Oct. 4, 1932. P. S. COPENHAVER ET AL 1,880,824

SWITCHBOARD JACK

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FIG.1.

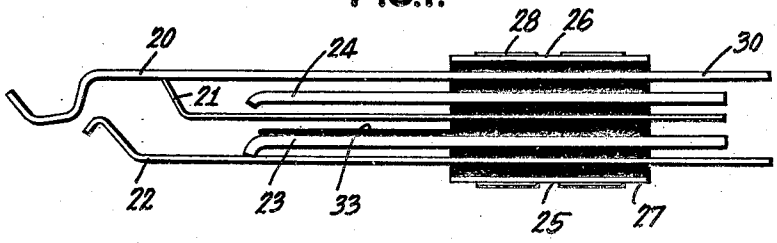


FIG.2.

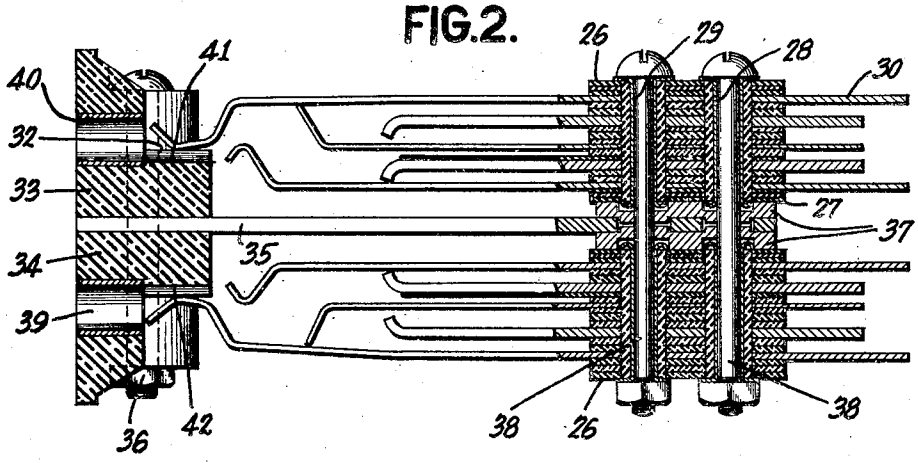
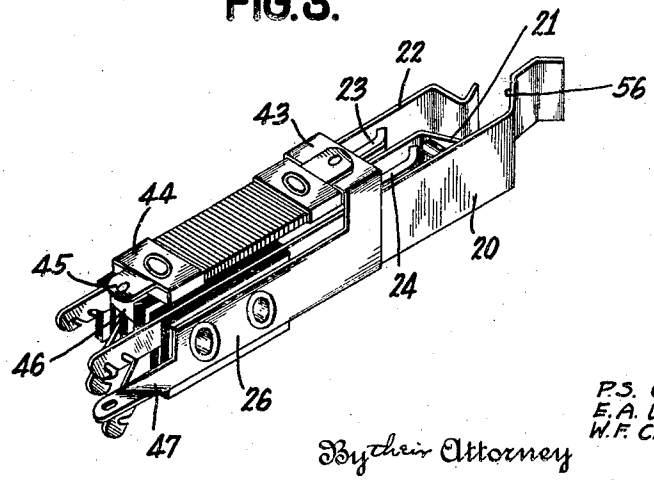


FIG.3.



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FIG.4.

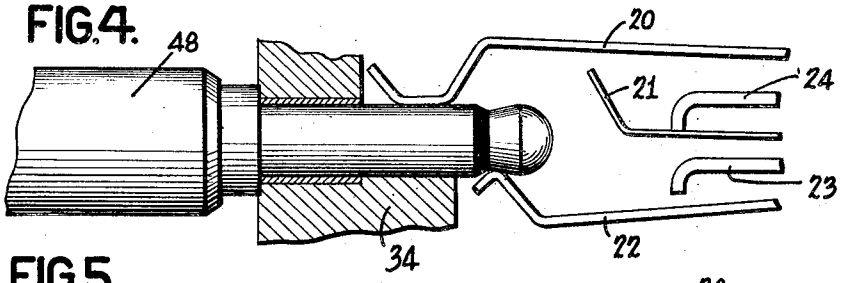


FIG.5.

