

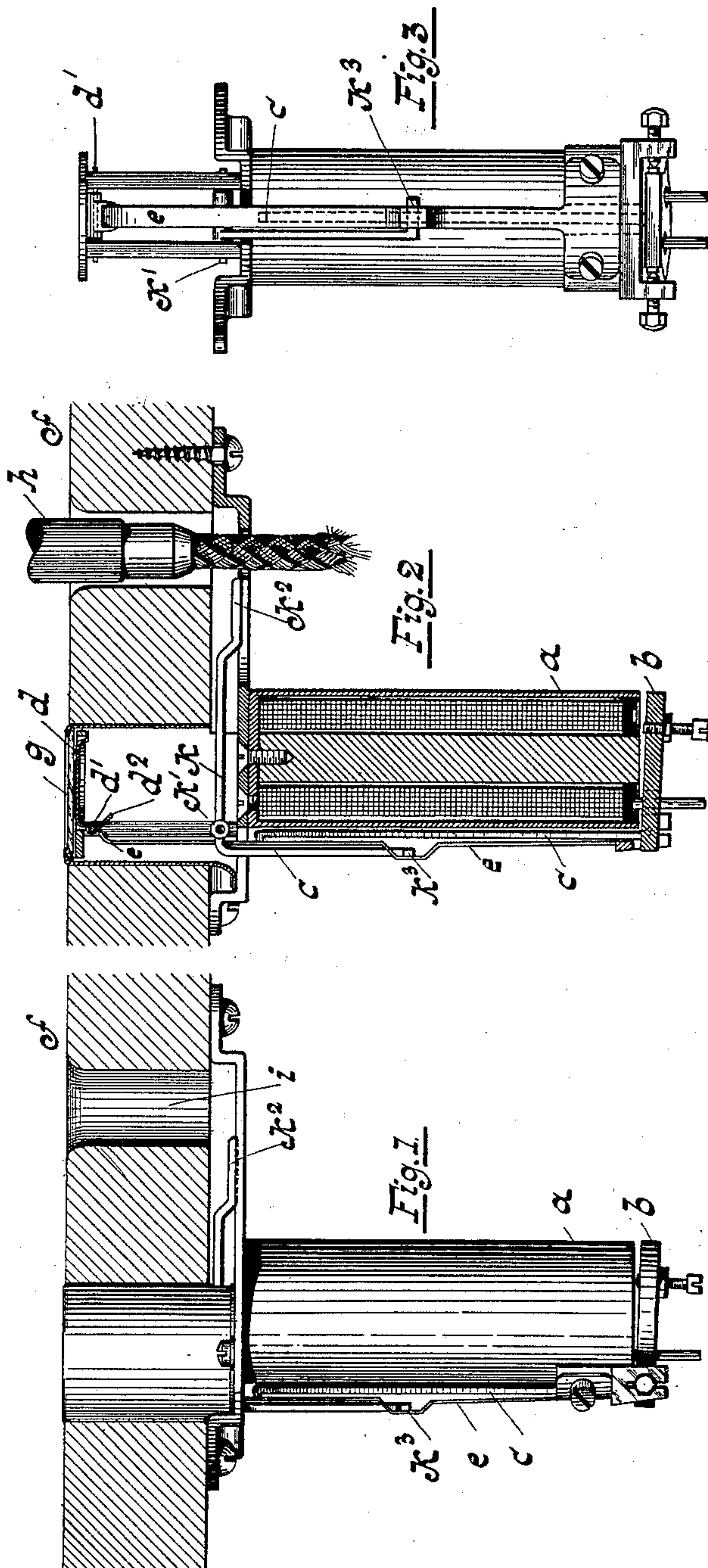
(No Model.)

F. R. McBERTY.

SUPERVISORY SIGNAL FOR TELEPHONE SWITCHBOARDS.

