No. 750,689. PATENTED JAN. 26, 1904.

F. D. PEARNE.

PLUG FOR TELEPHONE SWITCHBOARDS.

APPLICATION FILED APR. 20, 1903.

NO MODEL.

Fig. 1.

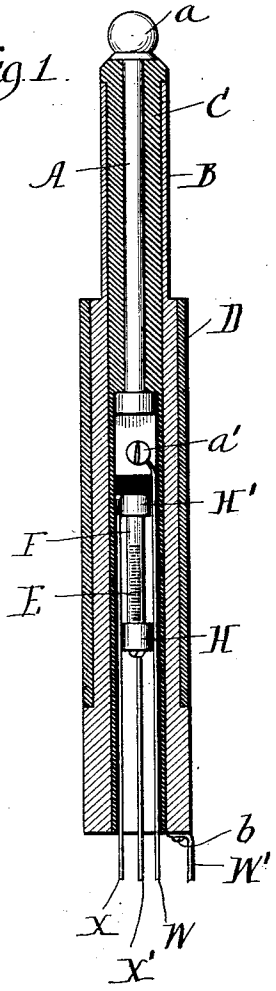


Fig. 2.

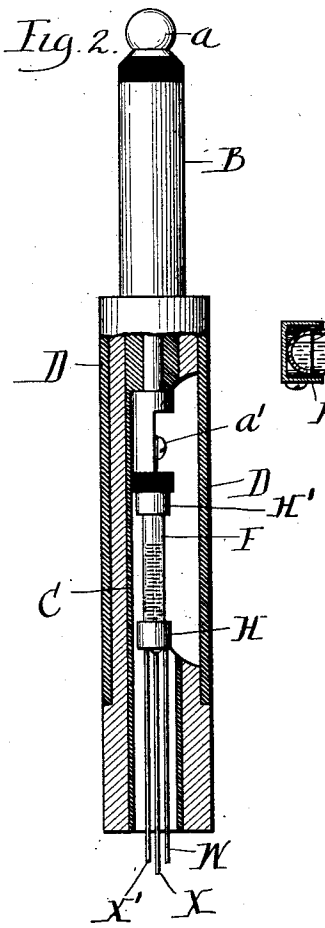


Fig. 3.

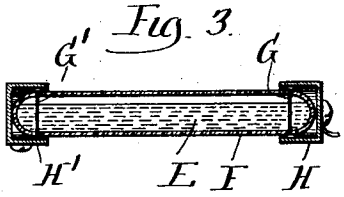
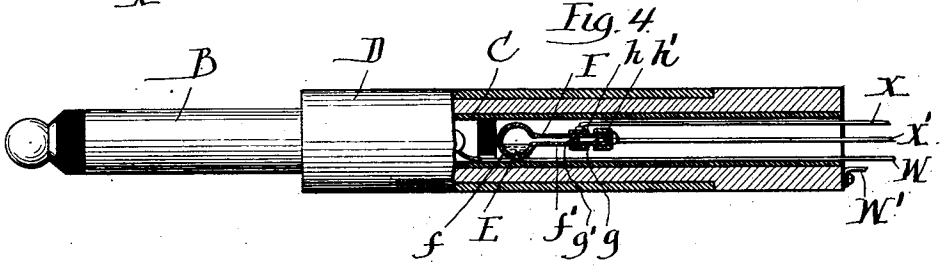


Fig. 4.



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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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UNITED STATES PATENT OFFICE.

FRANK D. PEARNE, OF CHICAGO, ILLINOIS, ASSIGNOR TO PEARNE, KRUM & COMPANY, OF CHICAGO, ILLINOIS, A COPARTNERSHIP.

PLUG FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 750,689, dated January 26, 1904.

Application filed April 20, 1903. Serial No. 153,567. (No model.)

To all whom it may concern:

Be it known that I, FRANK D. PEARNE, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Plugs for Telephone-Switchboards, of which the following is a full, clear, and exact description.

Signals and operating-circuits therefor have heretofore been provided for coöperation with the ordinary telephone-switchboard plugs and spring-jacks for controlling the talking-circuit whereby the operator at a distant switchboard would be notified visually as to the making and breaking the talking wire circuit. For the control of this signal-circuit means have heretofore been provided upon the plug-supporting key-shelf whereby when the plug on being withdrawn from the spring-jack of the switchboard is dropped to vertical position in its seat or socket of the key-shelf the signal-circuit will be automatically broken, thereby notifying the operator at the distant station that the talking-circuit has been broken. Various objections have been found to exist in the means heretofore provided on the plug-supporting table for automatically controlling the signal-circuit at the switchboard-plug, principally because dust collects upon the contacts of the circuit and interferes with the accuracy of operation; and the main object of the present invention is to provide a plug with automatic circuit-controlling means that shall be free from such objections.