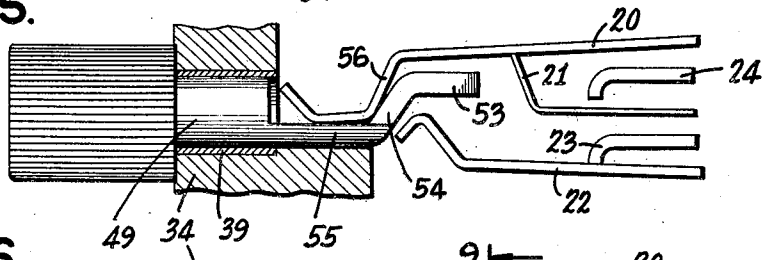


FIG.6.

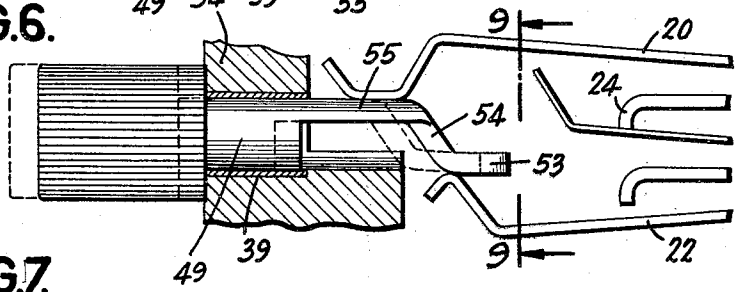


FIG.7.

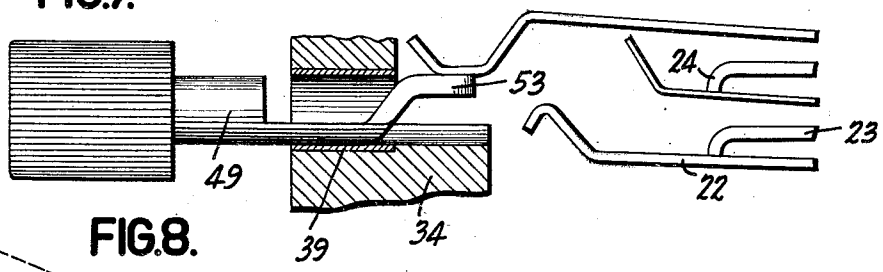


FIG.8.

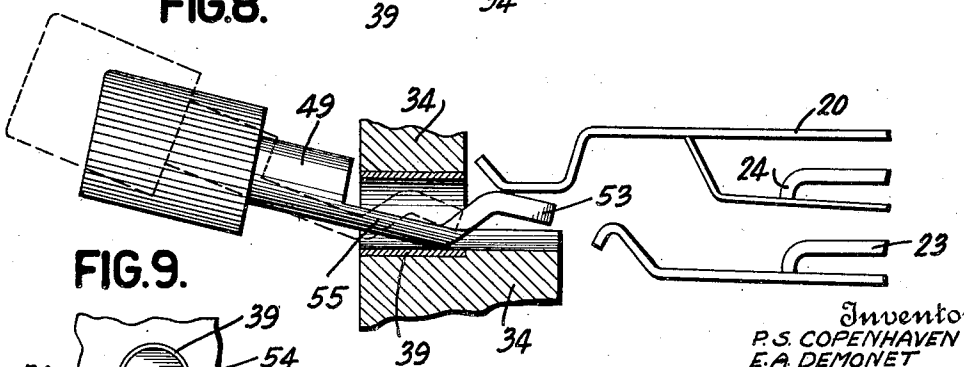
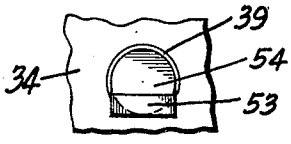


FIG.9.