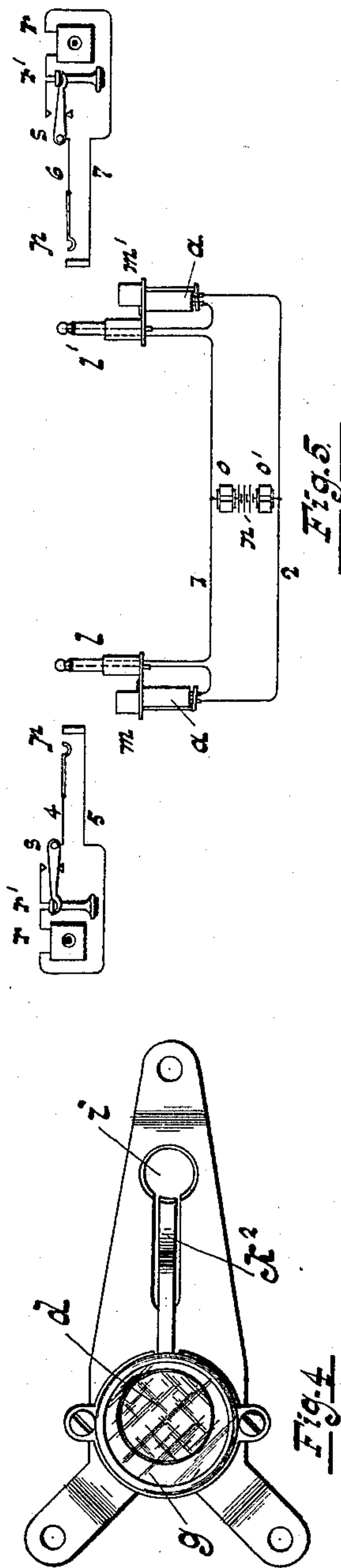
No. 596,609.

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Witnesses:

S. H. C. Tanner.
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UNITED STATES PATENT OFFICE.

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SUPERVISORY SIGNAL FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 596,609, dated January 4, 1898.

Application filed October 26, 1896. Serial No. 610,049. (No model.)

To all whom it may concern:

Be it known that I, FRANK R. MCBERTY, a citizen of the United States, residing at Downer's Grove, in the county of Du Page and State of Illinois, have invented a certain new and useful Improvement in Supervisory Signals for Telephone-Switchboards, (Case No. 44,) 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.

This invention concerns the signals which are associated with the connecting-plugs for uniting lines in a telephone-switchboard, the signals being responsive to current in the line determined by the position of some appliance at the substation and serving to indicate to the operator the use or disuse of the substation-telephone.

In some switchboards employing such supervisory signals the signal has been excited by current in the line during the use of the substation-telephone, the indicator of the signal being arranged to disappear when the telephone is replaced upon its support. The disappearance of a previously-displayed signal is not found to be a sufficiently striking indication, a signal which is displayed when the telephone is no longer in use being found more effective as a call for disconnection. With signals of the latter type, however, it is necessary that the signal shall be concealed not only while the telephone of the line with which it is associated is in use, but also when the plug or other appliance to which it refers is not in use, since otherwise in the ordinary switchboard the signal would be one of a group of similar indicators all of which would be displayed, and its return to the same condition as others in the vicinity would not be a sufficiently positive indication. This difficulty may be avoided in certain instances by providing a signal whose indicator is displayed when its magnet is excited in connection with a circuit which is open both while the switchboard appliances are not in use and while the station-telephone of the line with which the signal may be connected is in use, but which becomes closed when the telephone is replaced on its support at the substation. Such a circuit is found to be im-

practicable in many cases, however, it being much more convenient to permit the flow of current continuously in the line-circuit during the use of the telephone. The present invention is adapted to this last-mentioned condition and involves a signal-indicator adapted to display its signal when its magnet is not excited, and accessory mechanism normally operated to effect the concealment of the indicator through the agency of some connecting appliance in the switchboard while in its normal position. I find the connecting-plug to be the appliance most suitable for use in effecting this change in the condition of the signal. I therefore provide in the normal resting-socket of each connecting-plug a device made operative by the presence of the plug in its socket and acting to conceal the indicator of the supervisory signal. Hence while the connecting-plugs are not in use the indicators of the corresponding supervisory signals are not in sight. While a plug is in use in connection with the line of a subscriber engaged in conversation the indicator is still concealed, being maintained in that condition by the continued excitement of the magnet, and at the termination of conversation, the magnet becoming inert, the indicator is displayed and gives the signal for disconnection. A suitable form of signal for this purpose may comprise an electromagnet adapted for inclusion in the line conductor, a pivoted indicator tending to present itself before an opening, an arm carried by the armature of the electromagnet acting when the armature is attracted to displace the indicator, and a lever in the plug-socket arranged to receive the weight of the plug and having an engagement with the signal-controlling indicator to act thereon in the same manner as does the magnet.

