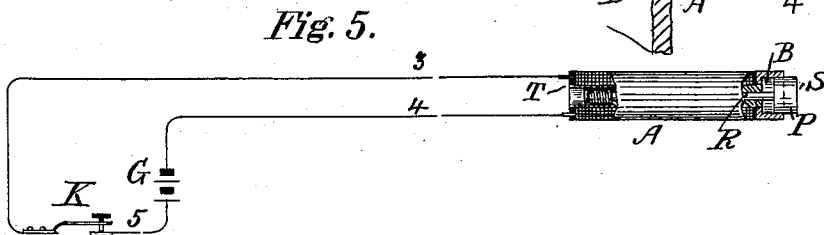
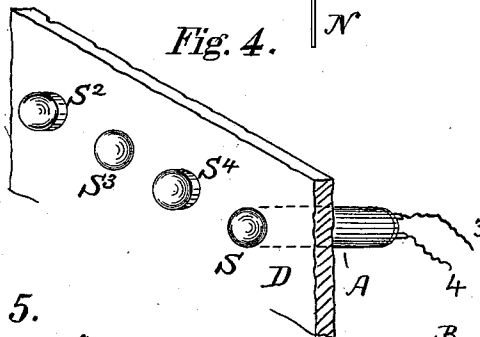
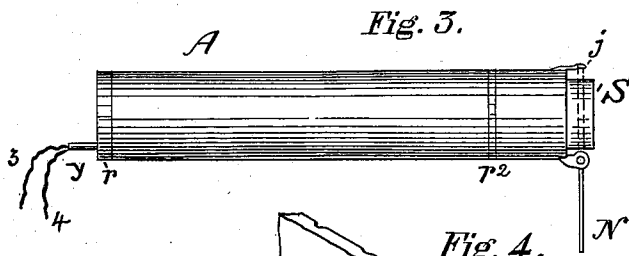
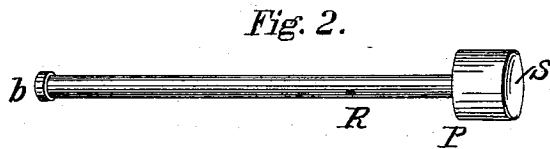
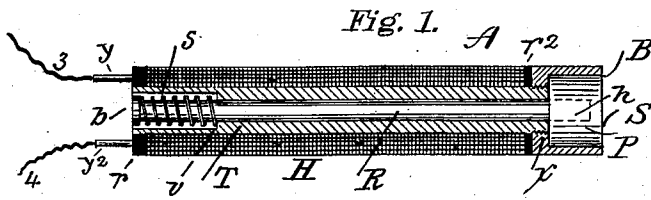


(No Model.)

F. S. PERRIN.
VISIBLE SIGNAL.

No. 506,883.

Patented Oct. 17, 1893.



Attest.
Frederic S. Perrin
J. M. Coppenhaver.

Inventor.
Frederic S. Perrin
by *W. H. Maunder*
his attorney.

UNITED STATES PATENT OFFICE.

FREDERIC S. PERRIN, OF NEW YORK, N. Y., ASSIGNOR TO THE AMERICAN TELEPHONE AND TELEGRAPH COMPANY, OF NEW YORK.

VISIBLE SIGNAL.

SPECIFICATION forming part of Letters Patent No. 506,883, dated October 17, 1893.

Application filed May 15, 1893. Serial No. 474,328. (No model.)

To all whom it may concern:

Be it known that I, FREDERIC S. PERRIN, residing at New York, in the county of New York and State of New York, have invented certain Improvements in Visible Signals, of which the following is a specification.

This invention relates to electro-magnetic signals, annunciators or indicators; and more particularly to that class of such devices in which the withdrawal as well as the display of the signal plate, block or disk, is automatically performed. Such annunciators may be usefully employed in a variety of ways; and are often very convenient appliances for use in association with telephone switchboard work. When so used they have technically been entitled "visual signals" in contradistinction to call bells or to the telephone itself when used for signaling; these ordinarily being classed as "audible signals."

