

No. 641,373.

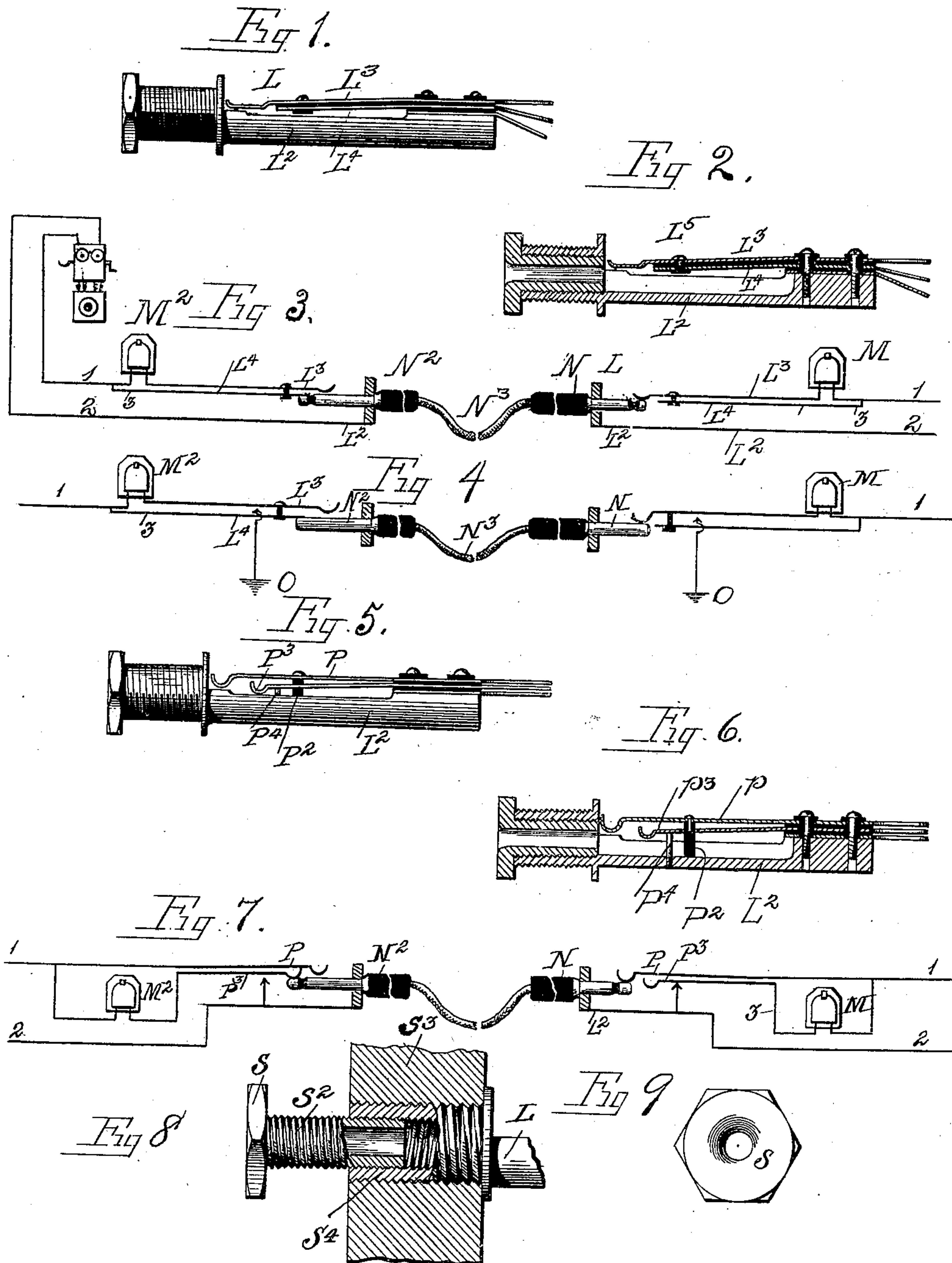
Patented Jan. 16, 1900.

