

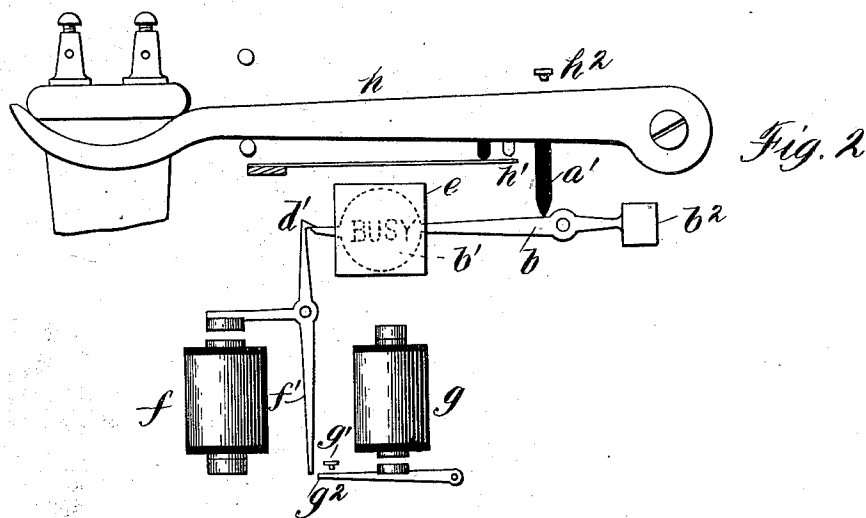
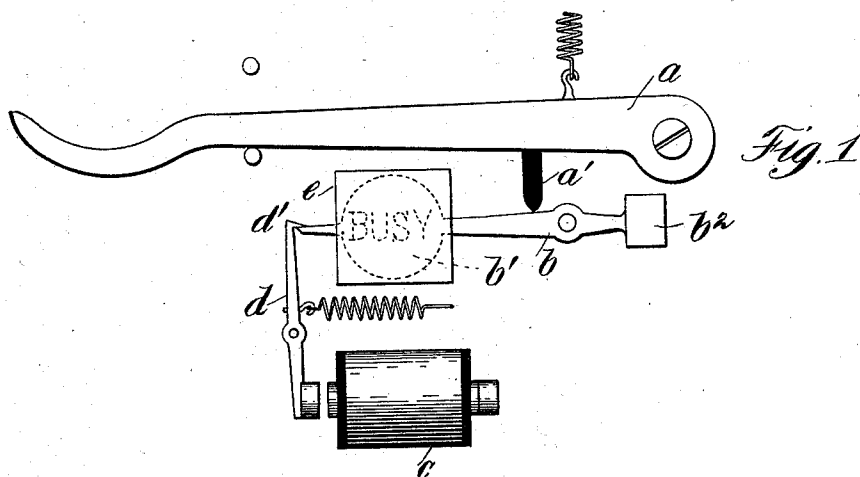
(No Model.)

2 Sheets—Sheet 1.

C. E. SCRIBNER.
BUSY SIGNAL FOR TELEPHONE LINES.

No. 560,757.

Patented May 26, 1896.



Witnesses:
George K. Cragg.
John H. Sinclair

Inventor:
Charles E. Scribner.
By *Boston Brown*
Attorneys.

