O. M. LEICH.

SWITCHBOARD SIGNAL.

APPLICATION FILED JULY 29, 1907.

918,682. Patented Apr. 20, 1909.

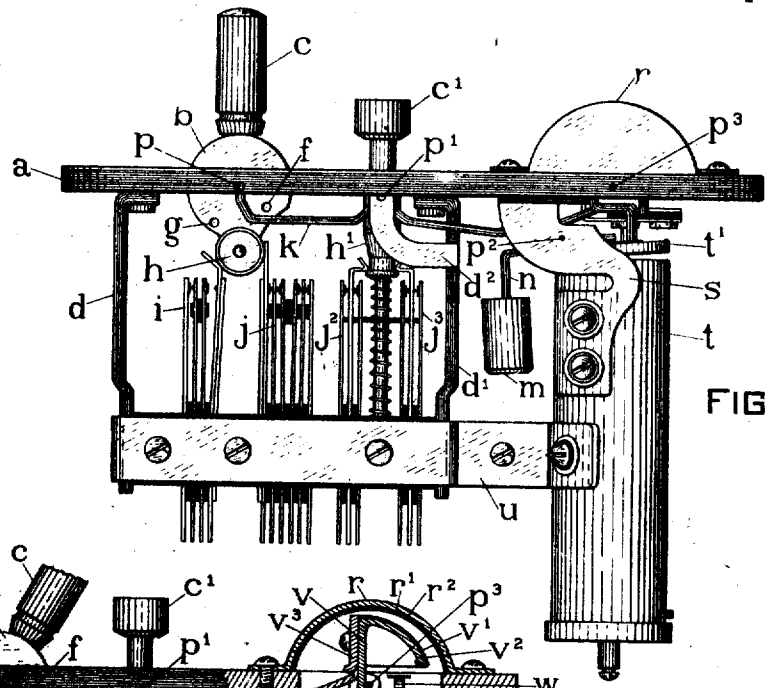


FIGURE-1

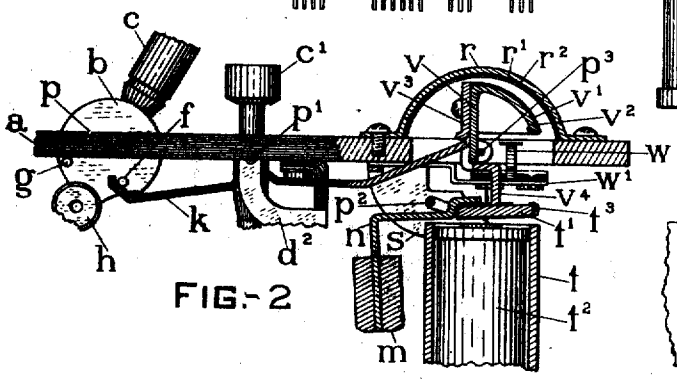


FIG.-2

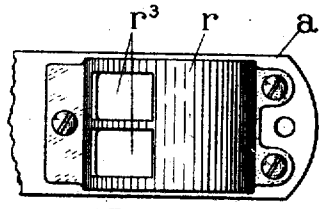


FIG.-4

FIG.-5

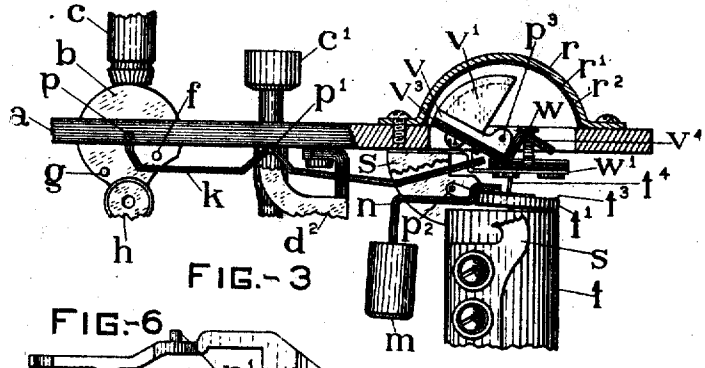
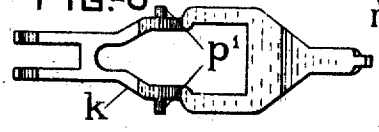


FIG.-3

FIG.-6



WITNESSES

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SWITCHBOARD-SIGNAL.

No. 918,682. Specification of Letters Patent. Patented April 20, 1909.

