

(No Model.)

T. SPENCER.
ANNUNCIATOR FOR TELEPHONIC CIRCUITS.

No. 532,605.

Patented Jan. 15, 1895.

Fig. 1.

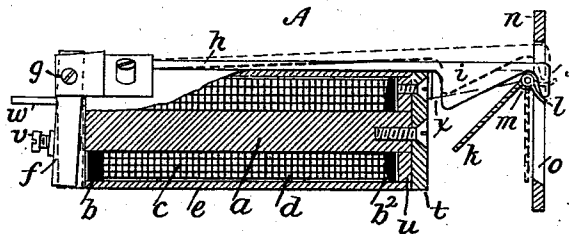


Fig. 2.

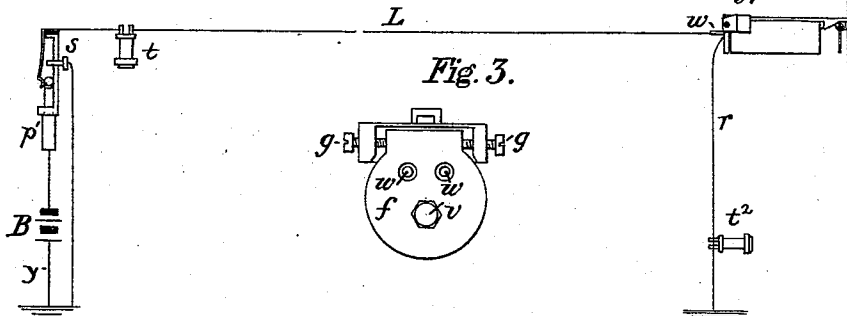


Fig. 3.

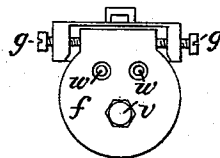
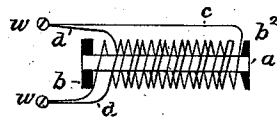


Fig. 4.



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ANNUNCIATOR FOR TELEPHONIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 532,605, dated January 15, 1895.

Application filed September 10, 1894. Serial No. 522,611. (No model.)

To all whom it may concern:

Be it known that I, THEODORE SPENCER, residing at Cambridge, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Annunciators for Telephonic Circuits, of which the following is a specification.

This invention relates to visible signal indicators or annunciators for telephonic circuits; and more specifically to that class which are arranged to display the indicating device when the circuit is closed, and to withdraw the same, thereby automatically resetting the signal, when the circuit is reopened. It is evident that the withdrawal equally with the display of the indicating device has a definite signification, and may be readily understood as a signal.

The object of the invention is to provide a self-setting indicator, simple in construction, and trustworthy in operation, adapted to give one indication under the application of a steady electric current, and to be automatically reset on the withdrawal of such current, whereby is afforded a reliable signal indicating at one point of a circuit any change in connections made at another point.

The invention consists in a signal device comprising an electromagnetic spool; an armature and armature lever therefor being weighted at its free end; and a signal shutter normally retracted and held out of sight by the weighted end of the armature lever, which as long as the magnet remains unexcited, rests upon a projecting heel piece with which it is provided; but adapted when freed from such weight to fall in virtue of its own weight, and display itself at a suitable aperture.

It also consists in combining in a self-setting annunciator the said shutter or signal plate tending when untrammelled by an opposing force to fall and display itself in virtue of its own weight, and the weighted armature lever normally preventing such a display by exercising a superior counter weight on a lever extension of the said shutter, with an electromagnet of low impedance adapted to be placed in a telephonic circuit without detriment to the transmission of voice currents.

It also consists in an annunciator having a shutter or signal plate held in a retracted or invisible position by a weighted armature lever when the armature controlling such lever remains unattracted by its magnet, and adapted when freed from the said weight by the operation of the said magnet to fall by its own weight into a position of display; and it further consists in combining in a signal indicating appliance, a signal plate or shutter tending by reason of its own weight to hang vertically, and display the signal; a superior weight normally acting in opposition to the said tendency and thereby holding the said signal plate in a horizontal and invisible position; and an electromagnet controlling the said superior weight, and adapted when excited to free the said signal plate therefrom, whereby the signal may be actuated from any point in a circuit containing the said magnet.

In the drawings, Figure 1 is a side view mostly in vertical section, showing an annunciator embodying the invention, and Fig. 2 is a diagram showing the annunciator in circuit with a spring jack, plug and battery; the said battery or any equivalent generator being applied by the insertion of the plug.

A represents the annunciator in both figures, and referring especially to Fig. 1, *a* is a soft iron core or pole piece secured to a soft iron shell or tube *e* at its front end *u*, and to the iron bar *t*, which if desired may be formed to constitute the support of a number of annunciators when arranged for central office switchboards.

Fig. 3 is a rear view of the annunciator showing the two electrical connections thereof; and Fig. 4 is a diagram indicating the magnetizing and shunt winding connections thereof.

The rear ends of the core and tube form virtually the two poles of a U magnet. The helices of the core are wound between the non-conducting end pieces *b* and *b*².

It is often desirable that signals or annunciators of this character shall be placed directly in a telephone circuit, to indicate at one station, changes in the electrical connections which may be made at another, and it is expedient therefore that their impedance shall be low. This desideratum can be at-

tained by providing the non-magnetizing helix with a non-inductive shunt circuit of suitable resistance, and for convenience I wind the said shunt round the core, and inclose it within the iron surrounding tube. A construction which has proved satisfactory, is to arrange the two windings on the spool in parallel with each other; the magnetizing helix *c* consisting of a single conductor of silk covered No. 28 copper wire wound to a resistance of seventeen ohms; while the shunt winding *d* constituting a path of low impedance for voice currents is made of No. 30 silk covered German silver wire, wound double to prevent self-induction. The two ends of both windings connect with the same terminals *w w* which in turn are electrically united with the circuit wires. A magnet so made, is of low impedance as respects telephonic or other rapidly changing currents.