F. B. COOK.
TELEPHONE SWITCHBOARD.

(Application filed Feb. 8, 1898.)

(No Model.)

2 Sheets—Sheet 1.



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2 Sheets—Sheet 2

Fig. 10.

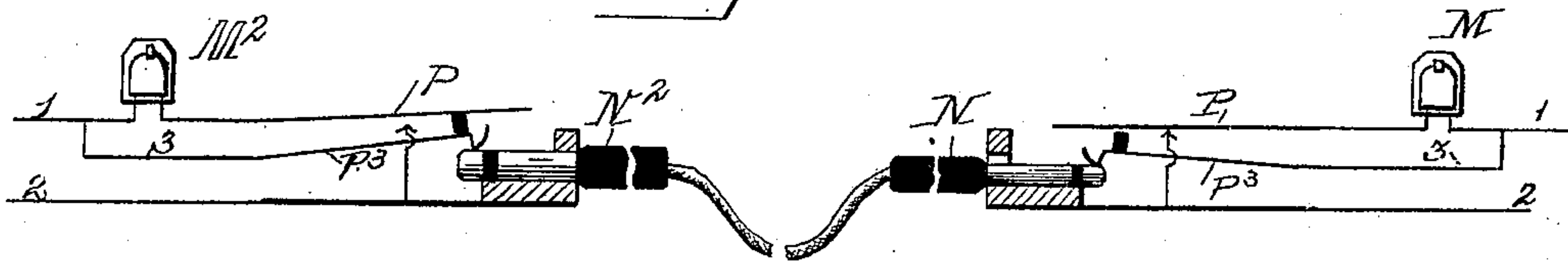
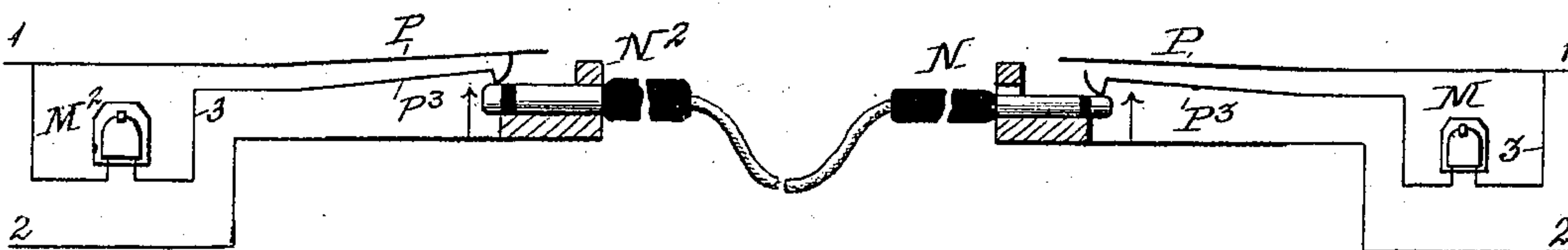


Fig. 11.



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UNITED STATES PATENT OFFICE.

FRANK B. COOK, OF CHICAGO, ILLINOIS.

TELEPHONE-SWITCHBOARD.

SPECIFICATION forming part of Letters Patent No. 641,373, dated January 16, 1900.

Application filed February 8, 1898. Serial No. 669,506. (No model.)

To all whom it may concern:

Be it known that I, FRANK B. COOK, 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 Telephone-Switchboards, of which the following is a specification.

My invention relates to that class of switchboard apparatus by which a connection is established for conversation between the lines or circuits of two subscribers on the switchboard and by which the operator at the switchboard may be notified to disconnect the lines by either one of the subscribers when conversation is completed.