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To all whom it may concern:

Be it known that I, OSCAR M. LEICH, a citizen of the United States, residing at Rochester, in the county of Monroe and State of New York, have invented a new and Improved Switchboard - Signal, of which the following is a specification.

An object of my invention is to construct a combined operator's key and signaling device in such a manner that the operator in responding to a call indicated by the signaling device, upon moving a key used in conjunction with such signaling device will restore such device to its initial or concealed position.

More specifically, my invention as disclosed by the accompanying drawings and specification, consists in a ringing and listening key and an operator's clearing out signal as commonly used in connection with telephone switchboard cord circuits, such key and clearing out signal being so related mechanically as to constitute a single mechanism such that, after the signal has been actuated so as to show a proper display surface or indicator to the operator, such signal may be restored to its concealed position by a movement of the key, in the case herein shown to its listening position.

Another object of my invention is to provide a convenient, cheap and effectual means for adjusting the magnetic effort required to release an indicator of this class.

The advantages resulting from my invention are numerous, some of the most prominent being the more intimate association of the apparatus used in the cord circuits of telephone switchboards and the simplification of the cabling and wiring necessary for properly connecting the signals and keys to the remaining apparatus of the switchboard.

The several drawings illustrating my invention are as follows:

Figure 1 is a side view of my signal complete and shows the indicator in its engaged position. Fig. 2 is a view showing partially in vertical section, the coöperating parts between the cam of the operator's key and the indicator, as well as the construction of such indicator and means carried by the armature of the electromagnet for engaging the same. The parts are shown in this figure in the position they assume when the indicator is restored to its concealed position by the operation of the cam of the operator's key. Fig. 3 is a view similar to Fig. 2 showing the indicator in its displayed position. Fig. 4 is a top view of the shield for the indicator and shows the apertures therein for disclosing such indicator when in its operated position. Fig. 5 shows a modified form of indicator. Fig. 6 is a top view of lever *k*.

Similar letters refer to similar parts throughout the several views.

Referring to the drawings, *a* is a mounting plate secured to the under side of which are seen brackets *d d*^{1} which serve to support the bent bars *u* between which and insulated therefrom are supported the springs *i*, *j*, *j*^{2} and *j*^{3}. The springs *i* and *j* are engaged by rollers *h* pivoted to the operating cam *b*, which in turn is pivoted in the mounting plate *a* at *p* and is provided with an operating handle *c* for suitably actuating the contacts carried by the springs *i* and *j*. The cam *b* carries pins *g* and *f* for limiting the motion of such cam in either direction.

Since this invention is not concerned with the particular function performed by the springs *i* and *j*, the circuit conditions controlled by such springs are not herein described, but as shown in the drawings, these springs are designed to control the ringing and listening condition of a telephone cord circuit. The button *c*^{1} adapted to operate vertically the cam *h*^{1} and thereby to actuate the springs *j*^{2} and *j*^{3}, is designed to control a ring back circuit in connection with the cord circuit above mentioned which, for the reason already indicated, is not herein described in detail. The bars *u*, besides supporting the springs just described, are attached to the electromagnet *t* which is also supported by the bracket *s* from the plate *a*. The electromagnet *t* is thus held in a vertical position and is provided with an armature *t*^{1} pivoted at *p*^{3} in the bracket *s*, such armature being counterbalanced by a weight *m* secured thereto by a bar or arm *n* of such material that it may be readily bent to give the desired balance of the armature *t*^{1}, whereby the amount of tractive effort necessarily exerted by the winding *t*^{2} of the electromagnet *t* to draw the armature *t*^{1} downward and therefore to move the weight *m* upward, may be varied as desired. The arm *n* should be of such material as to be readily bendable to