The armature *f* is pivoted at *g*, and may have a limit screw *v*. It carries a lever or arm *h* which extends forward to the front end of the annunciator, and terminates in a downwardly projecting end *j*. A short distance behind the projection *j* the lever has an enlargement *i* to serve as a weight to depress the end of the arm when the electro magnetic core *a* is not excited, and its armature *f* attracted. A signal plate or shutter *k* which may be made of any suitable material, such as aluminium, is hung in pivots *m*, and tends in virtue of its own gravity to hang vertically and to display itself as indicated in broken lines at the opening or aperture *o* in the frame plate *n*. This signal plate has a short lever or heel piece *l* secured to its top edge and extending forwardly therefrom, and with this lever the projecting end *j* of the armature lever or rod engages normally or when the electromagnet is unexcited. By its weight which is superior to that of the shutter on the other side of the pivots, the said shutter is prevented from yielding to its own tendency to assume a vertical position where it is displayed, and is forced away from the aperture *o*, and into a horizontal position, (shown in full lines,) where it is out of sight.

In Fig. 2, the armature is represented as being connected with its operating battery in a telephone circuit, and as indicating at a distant station, the fact that such circuit is engaged.

L is the telephone line extending from a spring jack *s*, to one of the signal terminals *w*, and the circuit continues through the windings of said signal, and from their remaining terminal to earth by the wire *r*. This line forms the actual conversation circuit, or a part thereof, as indicated by the presence of the telephones *t, t'*.

A plug *p* to which is connected a battery or any suitable generator *B*, having its other pole connected to the earth or equivalent return conductor, is shown as inserted in the spring jack, so that the current of the generator passes to line. If the plug were with-

drawn, the spring of the jack would rest on its insulated anvil contact and the line would be grounded direct. Placed, as shown, the current from the battery magnetizes the core of the signal indicator by means of the exciting helix *c*, the armature *f*, is attracted thereto, and the weight at the front end of the armature lever or rod is lifted from the short lever *l* of the signal shutter. The shutter thus released from the influence of its superior counterweight yields to its tendency to fall by reason of its own weight, and appears at the aperture *o*. Its appearance there may have any prearranged signification. As shown, it indicates that the line with which it is associated is engaged; and consequently its absence or disappearance from the opening *o* indicates that the said line is free. The signal being thus set by the act of making the plug connection, conversation can be carried on over the conductor *L* from one telephone *t* to the other *t'*, the rapidly varying voice currents passing without material obstruction by the aid of the reactanceless shunt winding *d*, which together with the magnetizing winding *c* is indicated diagrammatically in Fig. 4. The withdrawal of the plug *p* or the reopening in any preferred way of the generator and signal circuit brings about the demagnetization of the core *a*, and the consequent retraction of the armature and depression of the engaging projection *j* by means of the weight *i*; and the said projection striking the short lever *l* causes the signal shutter *k* to resume its former approximately horizontal position and to disappear, thereby indicating that the line *L* is now disengaged.

I claim—

1. In a signal indicating appliance, a signal plate or shutter tending in virtue of its own weight to hang vertically and display itself; a superior weight normally acting in opposition to the said tendency, and thereby holding the said signal plate in a retracted and invisible position; and electromagnetic mechanism controlling the said superior weight and adapted when operated, to free the said signal plate therefrom, the latter being automatically restored to its retracted and invisible position when the electromagnetic mechanism is thrown out of operation substantially as specified.

2. An electromagnetic annunciator having an armature carrying a weighted arm, normally resting upon a lever extension of a signal shutter or plate for automatically restoring the plate to and holding it in a retracted position, said plate being adapted to fall by its own weight when released from the superior weight of the arm through the attraction of the armature by its magnet, substantially as described.

3. An annunciator having a shutter or signal plate which is automatically restored to and normally held in a retracted or invisible position by a weighted armature lever when the armature controlling the said lever is un-

attracted by its magnet, and adapted when freed from the said weight by the operation of the said magnet, to fall by its own weight into a position of display.

5 4. The combination with a telephone circuit of a self-setting annunciator comprising an electro-magnet connected directly in said circuit and having a magnetizing helix and also a winding shunting the entire magnetizing helix and constituting a path of low impedance to voice currents; a shutter or signal plate provided with a lever extension and adapted when freed from control to fall by its own weight, and a lever of superior weight
10 to that of the signal plate attached to the armature and normally resting upon said lever extension and adapted when the armature is released from the attraction of said magnet to withdraw the signal-plate and retain it in its
15 retracted position, substantially as described.

20 5. A signal device comprising an electro-magnetic spool; an armature and a weighted

armature lever therefor; and a signal shutter forming one arm of a pivoted lever, and provided with a projecting heel piece constituting the complementary arm thereof, the said heel piece being normally engaged and depressed by the weighted armature lever and the said shutter being thereby correspondingly elevated; and the said shutter being adapted to assume a vertical position in virtue of its own weight, when the said weighted armature lever is disengaged from its heel piece, on the excitation of the said electro-magnetic spool; substantially as described. 35

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 1st day of September, 1894.

THEODORE SPENCER.

Witnesses:

GEO. WILLIS PIERCE,
JOSEPH A. GATELY.