When the subscribers whose lines or circuits are coupled together for conversation at the switchboard have completed their conversation, it is necessary to signal the operator at the switchboard to disconnect these lines. This signal is given by the subscriber, who generates a current at his station which operates an annunciator to display a number or in some instances illumines an electric light as a signal. Heretofore an annunciator or other signal device has been employed which is supplemental or independent of the signal device for calling. Connection between the circuits of two subscribers is effected by means of two plugs connected together by a flexible conductor or conductors, each of which plugs is inserted in the spring-jacks or switch-socket of the two subscribers to be coupled, a switch-socket on the switchboard being provided for each subscriber's line. The separate signal device for giving a disconnecting-signal, or, as it is termed, a "clearing-out" signal, is usually included in the circuit of the flexible conductor or conductors connecting the plugs together, termed the "cord-circuit." A separate supplemental signal device is now employed, located in the cord-circuit, to prevent the occurrence of a false signal when a number of operators are employed at different sections of the switchboard, the two calling-annunciators, one for each subscriber, being cut out of the circuit by the insertion of the plugs into the spring-jacks. This cutting out of the annunciators also excludes the resistance and impedance of their electromagnet-coils from the conversation-circuit, leaving, however, the separate

clearing-out annunciator of the two connected lines in the cord-circuit, with its resistance and impedance to respond to the current from either one of the subscriber's stations generated in "ringing off."

The object of my invention in this regard is to retain these advantages heretofore obtained, but dispense entirely with a separate independent clearing-out-signal device, employing one of the calling-signal devices for clearing-out signals and to accomplish this result without requiring the exercise of any special skill or judgment upon the part of the operator.

My invention has certain other objects in view; and it consists in certain features which will be fully described, and pointed out in my claims, reference being now had to the accompanying drawings, in which—

Figures 1 and 2 are respectively a side and a longitudinal sectional view of a spring-jack for a series complete metallic circuit arrangement adapted for use in connection with the means of effecting a clearing-out signal. Fig. 3 is a diagrammatic view of the complete metallic series-circuit arrangement, showing the plugs inserted in the special spring-jacks with one line-annunciator cut out and the other in circuit to respond for a clearing-out signal. Fig. 4 is a like view of a grounded circuit. Figs. 5 and 6 are respectively a side view and a longitudinal sectional view of a spring-jack for "bridging" arrangement. Fig. 7 is a diagrammatic view of the same. Figs. 8 and 9 are respectively a front or face view of the jack and an enlarged sectional view showing the removable and replaceable jack-opening ring or thimble. Figs. 10 and 11 are diagrammatic views showing a pair of plugs of relatively different cross-sections.

My invention consists in certain features relating to the spring-jacks and plugs of the cord-circuit whereby long and short plugs may be employed, with which one annunciator in the line may be cut out or excluded from the line and the other permitted to remain in the line to respond and give a clearing-out or disconnecting signal.

My invention also further consists in certain other features about to be described, and clearly pointed out in my claims.

I will first describe my invention as applied

to a series metallic circuit, spring-jacks therefor, and connections.

It will be understood that the spring-jacks L are all the same in point of construction, comprising the sleeve L^2 and the main contact-spring or spring-strip L^3 and the supplemental strip L^4 . As shown in Fig. 2, these two contact-springs are held together by the rivet L^5 , but are insulated from each other. The lead 1 of the metallic circuit is extended through the coils of the annunciator M and then connected with the main spring contact-strip L^3 , and the other lead 2 of the circuit is connected to the sleeve L^2 of the jack. A branch lead 3 is tapped onto the main lead 1, just beyond the annunciator M, and connected to the supplemental spring contact-strip L^4 of the jack.

I provide the plugs N and N^2 on either end of the conducting-cord N^3 , the plug N being relatively short and the other plug N^2 relatively long. These plugs, except as to relative length, are both of the same construction as ordinarily used for complete metallic circuits, being connected together through the cord N^3 by the circuit-wires.