various positions to readily facilitate the adjustment just described and yet such arm should possess sufficient rigidity to remain in any particular adjustment given it. The armature t^1 has folded about it as indicated, a non-magnetic strip of metal t^5 which serves to prevent the armature t^1 from sticking to the magnet t when attracted thereby. This non-magnetic strip t^5 extends between the armature t^1 and the arm n and has formed therein as indicated, an opening from which the projecting tongue t^4 is pressed, such opening being adapted to engage the arm v^4 carried by the plate v^3 when the indicator is in its concealed position. The plate v^3 is secured to a shutter v pivoted at p^3 in the plate a, such shutter having a rearwardly extending curved arm v^2 about which a thin indicator v^1 is secured as indicated. A shield r secured to the upper surface of the plate a and having openings r^3 therein, is provided in order to protect the indicator and shutter from accidental injury. The openings r^3 are closed by a transparent screen r^1 held in place by a curved strip r^2 similar in conformation to the inside surface of the shield r. From this it will be seen that the shield just described constitutes a perfect protection for the shutter and indicator while at the same time permitting such indicator to be readily seen when the shutter is released from the armature by the attraction of the electromagnet, for which condition the action of gravity moves such shutter and indicator to the position indicated in Fig. 3. In this position the arm v^4 engages a contact w supported and insulated from the under side of the plate a by a bracket w^1 as indicated, whereby any suitable night alarm or similar circuit may be closed to call the operator's attention to the fact that the indicator and shutter have been released and that such indicator is in the displayed position. The bracket d^1 has formed thereon two curved arms d^2 conformed to support at their outer ends the pivots p^1 of lever k, which lever is conformed at its left hand end to be engaged by the stop pin f carried by the cam b when the handle c is moved to the right, whereby the right hand end of such lever k is brought into engagement with a suitable cam surface on the plate v^3, as a result of which the indicator v^1 and shutter v are moved around to the right and the bar v^4 is brought into engagement with the opening above described in the strip t^5. The tongue t^4 serves to prevent the shutter v and indicator v^1 being moved too far around to the right. The pivots p^1 as shown in Fig. 6 are formed integrally with the lever k.

While I have in the drawings thus far described, indicated the shutter v and indicator v^1 as separate members, these two may be combined in one if desired, as indicated at v^5 in Fig. 5, by suitably proportioning the parts.

As a result of the construction above described it will be seen that when the electromagnet t is energized in any suitable manner not shown, and the armature t^1 is attracted thereby, the shutter v and indicator v^1 carried thereby are released and such indicator assumes a position behind the openings r^3 whereby the operator readily observes the same. It is preferable, though not necessary, to color or mark the outer surface of the indicator v^1 in contrast with the appearance of the parts through the openings r^3 when the shutter and indicator are in their normal or engaged position.

After the operator has observed the signal presented as described above, the shutter and indicator may be moved to their engaged position either during the regular operation of the handle c or by a special movement of such handle to the right as the case may be.

In the specifications and drawings just described I have shown my invention as embodied in a standard ringing and listening key combined with a drop signal controlled by a vertical electromagnet. Obviously, without departing from the spirit of my invention, I may make use of this key and signal for any other desired purpose in which it is desirable to effect circuit changes in response to a signal used to call for such changes.

What I claim is:

1. In a switchboard signal, in combination with an operator's key, an electromagnet and an armature adapted to be attracted thereby, an indicator adapted to occupy either a displayed or a concealed position, means carried by such armature for holding such indicator in a concealed position and means actuated by such operator's key for moving such indicator from a displayed to a concealed position.

2. In a switchboard signal, in combination with an operator's key, a vertically disposed electromagnet and an armature adapted to be attracted thereby, an indicator adapted to occupy either a displayed or a concealed position, means carried by such armature for holding such indicator in a concealed position and means actuated by such operator's key for moving such indicator from a displayed to a concealed position.

3. In a switchboard signal, in combination with an operator's key, a vertically disposed electromagnet and a horizontally disposed armature adapted to be attracted thereby, an indicator adapted to occupy either a displayed or a concealed position, means carried by such armature for holding such indicator in a concealed position and means actuated by such operator's key for moving such indicator from a displayed to a concealed position.

4. In a switchboard signal, in combination with an operator's key, an electromag-

net and an armature adapted to be attracted thereby, an indicator adapted to occupy either a displayed or a concealed position, means carried by such armature for holding such indicator in a concealed position, means actuated by such operator's key for moving such indicator from a displayed to a concealed position and means carried by the armature for varying the force required to operate such armature.

5. In a switchboard signal, in combination with an operator's key, an electromagnet and an armature adapted to be attracted thereby, an indicator adapted to occupy either a displayed or a concealed position, means carried by such armature for holding such indicator in a concealed position, means actuated by such operator's key for moving such indicator from a displayed to a concealed position and a weight secured to such armature by a bendable arm for varying the force required to operate such armature.

6. In a switchboard signal, in combination with an operator's key, a vertically disposed electromagnet and a horizontally disposed armature adapted to be attracted thereby, an indicator adapted to occupy either a displayed or a concealed position, means carried by such armature for holding such indicator in a concealed position, means actuated by such operator's key for moving such indicator from a displayed to a concealed position and a weight secured to such armature by a bendable arm for varying the force required to operate such armature.