The invention is illustrated in the annexed drawings.

Figure 1 of the drawings is a side elevation of the indicator, the plug-socket, and the intermediate target-controlling mechanism. Fig. 2 is a vertical sectional view of the same apparatus. Fig. 3 is a rear elevation of the same. Fig. 4 is a plan of the device, the plug-socket not being shown. Fig. 5 is a diagram representing its use in connection with

a telephone-line, two lines being shown united by means of two plugs and their plug-circuit and two supervisory signals being provided in association with the different plugs.

5 The signal-indicating appliance consists of a tubular magnet *a*, an armature *b*, an arm *c*, carried on the armature, an indicator or target *d*, and a spring *e*, acting upon the target. These parts are assembled in any convenient way for attachment to the under surface of the keyboard or shelf *f* of the switch-board. An opening *g* is provided through the casing of the signal appliance, at which the target *d* is designed to be displayed. This target consists of a light disk of metal pivoted in a fixed support at *d'* at one edge and having an extension *d''* in the nature of an arm of a bell-crank lever. The spring *e*, fixed at its lower extremity, is arranged to engage the extension *d''* and has sufficient tension to throw the target into a horizontal position, whereby it will be displayed at the opening *g*. The arm *c*, carried by the armature, lies in position to engage the spring *e* and thrust it out of connection with the extension *d''* when the armature is attracted. Normally, however, the armature being unattracted, the arm *c* lies in position to permit free play of the spring.

30 Connecting-plug *h* rests normally in a socket *i* in the keyboard, the flexible conducting-cord of the plug passing through an opening in the bottom of the socket. In order to bring the indicator of the signal under the control of the plug, a bell-crank lever *k*, pivoted at *k'* to a suitable fixed support, is provided with an extension *k''*, lying in the socket *i* in position to receive the weight of the plug and to be carried down thereby, and with a stud *k'''*, which lies in position to engage the target-controlling spring *e*. The pressure of spring *e* upon stud *k'''* tends to raise the extension *k''* in the socket when the lever is relieved from the weight of the plug. When the plug is in the socket, the stud *k'''* presses the spring *e* out of engagement with the indicator *b*, and thus permits the latter to fall into its concealed position, the action of the lever *k* when sustaining the weight of the plug being the same as respects the indicator as that of the magnet *a* when excited.

In associating this supervisory appliance with the plugs and plug-circuit, as represented in Fig. 5, the magnet *a* may be included serially in one of the conductors of the plug-circuit 1 2, which unites the connecting-plugs *l l'*. Two supervisory signals *m m'* are provided, one referring to each of the connecting-plugs. A bridge-conductor 3 of the plug-circuit includes a source of current *n*, together with impedance-coils *o o'* for preventing the shunting of telephonic current through the bridge. The magnets of the supervisory signals may be provided of non-inductive resistances in shunt of their helices, so as to present slight obstruction to telephonic currents in the circuit. This plug-circuit is used in

connection with telephone-lines 4 5 and 6 7, each of which terminates in a spring-jack *p* and is provided at its substation with transmitting and receiving telephones *r* and *r'*. The circuit including the telephones is of a comparatively low resistance. Hence while the line-circuit is closed at the substation through the telephones through the agency of the telephone-switch *s* sufficient current flows in the line to energize the magnets of the supervisory signals. When the telephones, being no longer in use, are replaced upon their switches, this low-resistance circuit is interrupted and the magnets of the supervisory signals become inert. Thus while the connecting-plugs are not in use they rest in their sockets and maintain the indicators of the supervisory signals associated with them in concealed condition. When either plug is used in making connection with the line, the indicator of the corresponding signal becomes displayed as long as the substation-telephone remains on its switch-hook, becoming effaced when the telephone is removed for use. When the telephone is replaced, the indicator again comes into view. When both indicators thus appear, they may have jointly the significance that the conversation is terminated and connection may be removed.

