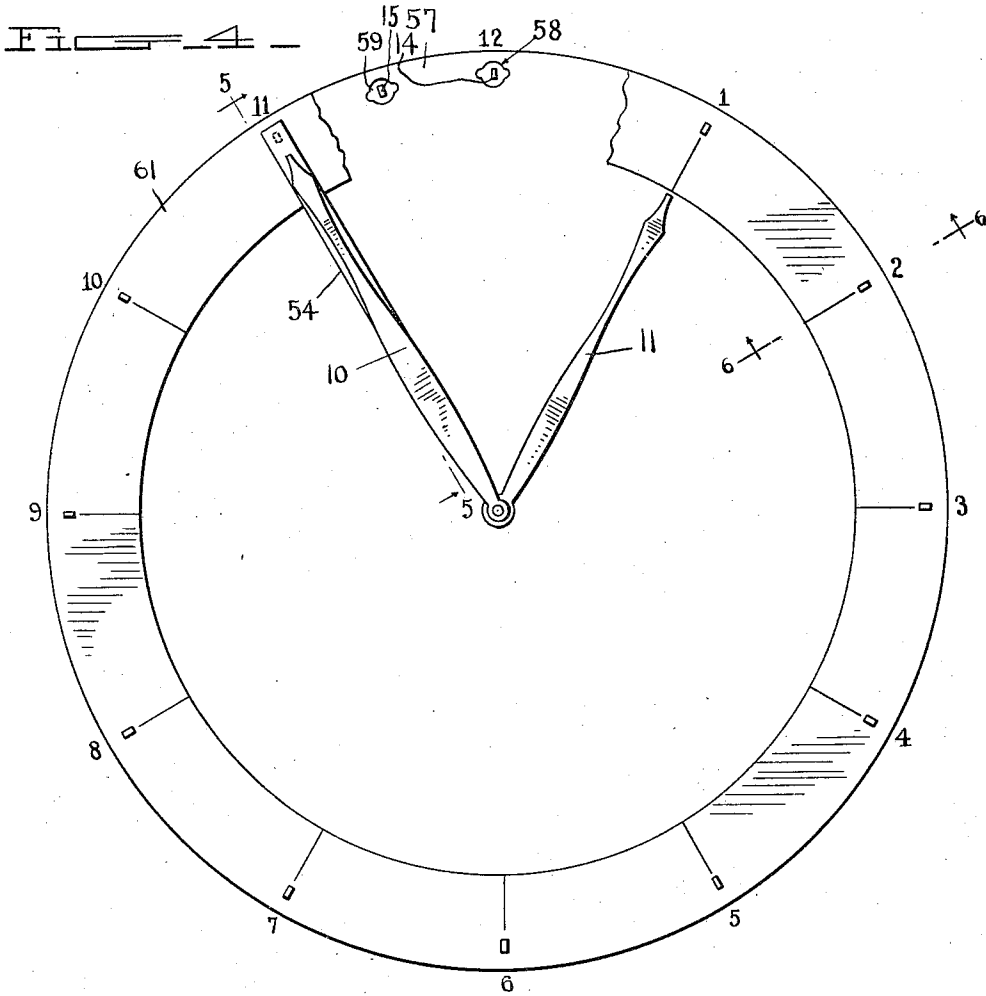
Attorneys

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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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ELECTRIC SIGNALING SYSTEM.

1,064,976.

Specification of Letters Patent.

Patented June 17, 1913.

Application filed March 9, 1911. Serial No. 613,299.

To all whom it may concern:

Be it known that I, ERIC R. LUNDIUS, a citizen of the United States, residing at Seattle, in the county of King, State of Washington, have invented certain new and useful Improvements in Electric Signaling Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to electric signal systems and has for an object to provide a time switch mechanism that will automatically actuate, maintain through a predetermined interval, and then automatically cut out a signal, such as an alarm, lamp, etc., means being provided for the repetition of the signal at regular intervals or cutting the signal out entirely after one operation.

A further object is to provide a device of this class that at one time, may be "set" to repeat a signal at irregular intervals.

A still further object of the invention is the provision of a novel rotary switch that will be uniformly and independently actuated by a clock controlled electro circuit.

A still further object of the invention is the provision of a novel clock dial and hands for controlling the rotary switch actuating current.