The objects of my invention are to provide a signal adapted to act positively in one or both directions; to dispense with pivoted or hinged armatures; and to secure a greater range of motion for the signal appliance when the same is desired, than hitherto has been attainable. To accomplish these objects, I utilize the principle that when the lines of force of a magnetic circuit include a magnet or a directly magnetized fixed core, an independent and movable piece of iron capable of inductive magnetization, and an air gap, the movable piece of iron will always tend to so place itself within the air gap as to reduce the length thereof, and to increase the length of the iron portion of such magnetic circuit. The appliance in which by my invention this principle is embodied, comprises an annunciator, in which an iron tubular core is surrounded by a magnetizing helix, and which has a subsidiary iron core loosely fitting the said tube and normally resting therein, but with one end preferably projecting slightly therefrom. A suitable signal plate, disk or block, painted or configured in any desired way, is secured to the said projecting end of the rod core; and when the tubular core is excited by the passage of a current through the magnetizing helix, the tendency of the magnetic circuit to reduce the air gap, results in the forcible projection of the iron rod core

and in the consequent display of the signal. Suitable means are of course provided to limit the extent of the advance of said rod core; and if, as usual, the annunciator is to be of the self-restoring class, a retracting spring is arranged to pull the rod core back to its normal position on the cessation of the exciting current. The signal device may be rigidly secured to the outer end of the rod core so as to move in accordance with all of the motions thereof; or it may be arranged as a drop or shutter to be pushed down thereby, and to be restored manually; or again it may be arranged so as to serve in both capacities, one signal being secured to said rod core; and another in the form of a shutter to be dropped thereby.

In the drawings which illustrate and form a part of this specification, Figure 1 is a central longitudinal section of one form of my annunciator. Fig. 2 is a perspective view of the central rod core and armature. Fig. 3 is a side view of the annunciator as adapted to give two signals; one by the fall of a shutter, and the other by the protrusion of the rod and block, which caused the fall of said shutter. Fig. 4 is a perspective view of a portion of a switchboard on which are mounted certain annunciators constructed in accordance with my invention; and Fig. 5 shows such an annunciator connected in circuit with a suitable generator, and circuit controller or key.

In all the figures, A represents the annunciator as a whole, which is composed of an electro-magnetic helix H, having a soft iron tubular core T, which at one end has its internal surface bored out to form a larger central chamber, and to form the shoulder *v*; and which at its other end is secured by a screw thread *x* or in any preferred way, to a non-magnetic signal inclosing chamber B which forms for it an extension.

R is a soft iron rod, loosely fitting the said tubular core and inclosed for the major part therein, as shown, which at one end has a button or stop *b*, while a prolongation *h* at its front end extends a little beyond the front of the tube, and becomes the nucleus of a block of hard rubber or other suitable material P, the face S of which constitutes a signal disk or plate; and which when passive rests wholly

within the chamber B, its face being flush with the front edge thereof, but which to give the signal is adapted to project therefrom, as shown at S^2 and S^4 Fig. 4. An insulating ring r may surround the rear end, and a second r^2 , the front end of the tube, and between these the exciting helix may be wound. The terminal wires 3 and 4 of the said helix are led out in any preferred way, for example through tubes y and y^2 .

If the annunciator is not intended to restore itself automatically, a retracting spring can be dispensed with; but as generally, automatic operation is preferred, the helical spring s for that purpose surrounds the rod R within the enlarged chamber at the rear end of the tube, its ends abutting against the button b of the said rod, and the shoulder v of said chamber respectively.

The face S and sides of the signal block P may be painted differently, and, if desired, the face may have some designating mark.

In addition to the construction so far described, a second signal may be added or the construction may be so modified that the prolongation h of the iron rod R, or the same fitted with the signal block P may be used, not itself to display a signal, but simply to drop a shutter which may constitute the signal. This is indicated in Fig. 3, where N is a drop signal pivoted at n and adapted when passive to occupy a vertical position as indicated by broken lines. When in such position its edge is lightly held by the spring catch or detent j . When in consequence of the excitation of the helix, and tubular core, the rod core moves forwardly, it sharply forces the drop outwardly, and causes it to fall. This may constitute the sole signal; but if the block P be withdrawn or withdraw itself before the drop N is manually raised, its projection forward a second time may constitute a second and independent signal.