The invention will be hereinafter described with reference to the accompanying drawings, forming a part of this specification, and will be particularly defined in the claims at the end of this specification.

Figure 1 is a view in central longitudinal section through a telephone-switchboard plug embodying my invention. Fig. 2 is a similar view, parts being shown in elevation. Fig. 3 is a detail view in section through the means carried by the plug for automatically controlling the signal-circuit. Fig. 4 is a view, partly in side elevation and partly in central longitudinal section, showing a modified form of the invention.

In the accompanying drawings the invention is shown as applied to one familiar form of switchboard-plug; but it will be readily understood that the invention is applicable to plugs of any suitable character.

A designates the stem of the plug, the tip *a* and sleeve B of which are adapted to enter the spring-jacks of the switchboard and make electrical contact therewith. C designates the insulating-sleeve, of rubber or like suitable material, between the stem A and the sleeve B. Around the sleeve B is set a cover or sleeve D, of indurated fiber or like material. The sleeve B is reduced peripherally to receive the cover D and to enter the spring-jack. To the inner end of the stem A is connected by a screw *a'* one of the terminal wires W of the talking-circuit, and the other wire W' of this circuit is connected, as at *b*, to the end of the metal sleeve B.

Within the chamber of the insulating-sleeve C that encircles the stem A and sets within the contact-sleeve B is shown the improved means whereby the passage of current through the signal-wires X and X' is controlled, although it is not essential to the broad feature of my invention that these means should be placed inside the plug.

My invention for controlling the passage of current through the signal-wires comprises, broadly, a plug adapted for use with the ordinary switchboard-jack and provided with means for automatically controlling the signal wire circuit as the plug is shifted into and out of the switchboard-jacks from vertical to horizontal position, and vice versa, and in the preferred form of the invention the signal-controlling means consists of a movable body, preferably a fluid of good conductivity, which shall be shifted by gravity to make or break the signal wire circuit at the plug, accordingly as the plug is in horizontal or vertical position. If the signal-circuit be a normally open circuit that must be closed for transmitting the signal when the plug is placed in the spring-jack of the switchboard, then the movable body that controls the signal-circuit will serve to close such circuit when the switchboard-plug is in horizontal position; but, on the

other hand, if the signal-circuit be a normally closed circuit that is to be opened for the transmission of the signal when the plug is inserted in the spring-jack then the movable body that controls the signal-circuit will serve to break the signal-circuit when the plug has been placed in the switchboard and close the circuit when the plug has been restored to vertical or idle position.

In Figs. 1, 2, and 3 of the drawings the invention is shown as adapted for controlling a normally open signal-circuit, while in the modified form of the invention shown in Fig. 4 my invention is shown as adapted for controlling a normally closed signal-circuit.

In the preferred form of the invention a body of mercury E or other fluid of good conductivity is inclosed within a casing F, preferably of glass tubing from which the air has been previously exhausted. Into or through this tubing extend metal contacts G and G′. As shown, these contacts G and G′ consist of wires that are inserted in the glass of the tubing or casing F, while the glass is in plastic condition, the ends of the contact-wires G and G′ extending to the outside of the casing or tubing F. Preferably metal caps H and H′ set over the ends of the casing F and are electrically connected to the contacts G. To these caps H and H′ connect, respectively, the ends of the signal-wires X and X′ that lead from the plug. As shown in Fig. 2, one side of the insulating sleeve or casing C and the metal sleeve B are cut away to permit access to the interior of the plug upon removal of the cover or jacket D.

From the foregoing description it will be seen that so long as the plug is in the normal vertical position (shown in Figs. 1 and 2 of the drawings) the body of mercury E, which does not fill the tube or casing F, will stand below the contact G, and hence the signal-circuit will not be completed through the contacts G and G′; but when the plug is brought to horizontal position and placed within the spring-jack of the switchboard the body of mercury E will assume the position shown in Fig. 3 of the drawings, and in such position will electrically connect the contacts G and G′ and will close the signal-circuit between such points. When the plug is withdrawn from the switchboard and restored to idle vertical position upon the key-shelf, the body of mercury E will by gravity return to the position shown by Figs. 1 and 2 and automatically break the circuit between the contacts G and G′. It will thus be seen that the mere act of shifting the plug to and from normal position will effectively serve to automatically control the passage of current through the signal-circuit of the wires X and X′.