With the above objects in view the invention consists of the novel details of construction and combination of parts hereinafter fully described and claimed, it being understood that various modifications may be made in the minor details of construction within the scope of the appended claims.

In the accompanying drawing forming part of this specification: Figure 1 is a diagram illustrating a practical embodiment of my invention. Fig. 2 is a plan view of my rotary switch. Fig. 3 is an end elevation of the rotary switch. Fig. 4 is a face view of my improved clock dial with parts broken away. Fig. 5 is a longitudinal sectional view of the dial minute hand taken on the line 5-5 Fig. 4. Fig. 6 is a fragmentary cross sectional view of the dial taken on the line 6-6 Fig. 4.

In the embodiment of my invention here shown, I employ a clock in which the minute hand 10 and hour hand 11 move uniformly over the dial 12. The minute hand is terminally equipped with a platinum tipped shoe

13 which successively engages platinum tipped contact plugs 14 arranged in a circular series in the dial one at each five minute designation character as shown, an additional contact plug 15 being arranged between the designating numerals 11 and 12, and this contact plug is connected by a conductor 16 to one pole of an electromagnet 17, the opposite pole of this magnet being connected by a conductor 18 to a battery 19 or other electro generator, which latter is in turn connected to the pivot of the minute hand by a conductor 20. The contact plugs 14 are individually connected through the instrumentality of conductors 21 to related contacts on a rotary switch which will now be described.

The rotary switch comprises a drum 22 having a longitudinal rib 23 on its outer surface. An axle 24 is fixed in the bore of the drum and the opposite ends of this axle are journaled in pedestals 25. A ratchet 26 is fixed to one end of the drum and forms means for rotating the drum step by step as will presently appear. A pair of spaced rings 27 surround opposite ends of the drum, these rings being held stationary through the instrumentality of suitable legs 28 and being connected by bars 29 of insulating material spaced at regular intervals from each other, twelve bars here being shown but it is not intended to limit the bars to this number as any desired number of bars may be used in practice. Fixed in each bar is a series of twelve pairs of springs 30, having their drum confronting ends arcuate in contour, and the opposing faces of these arcuate ends tipped with platinum contacts 31. A dog 32 operatively engages the ratchet 26, this pawl being connected to a spring controlled armature 33 which confronts the poles of the electromagnet 17.

When the minute hand engages with the contact plug 15 above described, a circuit may be traced through the minute hand 10, conductor 16, electromagnet 17, battery 19, and conductor 20 back to the minute hand, and while this circuit is closed the electromagnet will be energized, and the armature attracted. This attraction of the armature through the instrumentality of the pawl 32 and the ratchet 26 will cause a "step" rotation of the drum. When the minute hand has passed beyond the contact 15, the circuit will be broken, the electromagnet deener-

gized, and the armature released, the controlling spring of the armature then operating to move the pawl again into operative position on the ratchet for rotating the drum another step upon the circuit above outlined again being closed. The gap over which the armature travels is proportional to the step which the drum must be actuated through in order to bring the rib 23 of the drum to a position of rest under each of the bars 29 of the drum in succession.

It will now be noted that by virtue of the contact 15 being arranged intermediate the designation numerals 11 and 12 on the dial, that the electromagnet will be energized once every hour so that the drum is advanced one step every hour and this advancement takes place at approximately the end of the hour. The twelve different bars 29 correspond to the twelve hour designation marks on the dial passed over during one complete revolution of the hour hand 11.

During rotation of the drum, the rib 25 when passing under any particular bar will simultaneously engage one spring of each pair of springs carried by that bar and move the spring into engagement with the mating spring of the pair so that the twelve pairs of springs on the bar are simultaneously closed together. The twelve different sets of springs on one bar correspond to the five minute designation marks passed over by the minute hand during one complete revolution.

Referring now to the diagram it will be seen that from each contact plug 14 on the dial a conductor 21 is led to a corresponding spring 30 of each pair of springs on the bars 26. Further that a conductor 34 connects the mating spring of each pair of springs to a corresponding terminal 35. When the rib of the drum contacts with a pair of springs on any particular bar, as shown in the diagram, the springs will "close" and form an electrical connection between the conductor 21 leading from the corresponding dial contact plug 14 to one of the springs of the pair, and the conductor 34 leading from the mating spring of the pair to the corresponding terminal 35.