In Fig. 5 the terminal wires 3 and 4 connect with a key K and generator G, these being united by an intermediate conductor 5; and the annunciator is therefore to be operated by closing the key.

In operation, when the circuit of a battery or like generator G is closed through the annunciator helix H, it becomes excited, and magnetizes the tubular core T, the magnetic circuit thereof being through the said tube longitudinally, and from one end thereof, through the air to the other end; an air gap of considerable length being thus in existence. But since the iron rod R is within the tube, the tendency of the magnetization of the tube will not be to draw it farther in, but to project it outwardly, for the reason that the magnetic circuit will tend to shorten its air gap and lengthen its iron portion which can most readily be done by pushing outward the rod core. The rod thus being by the magnetic action of the helix and tube forced outwardly will cause its signal block or disk to project beyond the edge of its inclosing cham-

ber B, or beyond the surface of the switch-board front D, and such projection constitutes the signal; except when the drop signal N is added, in which case the projection of the disk or the fall of the drop or both, may constitute signals. When the key or other circuit closer K is opened and the circuit thereby broken, the excitement of the helix and magnetization of the core, both cease. If no retracting spring be present, the signal block and rod may now be pushed backward into position; but if, as is preferred, the spring s be present, as shown, its tension draws the rod immediately back within the tube T and the signal consequently into the chamber B; an efficient and satisfactory self setting signal being thereby provided.

I claim as my invention—

1. The combination of an electro-magnet having a tubular iron core, an iron rod loosely fitting said tubular core and adapted, when said magnet is excited, to be repulsively actuated thereby so as to move lengthwise of said core, and a visual signal disk or device carried or actuated by said rod, substantially as described.

2. An annunciator comprising an electro-magnetic helix; a tubular iron core therefor; and a signal carrying iron rod loosely fitting the said tubular core and normally inclosed or partly inclosed therein, but adapted to be repulsively actuated thereby and to project its outward end to give the signal, when the said tubular core is magnetized by the passage of an electric current through the said helix; substantially as specified.

3. The combination in an annunciator, of an electromagnetic helix; a tubular iron core surrounded thereby; a subsidiary core consisting of an iron rod inclosed or partly inclosed within the said tubular core, and forming an armature therefor, capable of being repelled thereby, upon the magnetization thereof; a retracting spring to limit the motion of said subsidiary core and to retract the same; and a signal disk or plate secured to the said subsidiary core and participating in the motions thereof.

4. A self setting or restoring annunciator comprising an electro-magnetic helix adapted for connection in an electric circuit; a tubular iron core therefor; an iron rod loosely fitting the said tubular core and normally resting therein, but adapted to move outwardly and thereby lengthen the iron of the magnetic circuit of said core on the passage of a current through said helix; a visible signal device mounted on said iron rod, and projected on the outward movements thereof; and means for automatically retracting the said rod and signal on the cessation of said current; substantially as described.

5. The combination in a self setting or restoring annunciator, of an electro-magnetic helix; having a tubular iron core recessed and shouldered at its rear end as shown; a non-magnetic chamber attached to the front

end of said helix; a visual signal disk or block normally incased in said chamber; an iron rod or armature adapted to slide easily within said tubular core, having a button or stop at its inner end, and projecting beyond the tubular core and into the substance of the signal block at its outer end; and a retracting spring surrounding the said rod within the said recess of the tubular core, and bearing against the shoulder thereof and the button stop of said rod; whereby the said tubular core when magnetized by the said helix is enabled to act repulsively on said rod, and

thereby to push it forward and display the signal, and whereby the said signal may be automatically withdrawn when the said core is no longer magnetized, substantially as specified herein.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 9th day of May, 1893.

FREDERIC S. PERRIN.

Witnesses:

W. H. LANE,
GEO. W. BETTS, Jr.