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FIG.10.

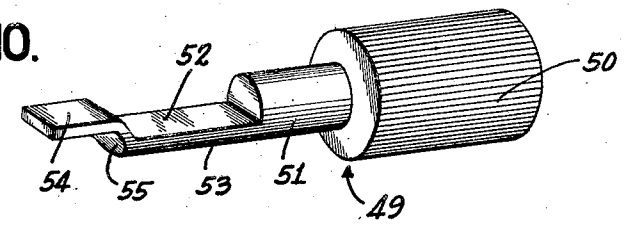


FIG.11.

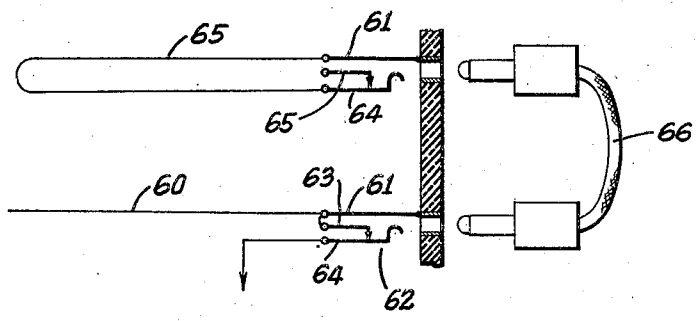


FIG.12.

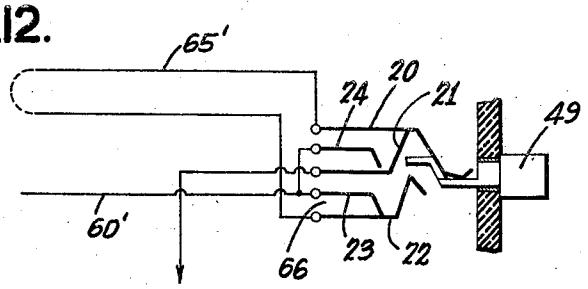
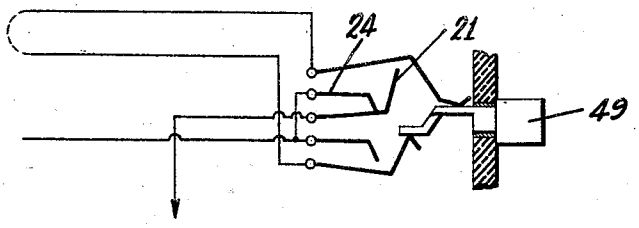


FIG.13.



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UNITED STATES PATENT OFFICE

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SWITCHBOARD JACK

Application filed July 19, 1930. Serial No. 469,112.

This invention relates to pin jacks and particularly to jacks employed in telegraph switchboard construction, although they are not limited to such use.

In pin jack switchboard contruction, as ordinarily employed for wire telegraphy, each line wire entering the telegraph office terminates at a switchboard jack which has associated with it a number of other jacks whereby the wire may be easily and quickly connected to any other wire entering the office or connected to the ground, to a source of potential or to any desired apparatus. Heretofore the line has been carried through one or more looping jacks at the switchboard from which it may be connected to any desired loop by a patching cord extending from one of the looping jacks to a jack individual to each loop.

One of the objects of the present invention is to provide a jack construction for use in connection with a telegraph switchboard in which the normal loop assignments of each line may be made directly through a single jack associated with each loop, without the use of intermediate looping jacks and patching cords.

Another object is to provide a continuity preserving jack in which the normal contact condition of one of the jack elements is not interrupted, by insertion of a key or plug, until a new contact condition has been established for such element.

A further object is to provide a combined jack and switch which may be employed with a cord and plug to continue a normal jack circuit to any other circuit or apparatus, or with a key to open and close predetermined circuits through the jack springs.