In ordinary practice to connect any two circuits together at the switchboard plugs of the same length and construction are used with their connecting-cord, the plugs being inserted in the spring-jacks of the two subscribers on the switchboard, whereby the circuit is established through the line or leads of the circuit for the one subscriber's station to the spring-jack, from thence to the plug therein, and from this plug through the connecting-cord circuit to the plug, spring-jack, and line of the other subscriber. When the annunciator M or M^2 is operated, it displays the number of the subscriber extending that signal, whereupon the operator ascertains the number of the subscriber with whom conversation is desired by means not necessary to be explained herein. These annunciators are therefore termed "calling-annunciators." In ordinary practice, also, a special annunciator or signal device is provided separate from the annunciators M and M^2 , included in the cord-circuit N^3 , whereby either or both of the subscribers may signal the operator at the switchboard that conversation is completed, whereupon the operator disconnects the two lines by withdrawing the plugs from the spring-jacks. As the electromagnet-coils of the annunciators M and M^2 offer a substantial resistance and impedance to the talking-currents, resort has been had to an arrangement whereby the calling-annunciators are cut out of the circuit entirely when the plugs are inserted in the spring-jacks. In this arrangement the annunciators are not located or included in the line-circuit, as in my improved system and as shown in the several figures.

I employ one of the two calling-annunciators M M^2 for the purpose of receiving and

indicating a clearing-out or disconnecting signal, and cut out the other one of the annunciators by means which I will now describe.

When the operator receives a calling-signal by one of the annunciators—say, for instance, the annunciator M—she then inserts the short plug N in the spring-jack of that annunciator, answers the call, and upon obtaining the number of the subscriber with whom conversation is desired inserts the long plug N^2 in the jack of that subscriber. The lines of the subscribers are now coupled for conversation through the tip of each of the plugs N and through the sleeves of the jacks; but it will be observed that the annunciator M^2 is cut out of or excluded from the talking-circuit, while the other annunciator M remains in the line to be operated by a current from either subscriber's station to indicate a disconnecting or clearing-out signal. The annunciator M^2 is cut out as the current takes the path over the branch wire 3, the supplemental contact-spring strip L^4 of which is reached and connected with the tip of the long plug N^2 , and as the main contact-spring strip L^3 is connected and moves with the contact-strip L^4 it is moved away from and out of contact with the plug by the plug, thus leaving this limb of the lead 1 through the annunciator open at the jack. The annunciator M remains in the line-circuit, as the tip of the short plug N reaches only to the end portion of the main contact-strip L^3 , connected with the lead 1 of the line through the annunciator M, and cannot reach to or make connection with the contact-spring L^4 , connected to the branch lead 3 around the annunciator. By this means I dispense entirely with a signal device used specially for giving clearing-out signals and yet interpose the resistance and impedance of only one signal device in the talking-circuit, as I cut out one of the annunciators with the long plug.

In sectional switchboards a false signal is prevented by inserting the short plug in the jack of the calling subscriber, thus leaving the calling-annunciator of that subscriber in the talking-circuit to respond to a clearing-out signal, and inserting the long plug in the jack of the subscriber called or to be called.

In Fig. 4 I have shown the same system in connection with subscribers' circuits which are returned through the common ground at O or a common return-wire.

In my improved system or arrangement it is apparent that the calling-annunciators are directly included in the line, or, in other words, the annunciators are between the line and the jacks and not between the jacks and the ground or return, as is usually the case in the ordinary arrangement, that the use of a separate annunciator is avoided without increasing the resistance or impedance, false signals prevented, and no special skill on the part of the operator demanded.

In Figs. 5, 6, and 7 I have shown the same plan as applied to a bridging-circuit arrangement, in which the annunciators are bridged across between the leads of the line-circuit.

5 In this arrangement the construction of the spring-jack differs somewhat from that of the series arrangement. I provide a main contact-spring strip P, which is insulated and held away from the sleeve L² of the spring-jack L by the insulating-pin P², the supplemental contact-strip P³ being connected normally with the conducting-sleeve of the plug by the conducting-pin P⁴. As shown in Fig. 7, the annunciators M and M² are in parallel
15 or bridged between the leads 1 and 2 of the line-circuit. When the short plug N is inserted in the jack, as shown at the left hand of the figure, the tip of the plug makes contact with the main strip P of the jack, and as
20 it cannot reach the supplemental strip P³ this strip remains in circuit with the sleeve of the jack through the pin P⁴, on which it rests, and therefore the annunciator remains bridged across between the lines 1 and 2 in circuit to
25 give a clearing-out signal. When the long plug is inserted in the jack, as shown at the left of the figure, its tip engages the supplemental strip, lifting it from its seat upon the contact or conducting pin P⁴ and forcing it
30 into contact with the main strip P. The bridging-limb 3 of the circuit is therefore broken at the contact-pin P⁴, excluding the annunciator from the line-circuit and connecting the line with the plug through the two strips
35 P and P³ on one side and the sleeve of the jack on the other.