The other 11 sets of springs on the same bar, but which are not shown in the diagram, will also "close." Thus there are twelve closed circuits at one time from a single contact plug 14 on the dial to twelve terminals similar to 35. The terminals shown in the diagram illustrate a single series of terminals on a switch board, the series being the terminals corresponding to the five minute designation character that is passed over twelve times during a complete revolution of the hour hand. It is to be understood that the next adjacent set of terminals on the switch board would be the terminals corresponding to the 10

minute designation character, and these terminals would be wired to their corresponding springs on the bars around the drum in the same manner as those illustrated.

Supposing it is desired to actuate an alarm such as a bell or the like at 1:05 o'clock. One terminal of the bell may be connected to the terminal designated by 1:05 on the switch board, and the other terminal of the bell grounded. When from the illustrated position of the clock hands, the minute hand 10 advances and makes contact with the contact stud 15, the battery circuit will be closed, the electromagnet energized, the armature attracted and the drum advanced one step as above described. After the minute hand 10 has passed beyond the contact 15, and has come into contact with the stud 14 at the designation character indicating five minutes after the hour of one on the dial, a circuit may be traced from the battery 19 through the conductor 20, minute hand 10, contact plug 14 at the designation character one, related conductor 21, related springs 30 and related conductor 34, to the terminal designated by 1:05 on the switch board, thence through the bell and into the ground, it being understood that the circuit is also grounded at the battery as illustrated. The bell is actuated during the flow of current through this circuit. It is evident that the bell will be actuated at the expiration of every twelve hours and thus the signal repeated at regular intervals. In order to repeat this signal at irregular intervals, say at 3:05, 4:05, and 8:05, it is simply necessary to provide a branched conductor for the bell, the branches of the conductor being inserted in the terminals 3:05, 4:05 and 8:05.

It will here be stated that the diagram shows terminals 35 corresponding to the twelve contact plugs 14 passed over during one complete revolution of the hour hand. The hour hand makes two revolutions in a day of 24 hours. We have illustrated simply the connections and the terminals corresponding to the a. m. hours. Should it be desired to provide terminals corresponding to the p. m. hours, it is obvious that this result may be accomplished by equipping the rotary switch with 24 sets of bars, rather than 12 sets, and equipping the ratchet gear 16 with 24 teeth. In this construction each a. m. and p. m. terminal would have a separate conductor leading to the related spring on the rotary switch as will be understood.

When it is desired to automatically actuate, maintain through a predetermined interval and then cut out a signal such as an alarm, lamp, etc., additional apparatus is required. In this connection I employ a relay 36 the armature 37 of which operates

between two contacts 38 which are connected with a conductor 39, which actuates lamps or other desired signals, and a battery or other source of electric energy 40. The relay 36 is grounded through the instrumentality of conductors 41 and 42, the armature 43 of a relay 44 being connected in series with the conductors 41 and 42. The armature 43 works between two contacts 45, one of these contacts forming part of the ground conductor 42 and the other being connected to the armature 37 of the relay 36 by a conductor 46. The relay 44 is grounded through a conductor 47, which is connected to the ground wire 42 of the mating relay 36, and this ground conductor 42 is intercepted by a manually operatable switch 48 the purpose of which will presently appear. Assuming that it is desired to operate a signal such as causing one or more lamps to glow on the line wire 39, at 1:05 and to extinguish the lamps at 4:05 automatically. One terminal of the relay 36 is connected to the terminal designated by 1:05 on the switch board through the instrumentality of a conductor 49, and this same terminal is connected to the feed wire 39 by a conductor 50. A terminal of the relay 44 is connected to the terminal designated by 4:05 on the switch board by a conductor 51, and the same terminal of this relay is connected by a conductor 53 to a contact point 52 which confronts one of the above described contacts 45 the latter being pivotally mounted as shown at 54.

