

(No Model.)

T. B. DOOLITTLE.
ELECTRIC SIGNALING APPARATUS.

No. 511,731.

Patented Dec. 26, 1893.

Fig. 1.

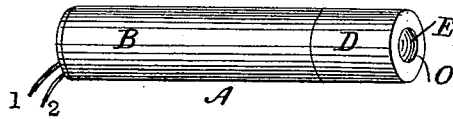


Fig. 2.

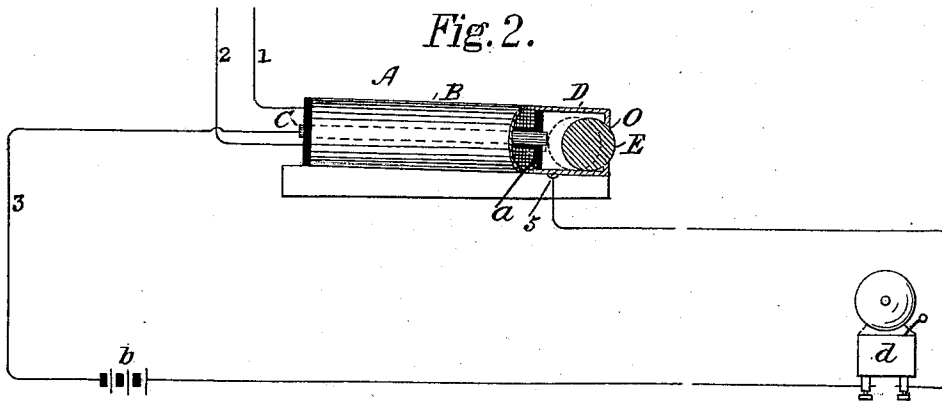
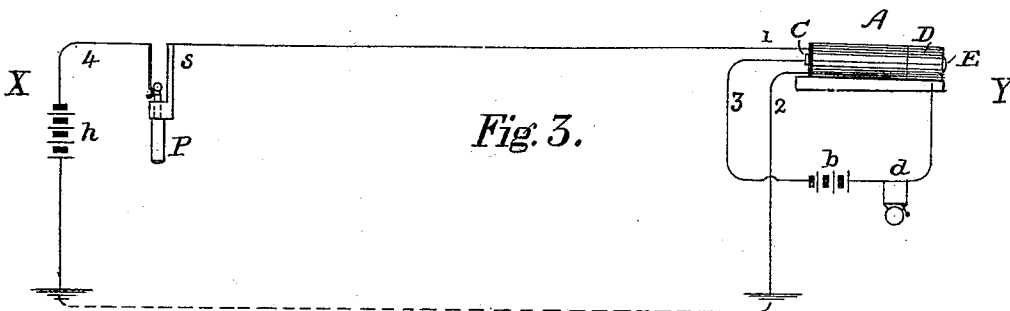


Fig. 3.



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THOMAS B. DOOLITTLE, OF BRIDGEPORT, CONNECTICUT.

ELECTRIC SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 511,731, dated December 26, 1893.

Application filed February 13, 1893. Serial No. 462,158. (No model.)

To all whom it may concern:

Be it known that I, THOMAS B. DOOLITTLE, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain Improvements in Electric Signaling Apparatus, of which the following is a specification.

This invention has reference to that class of electrical apparatus employed for calling the attention of a person at a distance, (usually called annunciators) such as are employed in hotel offices, telephone switchboards, &c. It has special reference to an annunciator which will indicate visually that a call has been made, or that the line in which it is connected is in use, as long as the current which energizes it is upon the line; and when the said current is removed therefrom will automatically indicate the normal line condition, and in this relation may be termed "a self-setting, or self-restoring signal." It also has reference to an annunciator which, when energized by a current of electricity will act as a relay and close a circuit which includes a battery and vibrating bell or a buzzer.

The invention consists essentially of an electro-magnet and an inductive armature which is free to move bodily (in contradistinction to a hinged or pivoted armature) and which in operation moves to one position under the influence of gravity, and to another position when the magnet is energized and the armature is attracted thereby. The bodily moving armature (which is preferably in the form of a ball so that its movement may be attended with little friction) is confined, and guided to limit its path of motion.

The principle of the invention may be embodied in the various forms. In the embodiment herein described I employ an electro-magnet with one helix, having a straight core; to one end of the bobbin, which is of insulating substance as wood or hard rubber, is attached a cylindrical casing of non-magnetic metal having an opening at its end. Within the casing is a ball made of or coated with iron or other para-magnetic metal, of such size as to move or roll freely therein. The annunciator is so seated or placed that the casing containing the ball is on a plane in-

clining downwardly toward its mouth, so that normally the ball will remain by gravity at the lower end of the cylinder and be visible through an orifice in its end; but when the magnet is energized by a current of electricity the ball will be attracted to its core and roll uphill to reach it, and in this position cannot be seen at the orifice. When again the current is removed or interrupted, the ball in virtue of gravity will roll down to the lower end of the cylinder, and be visible at the said orifice. The ball or rolling inductive armature thus serves as a visual indicator to indicate that a current is on the line in which it is connected.