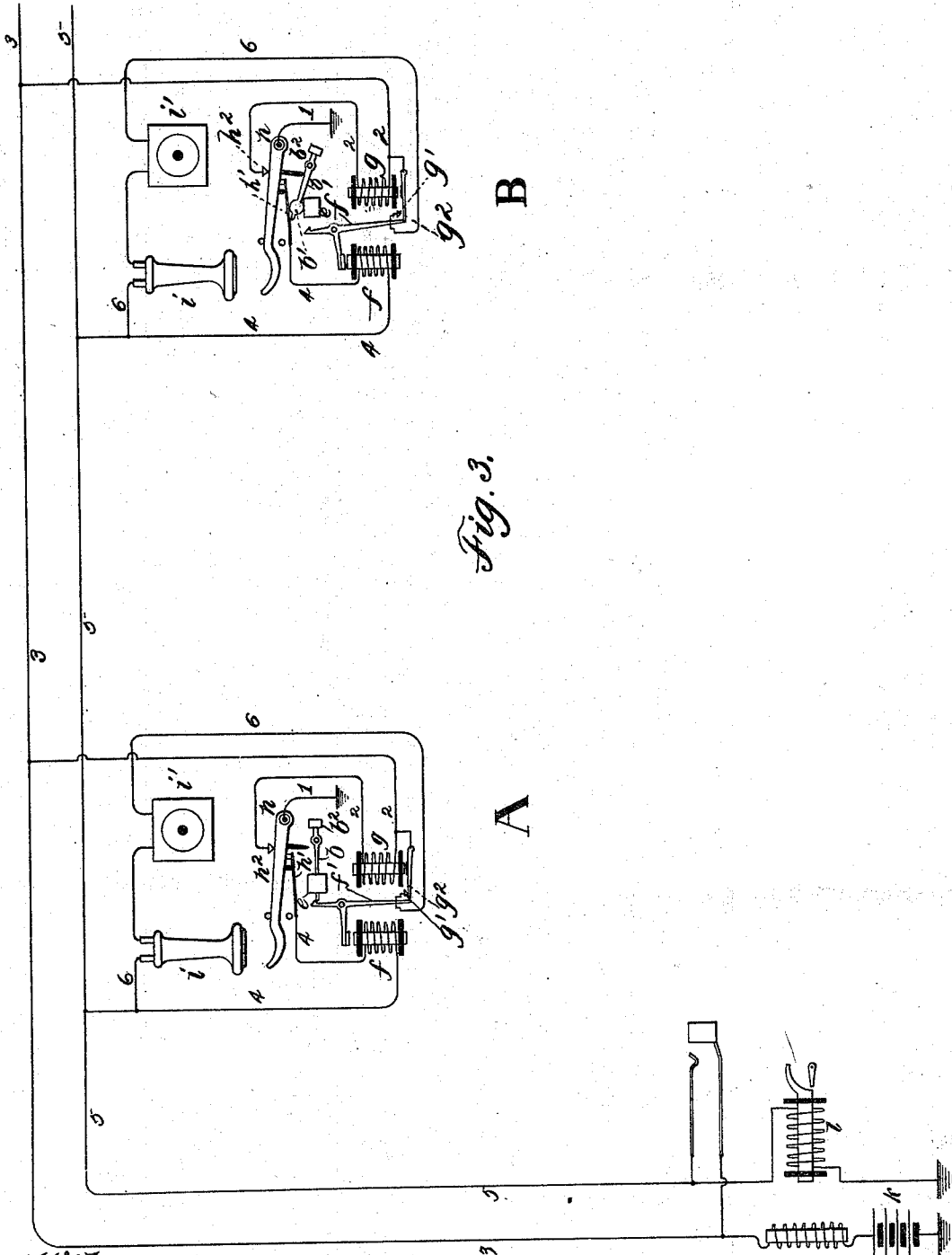
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By *Arthur Brown Atty.*

UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

BUSY-SIGNAL FOR TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 560,757, dated May 26, 1896.

Application filed August 17, 1895. Serial No. 559,625. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Busy-Signals for Telephone-Lines, (Case No. 389,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention is a signal for use on "party" telephone-lines to indicate at each substation when the line is in use. It consists in a signal or indicator actuated by the movement of the telephone-switch or other suitable mechanism at the substation, but controlled in its movement by an electromagnet whose excitement is determined by current in the line-circuit during the use of the line. I am aware that electromagnetic signals at different stations of a party-line have been included in the line-circuit, so as to be excited by current in the line during its use and thus to indicate the free or busy condition of the line; but in practice the indicator or target of such a signal must be moved through a comparatively wide range to give a suitable signal, and thus for its operation requires the expenditure of considerable energy, which is not always available.