If the signal-circuit be a normally closed circuit—that is to say, a circuit closed when the switchboard-plug is in vertical or idle position—then the form of the invention shown in Fig. 4 of the drawings is preferably employed. In this form of the invention the tube or casing F that contains the body of mercury E is formed with an enlargement f and with a contracted portion f'. In the contracted portion f' are embedded the contacts g and g', these contacts consisting, preferably, of short wires passing through the contracted portion f' of the tube or casing and having their ends hermetically united thereto and extending outside the tube or casing. With the contact g connects the terminal h' of the wire X′, and with the contact g' connects the terminal h of the wire X. With this form of the invention when the plug is in vertical position the body of mercury E will stand within the contracted portion f' of the casing and will close the circuit between the contacts g and g'; but when the plug is in horizontal position the body of mercury E will flow into the bulb or enlarged portion f of the casing F and will break the circuit between the contacts g and g'. With this form of the invention, as with that hereinbefore described, it will be seen that the shifting of the plug from the horizontal to the vertical position serves to automatically control the passage of current through the signal-circuit.

The invention thus provides a switch-plug which may be used with the ordinary switchboards now in use and by which the condition of a supplemental or signal circuit is automatically changed when the plug is inserted into one of the switchboard-jacks and is restored to normal condition when the plug is returned to vertical position upon the operator's key-shelf.

It is manifest that the details of construction above set out may be varied within wide limits without departing from the spirit of the invention. Thus, for example, instead of employing a body of mercury for controlling the flow of current through the signal-circuit a body of acid or other fluid of good conductivity might be employed, or a spherical body adapted to move by gravity, as the plug is shifted, might be used.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A switchboard-plug provided with line-terminals and with supplemental-circuit terminals and means carried by the plug for automatically controlling the passage of current between said supplemental terminals as the plug is shifted to and from its normal position and into and out of the switchboard-jacks.

2. The combination with a switchboard-plug, of line-wires and supplemental-circuit wires leading to the plug, means automatically controlling the passage of current through the terminals of said supplemental-circuit wires comprising a movable body carried by the plug and shiftable by gravity to make and break connection through said terminals as

the plug is shifted to and from its normal position and into and out of the switchboard-jacks.

3. A switchboard-plug provided with line and supplemental-circuit terminals and with means automatically controlling the passage of current between said supplemental terminals as the plug is shifted to and from normal position and into and out of the switchboard-jacks, said means comprising a casing carried by the plug and having contacts with which the supplemental-circuit terminal-wires are connected and a movable body within said casing adapted to shift by gravity as the plug is moved from horizontal to vertical position and thereby change the condition of the supplemental circuit at the plug.

4. The combination with a switchboard-plug and with line and supplemental-circuit wires connected to said plug, of means for automatically controlling the passage of current through said supplemental circuit as the plug is shifted into and out of the switchboard-jacks, such means comprising a casing or tube mounted on the plug, a movable body within said casing or tube and contacts exposed within said casing or tube to contact with said movable body and connect the supplemental-circuit wires.

5. A switchboard-plug provided with line and supplemental-circuit terminals and with means automatically controlling the passage of current between said supplemental terminals as the plug is shifted into and out of the switchboard-jacks, said means comprising a hermetically-sealed tube or casing, a movable body of fluid within said tube or casing, contacts within said tube or casing adapted to be engaged by said fluid body and connected to said supplemental-circuit terminals.

6. The combination with a switchboard-plug and with line and supplemental-circuit wires connected thereto, of means for automatically controlling the passage of current through said supplemental-circuit wires as said plug is shifted into and out of the switchboard-jacks comprising a tube or casing carried by the plug and having contacts extending from the interior to the outside thereof, terminals connecting said contacts with said supplemental-circuit wires and a movable body within said tube or casing for controlling the passage of current between said contacts.

7. A switchboard-plug provided with line and supplemental-circuit terminals and with means automatically controlling the passage of current between said supplemental terminals as the plug is shifted to and from normal position and into and out of the switchboard-jacks, said means comprising a hermetically-sealed glass tube or casing, contacts extending from different points of the interior of said tube or casing to the outside thereof and connected to said supplemental-circuit terminals and a body of mercury within said tube or casing for controlling the passage of current between said contacts.

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