In Figs. 10 and 11 I have shown, respectively, a bridging and series circuit arrangement in which practically the same results
40 are accomplished, as hereinbefore described, by means of a pair of plugs relatively of different cross-section.

In Figs. 8 and 9 I have shown a detail of the fastening or securing means for a protecting-ring to be positioned about the jack-opening on the switchboard. In the continued use of a switchboard the operators in
45 their haste to effect connections frequently strike and batter the jack-openings with the plugs to an extent which render the jacks unfit for use. Heretofore when this occurs
50 it has been necessary to remove the injured or damaged jack as an entirety and replace the same with a new one. This process is expensive and consumes some time, which
55 interferes with the operation of the board. I provide a protecting-ring of metal or other suitable material (designated at S) having the hollow screw-threaded shank S² extended
60 therefrom. The jack L is secured to the switchboard S³ by the screw-threaded hollow shank S⁴, the interior of which is screw-threaded to receive the screw-threaded shank S² of the protector. I provide by this con-

struction a means of protecting the jack- 65 opening by a removable member independent of the jack. Thus when the protecting member S is worn or damaged by receiving the repeated blows of the plug this removable member may be unscrewed from the jack- 70 shank S⁴ and replaced by a new protecting member. This exchange is effected from the front of the switchboard and without interfering in any manner with the jack. In fact, it is not necessary to touch the jack at all, as 75 the protecting member is inserted from the front of the switchboard by screwing it into the jack and unscrewing it therefrom, the jack remaining stationary.

Having thus described my invention, what 80 I claim as new therein, and desire to secure by Letters Patent, is—

1. A spring-jack switch and connections therefor, comprising a main contact-strip and a supplemental contact-strip of relative dif- 85 ferent dimensions, together with plugs of different relative dimensions, one of which is of such dimensions that when inserted it makes contact with the main strip only and the other plug of such dimensions as to make 90 contact with the supplemental strip.

2. In a telephone central-station system the combination with the spring-jacks and plug connections, of a circuit comprising a plurality of branches from the line, one of 95 which includes the annunciator and plugs of different dimensions, the larger adapted to open the branch including the annunciator and make contact with the other, whereby the annunciator is excluded from the line-cir- 100 cuit and the other plug of lesser dimension adapted to make contact with the line but not open the branch including the annunciator whereby the annunciator remains in the line-circuit to respond as a clearing-out signal. 105

3. In combination with a spring-jack switch, a circuit comprising two branches from the line, one of which including the annunciator is normally closed and the other normally open and means for making contact with 110 either one of said branches independent of the other.

4. In a telephone-switchboard, spring-jacks, connecting conductor and plugs therefor, two branch limbs from the line-circuit, one nor- 115 mally open and the other normally closed, an annunciator in the branch which is normally closed, and spring-jack contact-strips, one for each of the said branch limbs, in such proximity to each other that the plug, when inserted 120 in the spring-jack, forces one contact-strip into contact with the other, thereby cutting out the annunciator.

5. In a telephone-switchboard, spring-jacks, two branch limbs from the line-circuit, one 125 normally open and the other normally closed, an annunciator in the branch which is normally closed, spring-jack contact-strips, one

for each of the said branch limbs, plugs of
different dimension, said contact-strips being
in such proximity to each other that when
one of said plugs is inserted in the spring-
5 jack, one of the contact-strips is forced into
contact with the other, thereby cutting out
the annunciator, and when the other plug
is inserted establishing connection between

itself and the line and leaving the annunciator
in the closed branch. 10

In testimony whereof I affix my signature
in presence of two witnesses.

FRANK B. COOK.

Witnesses:

WALTER E. DOOLITTLE,
JOHN F. TOMPKINS.