Suppose the clock hands to be in the position illustrated. Until the minute hand has passed beyond the contact plug 14 at the designation character denoting five minutes past the hour of one on the dial, the operation will be the same as described in actuating the bell. Now when the minute hand is in engagement with the contact plug 14 at said five minute designation numeral, a circuit may be traced through the battery 19, conductor 22, minute hand 10, contact plug 14, related conductor 21, related springs 30, related conductor 34, terminal 1:05 on the switch board, conductor 49, relay 36, ground conductors 41 and 42, the armature 37 being attracted by the relay and consequently contacting with the contact point 38 and thereby closing the circuit between the generator 40 and feed wire 39. A shunt circuit may be traced from the generator 40 through the conductor 50, relay 36 and ground conductors 41 and 42 so that when the minute hand has passed beyond the said five minute designation character on the dial, and thereby opened the initial relay energizing circuit, the relay will still be energized by this shunt circuit and hold the armature attracted and consequently hold the circuit between the generator and feed wire closed. When the hands of the clock have reached such a posi-

tion as to designate the hour of 4:05 on the dial, the current from the battery 19 will flow through the terminal 4:05 on the switch board, conductor 51, relay 44, and ground conductors 47 and 42 into the ground, this current energizing the relay, and causing the withdrawal of the relay armature 43 from the contact 45 of the ground wire 42. The "ground" of the relay 36 will thus be broken causing the deenergizing of the relay and consequently release of the armature 37 thereby opening the circuit between the generator 40 and feed wire 39 and extinguishing the lamps. The lamps will not be lighted again automatically since upon the energizing of the relay 44, and consequent attraction of the armature 43, the loose contact 45 and the contact 43 will be brought into engagement, a current then flowing through the generator 40, conductors 46 and 53, relay 44 and ground conductors 47 and 42 and maintaining the relay in an energized state consequently holding the armature 43 in such a position as to maintain open the "ground" of the relay 36. If the signal is desired to be repeated again at an interval of twelve hours the manually operatable switch 48 may be opened so that the current of the relay is broken and the relay consequently deenergized permitting of the armature 43 to return to the position shown in the diagram and in which position of the parts the operation above described may be repeated. Removal of the conductor 53 will accomplish the same end namely, permit of repetition of the signal twelve hours later.

In order that a good electrical connection may be made between the minute hand and contact plugs of the dial, to the under face of the hand is secured an elongated strip 54, formed of any good conducting material, and being terminally equipped with a shoe 55 connection between the shoe and strip being made by means of a spring 56. To the dial 12 is fixed a ring 57 of vulcanized fiber or other insulating material, and this ring is provided at regular intervals with sockets 58 in which are mounted the contact plugs 14 above referred to. Each contact plug is provided intermediate its ends with a circumferential stop collar 59, and a helical spring 60 surrounds the plug and bears with its opposite terminal convolutions against the bottom of the socket and confronting face of the stop collar.

A ring 61 of insulating material is fitted upon the ring 57, and is provided at intervals with openings 61 through which the outer ends of plugs project, the stop collars of the plugs bearing against the marginal portions of these openings and limiting outward movement of the plugs. It is clear that during advancement of the minute hand upon the dial, that the spring pressed shoe

of the hand will when in engagement with any particular spring pressed contact plug form a good electrical connection.

What is claimed is:—

- 5 1. In an electric signaling system, a clock having a circular series of spring pressed dial plugs, a supplemental spring pressed dial plug inserted between two of the first
10 named plugs, an intermittently revoluble circuit closing cylinder, signal actuating conductor wires leading from each of the first named plugs, said wires being inter-
15 cepted by said cylinder, a conductor wire leading from said supplemental plug to the minute hand and including in its circuit a
20 source of electricity and an electromagnet, and means operated by said electromagnet upon contact of said minute hand with said supplemental plug for actuating said cylin-
der one step.

2. In an electric signaling system, a clock having a circular series of spring pressed dial plugs, a supplemental spring pressed

dial plug inserted between two of the first named plugs, an intermittently revoluble 25 circuit closing cylinder, signal actuating conductor wires leading from each of the first named plugs, said wires being intercepted by said cylinder, a conductor wire leading from said supplemental plug to the 30 minute hand and including in its circuit a source of electricity and an electromagnet, means operated by said electromagnet upon contact of said minute hand with said sup- 35 plemental plug for actuating said cylinder one step, and means selectively engageable with said signal actuating conductor wires for maintaining a signal a predetermined length of time.

In testimony whereof, I affix my signature, in presence of two witnesses.

ERIC R. LUNDIUS.

Witnesses:

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H. B. KENNEDY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."