7. In a telephone switchboard signal, in combination with a ringing and listening key, an electromagnet and an armature adapted to be attracted thereby, a drop shutter, an indicator carried thereby and adapted to occupy either a displayed or a concealed position, means carried by such shutter for engaging such armature when such indicator is in a concealed position and means operated by such ringing and listening key for moving such indicator from a displayed to a concealed position.

8. In a telephone switchboard signal, in combination with a ringing and listening key, an electromagnet and an armature adapted to be attracted thereby, a drop shutter, an indicator carried thereby and adapted to occupy either a displayed or a concealed position, means carried by such shutter for engaging such armature when such indicator is in a concealed position, means operated by such ringing and listening key for moving such indicator from a displayed to a concealed position and means carried by the armature for varying the force required to operate such armature.

9. In a telephone switchboard signal, in combination with a ringing and listening key, a vertically disposed electromagnet and a horizontally disposed armature adapted to be attracted thereby, a drop shutter, an indicator carried thereby and adapted to occupy either a displayed or a concealed position, means carried by such shutter for engaging such armature when such indicator is in a concealed position, means operated by such ringing and listening key for moving such indicator from a displayed to a concealed position and a weight secured to such armature by a bendable arm for varying the force required to operate such armature.

10. In a telephone switchboard signal, in combination with a ringing and listening key, an electromagnet and an armature adapted to be attracted thereby, a drop shutter, an indicator carried thereby and adapted to occupy either a displayed or a concealed position, means carried by such shutter for engaging such armature when such indicator is in a concealed position, a protecting shield for such indicator, such shield serving to conceal such indicator when such shutter is in an engaged position and to disclose such indicator when such shutter is released and means operated by such ringing and listening key for moving such indicator from a displayed to a concealed position.

11. In a telephone switchboard signal, in combination with a ringing and listening key, an electromagnet and an armature adapted to be attracted thereby, a drop shutter, an indicator carried thereby and adapted to occupy either a displayed or a concealed position, means carried by such shutter for engaging such armature when such indicator is in a concealed position, a protecting shield for such indicator, such shield serving to conceal such indicator when such shutter is in an engaged position and provided with an opening for disclosing such indicator when such shutter is released and means operated by such ringing and listening key when moved to a listening position for moving such indicator from a displayed to a concealed position.

12. In a telephone switchboard signal, in combination with a ringing and listening key, an electromagnet and an armature adapted to be attracted thereby, a drop shutter, an indicator carried thereby and adapted to occupy either a displayed or a concealed position, means carried by such shutter for engaging such armature when such indicator is in a concealed position, a protecting shield for such indicator, such shield serving to conceal such indicator when such shutter is in an engaged position and provided with an opening having a transparent screen therein for disclosing such indicator when such shutter is released and means operated by such ringing and listening key when moved to a listening position for moving such indicator from a displayed to a concealed position.

13. In a telephone switchboard signal, in

combination with a ringing and listening key and the operating cam thereof, an electromagnet and an armature adapted to be attracted thereby, a drop shutter, an indicator carried thereby and adapted to occupy either a displayed or a concealed position, means carried by such shutter for engaging such armature when such indicator is in a concealed position and a lever for communicating motion from the operating cam of such ringing and listening key to such shutter for moving such indicator from a displayed to a concealed position.

14. In a telephone switchboard signal, in combination with a ringing and listening key and the operating cam thereof, an electromagnet and an armature adapted to be attracted thereby, a drop shutter, an indicator carried thereby and adapted to occupy either a displayed or a concealed position, means carried by such shutter for engaging such armature when such indicator is in a concealed position and a lever pivoted to the frame of such signal for communicating motion from the operating cam of such ringing and listening key to such shutter for moving such indicator from a displayed to a concealed position.

15. In a telephone switchboard signal, in combination with a ringing and listening key and the operating cam thereof, an electromagnet and an armature adapted to be attracted thereby, a drop shutter, an indicator carried thereby and adapted to occupy either a displayed or a concealed position, means carried by such shutter for engaging such armature when such indicator is in a concealed position and a lever pivoted to the frame of such signal and adapted to coöperate at one end with a pin carried by such cam and at the other end with such shutter whereby when such cam is moved to a listening position such lever is operated to move such indicator from a displayed to a concealed position.

OSCAR M. LEICH.

Witnesses:
A. J. KOHN,
E. G. EIDAM.