It will be understood that other mechanism than that described may be employed to conceal the indicator while the plugs are in use, or, indeed, that such mechanism may be used in connection with some other appliance of the plug-circuit, which lies normally in one position while the plugs are not in use and is brought into a different position during the use of the plugs or during particular stages in the process of making and removing connection between the lines.

I claim as my invention—

1. The combination with a telephone-line and means for altering its electrical condition, of a signal-indicator associated with the line, a magnet controlling the indicator responsive to currents in the line, an appliance whose position or condition is altered during connection with the line, and a mechanical device actuated in the movement of said appliance adapted to act upon the indicator in the same manner that the magnet does, as described.

2. The combination with a telephone-line and means for changing the electrical condition of the line while the telephone is in use, of a signal-indicator associated with the line, a magnet controlling the indicator responsive to currents in the line, an appliance whose position is altered in the act of making connection with the line, and a mechanical device actuated by the said appliance when its position is changed, adapted to move the indicator in the same manner that the magnet does, while the said appliance is in use, as described.

3. The combination with a telephone-line, a source of current therein and a circuit at the substation closed through the substation-telephone continuously during the use thereof, of

a plug and plug-circuit for making connection with the line, a signal-indicator associated with the plug, an electromagnet responsive to currents in the line controlling the indicator, and mechanism in the normal resting-socket of the plug also controlling the indicator in the same way that the said magnet controls it, as described.

4. The combination with a telephone-line and means for producing current in it continuously during the use of the telephone, of a plug and plug-circuit for making connection with the line, a signal-indicator associated with the plug, a magnet controlling the indicator excited by the current in the line and adapted thereon to cause the concealment of the indicator, and mechanism in the plug-socket made active through the presence of the plug in its socket adapted to conceal the indicator; substantially as described.

5. The combination in a supervisory signal of an indicator and means for causing its display, an electromagnet adapted to prevent the display of the indicator when excited, and a mechanical device in the plug-socket acting upon said indicator to prevent its display when the plug is present in the socket, as described.

6. The combination with a connecting-plug and the normal resting-socket thereof, a signaling instrument comprising a magnet and a target controlled thereby associated with the plug, of a mechanical device in the plug-socket to be operated by the plug adapted to conceal the signal, substantially as described.

7. The combination with a group of telephone lines and switches at the stations thereof for closing the lines during the use of the telephones, of plugs and a plug-circuit therefor independent of the lines adapted to be connected with one line, a magnet connected

with the plug-circuit and an indicator controlled thereby to be displayed when the magnet is inert, a resting-socket for one of the plugs and mechanism therein controlling the indicator to effect its concealment when the plug is in its socket, and a source of current adapted to be brought into circuit of a line and the plug-circuit when a plug is connected with the line and to produce current through the said magnet while the telephone is in use at the substation of the line; whereby the indicator is concealed when the plug is disconnected from the line and in its socket, or when the plug is connected with the line and the line is in use, being displayed when the plug is connected with the line and the line is not in use, as described.

8. The combination with a group of telephone lines and switches at the stations thereof for closing the lines during the use of the telephones, of a pair of plugs and a plug-circuit therefor independent of the lines, each plug being adapted to be connected with a line, a magnet connected with the plug-circuit and an indicator controlled thereby to be displayed when the magnet is inert, an appliance associated with the plug-circuit whose position is changed during the use of the plugs in uniting lines, and mechanism actuated by the said device adapted to conceal the indicator when the plugs are not in use, a source of current and means for closing a circuit thereof through the said magnet and the telephone-line with which a plug is connected, substantially as described.

In witness whereof I hereunto subscribe my name this 13th day of August, A. D. 1896.

FRANK R. MCBERTY.

Witnesses:

ELLA EDLER,

W. M. CARPENTER.