In my improved signal I make use of some part of the telephone mechanism which is manually actuated in the use of the telephone to operate the indicator when the latter is free to move, controlling its movement, however, by an electromagnet connected with the circuit. I am thus enabled to permit a positive motion to the signal through any desired range, while determining its movement with a minimum expenditure of energy.

In a particular form of my invention the indicator is carried on a weighted pivoted lever, which tends to follow the switch-hook of the telephone as the latter rises when the receiving-telephone is removed from it for use, but which is normally engaged by a detent carried upon the armature of an electromagnet connected with the line. When the switch-hook rises, if the line be not already

in use, the indicator is engaged by the detent and prevented from following the switch in its movement; but if the line be in use when the movement of the switch-lever takes place the magnet is excited and the indicator is released from the detent and follows the switch-lever in its movement and is displayed at a suitable opening in the case of the instrument.

In a prior application, (Case 379,) I have shown a lock-out system for party-lines, which comprises a relay-magnet which is arranged to be excited when the receiving-telephone is taken from its switch-hook, controlling the continuity of the telephone-circuit, and a stop-magnet, which is excited only when the line is already in use, which may act to obstruct the relay and thus to prevent the use of the telephone. My present invention is readily adapted to this device, the stop-controlling magnet of the earlier invention being employed also to operate the detent controlling the indicator of the present invention.

I have shown my invention in the attached drawings, in which—

Figure 1 represents the essential elements of the device, the manually-operated lever, the indicator, the magnet, and detent controlling the movement of the indicator. Fig. 2 shows the invention as employed in connection with the lock-out mechanism of my earlier application. Fig. 3 is a diagram illustrating the circuits employed with the lock-out and signaling mechanism.

In Fig. 1 the elements represented comprise a pivoted lever *a*, which may be the telephone switch-hook, another pivoted lever *b*, carrying an indicator *b'*, a magnet *c*, and the armature-lever *d* of the magnet. Lever *b* carries at the extremity opposite to that on which the indicator *b'* is fixed a weight *b²*, which tends to raise the indicator and withdraw it from behind the screen *e*. The extremity of the lever is formed into a catch, which engages with the detent *d'* at the end of the lever *d*. A stud *a'*, carried by lever *a*, engages lever *b* near its pivotal point and presses the lever downward in opposition to the weight *b²*, so that the indicator *b'* is concealed behind the screen. As long as the magnet *c* is not excited the lever *a* may be vibrated without

causing the display of the indicator, since the lever *b*, carrying the indicator, is engaged by detent *d'*. When, however, the magnet *c* is excited, the detent *d'* releases the lever *b* and permits the weight *b*², as the lever *a* rises, to withdraw the indicator from its concealed position.

As I have already stated, my invention is not limited to any particular mode of exciting-magnet *c*, but I have mentioned the use of the stop-magnet of a lock-out box as a suitable motor to control the detent. Such an instrument is represented in Fig. 2.

The lock-out mechanism described in my earlier application comprises two electromagnets *f* and *g*, which I have called the "stop-controlling magnet" and the "relay-magnet," respectively, and a telephone-switch having peculiar contacts. The armature of magnet *g* carries relay-contacts which control the continuity of the telephone-circuit at the substation. The armature of magnet *f* is so placed with relation to that of magnet *g* that when magnet *f* is excited its armature-lever is thrown into the path of the relay-lever and prevents the movement of the latter in response to its magnet. The lever *h* of the telephone-switch is provided with two switch-contacts *h'* and *h*², respectively. The first, *h'*, of these is adjusted to make connection with the lever after the latter has moved through a very slight distance. The second, *h*², does not become connected with the lever until it has reached the extremity of its range of movement. Circuit from lever *h* to contact *h'* is thus first closed, and circuit from lever *h* to contact *h*² is completed later, as the switch-hook rises when released from the weight of the telephone. In adapting my present invention to this lock-out mechanism the detent *d'* is carried on the lever *f'* of the stop-controlling magnet.