As my invention relates to an armature which moves as a whole, or as a body, it is immaterial what its shape is, or what the shape of the inclosing case by which it is confined and guided. It may be cylindrical for instance, and slide within its guides. In the form herein described the inclined bottom of the cylinder serves as a path and the slides thereof as guides for the ball.

When I wish to use the annunciator for the purposes of a relay to open and close a circuit, I connect a wire to one end of the core of the helix, and attach the other end of the wire to the metal cylinder, and include in circuit with the said wire, a battery and an electro-magnetic alarm device, such as a buzzer or bell, and when a current of electricity causes the ball to be attracted to the core as it comes in contact therewith, the circuit is closed and the buzzer operates to give a signal.

I will now proceed to describe the annunciator itself and how it is associated in an electrical circuit.

Figure 1 of the drawings is a perspective view of the annunciator. Fig. 2 is a side view of the same partly in section, illustrating also the circuit connections. Fig. 3 shows the annunciator associated with a simple grounded circuit, and adapted to act as a busy signal.

In Figs. 1 and 2, A represents the annunciator as a whole, of which B is the helix and C the core thereof, constituting an electro-magnet. D represents a metallic cylinder, forming a chamber containing the ball E. Cylinder D is fitted over the head *a* of the spool or bobbin of helix B, which head is of

a smaller diameter than that at the other end of the spool, so that the surface of cylinder D is flush with that of the helix. Cylinder D has at the end remote from the magnet an aperture O, through which the ball E is normally visible, the bottom of the cylinder being tipped slightly downward toward this end. The length of the chamber formed by cylinder D is such that when the ball is drawn to its inner end by the attraction of the magnet it will not be visible at the aperture O. When the annunciator is to act as a relay and close a circuit, I extend a wire 3 from the core C to the point 5 on the surface of the metal cylinder D and include in the wire a battery *b* and a buzzer or bell *d*. When the ball E is in its normal position at the lower end of the cylinder D, this local circuit is open, as the cylinder D is insulated from the core C by the bobbin-head *a*. For the purpose of improving the electrical contact between the ball and the core it is preferred to cover the end of the latter with platinum and to place it at a level slightly lower than the center of the ball.

Fig. 3 shows a circuit to illustrate the operation of the annunciator when employed as a busy signal device. One end X of the circuit represents a call or signal sending station, and has included a source of electricity, as a battery *h*, and an open plug socket *s*. The other end of the circuit represents a signaling receiving station and an annunciator A is located there. Upon the insertion of the plug P the current from battery *h* energizes the helix B, and magnetizes the core C. The inductive rolling armature indicator E is attracted to the latter and remains there as long as the plug is inserted, and its absence from the orifice O signifies to the attendant at the station that a call has been made, or that battery current is on the line, and that the line is in use; and upon the withdrawal of the plug and opening of the line, the ball rolls to its normal position to indicate line not in use.

My invention is operative in either grounded or metallic circuits. The cylinder may be mainly of non-conducting material, with a

plate of metal for the armature E to rest upon when it is attracted.

If it be desirable that an audible indication be made at the time that the annunciator denotes the line to be in use, either in the vicinity thereof or at a distance therefrom, a circuit may be closed through the substance of the rolling iron ball E when it is attracted, from the core I, wire 3 connected to the said core at one end thereof, and with the metal surface of the cylinder D with its other end, including therein a battery and any suitable audible alarm as a bell or buzzer.

I claim as my invention—

1. A visual signal indicator comprising in combination an electro-magnet, a casing, and a bodily-moving inductive armature confined in said casing and having its movements limited thereby, the casing being provided with a suitable aperture, for the display of the armature, substantially as described.

2. A visual annunciator, consisting of an electro-magnet, and a rolling indicating armature confined and guided in a casing having an aperture at which said indicating armature is displayed.

3. A visual annunciator, consisting of an electro-magnet, and a rolling indicating armature, and a chamber containing the said armature whose floor and sides form an inclined path and guides therefor.

4. A visual signal annunciator, consisting of an electro-magnet, and an iron rolling inductive indicating armature having a confining casing, provided with means for closing a circuit extending from the core of the electro-magnet to the said casing and including therein a battery and bell, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 2d day of February, 1893.

THOMAS B. DOOLITTLE.

Witnesses:

GEO. WILLIS PIERCE,
THOS. D. LOCKWOOD.