Fig. 3 is a diagram of a party-line extending to two substations, each of which is furnished with lock-out mechanism and with a "busy-indicator." In this diagram it will be observed that the lever *h* of the switch-hook is connected to earth by a conductor 1. Magnet *g* is in a branch 2 from one line conductor 3, the branch terminating in contact-point *h*² of the switch. Magnet *f* is in a similar branch 4 from the other line conductor 5, this branch being normally open at contact-spring *h'*. The receiving-telephone *i* and transmitting-telephone *i'* are connected in a bridge 6 of the line-circuit, whose continuity is controlled by the relay-contacts *g'* *g*². Line conductor 3 is grounded at any suitable point, as at a central station, through a battery *k* or other source of current. Line conductor 5 may include a signal *l*. For the purpose of tracing the operation of the indicator assume that subscriber at station A requires a connection with another telephone-line. He removes his receiving-telephone *i* from its switch-hook, which, as it rises, closes, first, the branch 4 through conductor 1 to ground

and, later, the branch 2 to the same earth connection. When branch 1 becomes closed, magnet *f* is not excited, since no source of current is included in the circuit which is formed through it. When, however, the branch 2 is closed to ground through magnet *g*, the latter becomes magnetized and, attracting its armature, brings contact-points *g'* *g*² into connection and closes the bridge of the line-circuit, which includes the telephones. It will be observed that since magnet *f* was not excited during the movement of the switch-hook the indicator was prevented from being displayed. Assume, now, that during the use of the telephone at A the subscriber at station B should require the use of the line. He would remove his telephone from its switch-hook; but as the switch-hook in rising first closed the branch 4 to ground a current would be created from line conductor 3 through the existing bridge 6 at station A to line conductor 5 and thence through magnet *f*. The latter magnet would then be excited. In moving its armature it would not only block the movement of the relay-lever, but would release the indicator *b'* and permit it to be displayed as the switch-hook rose. The apparatus at station B is shown in this position.

The substance of my invention is defined in the following claims:

1. In combination, a switch-lever of a telephone set, an indicator adapted to be set by the movement of the lever, a detent controlling the movement of the indicator, and an electromagnet acting upon the detent, as described.
2. The combination with the lever of an automatic telephone-switch, of an indicator adapted to be set by the movement of the telephone-switch, a detent adapted to engage the indicator, and an electromagnet controlling the detent, as described.
3. In a telephone-line extending to several different substations, the combination with a manually-movable lever at each substation, of an indicator adapted to be set by the lever, a detent arranged to engage the indicator to determine its movement, an electromagnet controlling the detent, and means for altering the magnetic condition of the electromagnet at every other substation when the telephone at one substation is brought into use, as described.
4. The combination with the lever of a telephone-switch, of a busy-indicator adapted to follow the lever in its movement, a detent normally engaging the indicator to prevent its movement, and an electromagnet controlling the detent, as described.
5. In combination, a telephone-line extending to several substations, a telephone switch-lever at each station, a busy-indicator adapted to follow the switch-lever and thus to display its signal, a detent normally engaging the indicator, an electromagnet controlling the detent, and a source of current and circuit connections adapted to cause the excitement of

all the electromagnets during the use of the line, as described.

6. In combination, the lever of a telephone-switch, an indicator adapted to be set by the switch-lever in its movement, a detent arranged to engage the indicator, and an electromagnet controlling the detent, a normally open branch of the line-circuit including the electromagnet, and switch-contacts on the telephone-switch for closing the circuit through said branch, as described.

7. The combination with a metallic-circuit telephone-line connected with several substations, having its different line conductors normally separated, of a source of current connected with one line conductor; a telephone-switch at each substation, an indicator adapted to be set by the lever in its movement, a detent engaging the indicator and an electromagnet controlling the detent; a

ground branch from that line conductor with which no source of current is normally connected, including the electromagnet, switch-contacts on the telephone-switch controlling the continuity of the branch, and means for closing a bridge between the line conductors when any telephone is brought into use, as described.

8. The combination with the lever of a telephone-switch, of an indicator adapted to be set by the lever in its movement, and a detent for determining the movement of the indicator, the detent being carried on the stop-lever of a lock-out device, as described.

In witness whereof I hereunto subscribe my name this 12th day of July, A. D. 1895.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,
MYRTA F. GREEN.