A still further object is to provide a jack or switch having facilities for mounting the same entirely from the rear of a switchboard panel so that there will be no live parts of the jack exposed at the front of the switchboard.

Still another object is to produce a key switch having a removable key which is locked in the switch in either of its normal positions, but which is removable from the switch by a special manipulation.

Other objects are to provide a simple, rugged jack construction, and to provide means for mounting a resistance unit or similar devices directly on the jack assembly.

Other objects and advantages will appear from the following description taken in connection with the accompanying drawings and appended claims.

In accordance with one phase of the invention, the differential spring pressure between two of the jack elements, such as the sleeve spring and sleeve normal spring, is employed for maintaining contact between such elements until a new contact has been established for one of the elements.

The jack springs are clamped at the rear thereof between insulating separators by means of hollow rivets or eyelets which enable the jack parts to be assembled independently of the switch panel and to be secured to a support at the rear of the panel of means passing through the eyelets, thereby rendering it unnecessary for any live parts of the jack to be exposed at the front of the panel. The jack may be used in conjunction with a cord through an ordinary tip and sleeve plug, or it may be employed as a switch by the insertion of a specially shaped key which serves, in one position to bridge the tip and sleeve springs and to force them apart to disengage their cooperating contacts therefrom, and in the other position to disconnect the sleeve and tip springs and permit them to move into engagement with their cooperating contacts. The key may be adjusted to either position without removal from the jack, and in each position it is locked against accidental displacement. A special manipulation is required to remove the key from the jack.

The arrangement of the jack springs is such that loop assignments may be normally completed directly therethrough without the use of patching cords, the loop being shunted out of the line circuit when desired by manipulation of the key or by insertion of a plug in the jack, the shunt path being created prior to the opening of the loop circuit. This feature is important particularly in connection with circuits employing auto-

matic printing apparatus, since a signal impulse may be dropped or an extra impulse added by the momentary opening of the line circuit, which may cause faulty operation of the printing apparatus. The key may also be removed and a patching cord plug inserted to connect the loop to another line without interrupting the original line circuit.

In order that the invention may be more fully understood, reference will be had to the accompanying drawings in which

Figure 1 is an elevational view of a jack embodying the present invention;

Figure 2 is an elevational view partly in section, showing the manner of securing the jack parts together and mounting of the jack at the rear of a switchboard panel;

Figure 3 is a perspective view of a jack showing the manner of supporting a resistance unit therefrom;

Figure 4 is a fragmentary view of the switch panel and jack, showing a plug inserted in the jack;

Figures 5 and 6 are similar views showing a key inserted in the jack in two positions thereof;

Figures 7 and 8 are similar views showing progressive stages of removal of the key from the jack;

Figure 9 is a view on a line 9—9 of Figure 6 with the jack springs removed;

Figure 10 is a perspective view of the key employed with the jack;

Figure 11 is a diagrammatic view showing the jack and patching cord arrangement employed heretofore for connecting and disconnecting line and loop circuits;

Figure 12 is a diagrammatic view showing one manner of connecting a line and loop circuit to the jack of the present invention; and

Figure 13 is a view similar to Figure 12, showing the loop disconnected from the line circuit.

Referring first to Figures 1, 2 and 3, the jack assembly shown comprises a sleeve spring 20, a sleeve normal spring 21, a tip spring 22, a tip normal contact 23, and an extra contact 24. The contacts 20 to 24 are separated by insulating strips 25 and the complete assembly is clamped between metal plates 26 and 27 by hollow rivets or eyelets 28. An insulating sleeve 29 surrounds the eyelet and prevents contact thereof with the jack springs. Soldering lugs 30 are provided at the rear of the jack.

The tip spring 22 and sleeve 20 are normally biased toward each other into engagement with the contacts 23 and 21, respectively, and the latter contact is biased toward the sleeve spring 20 but is of lesser weight so that the predominating pressure of the sleeve spring normally holds the sleeve normal spring 21 out of engagement with the substantially rigid contact 24. The sleeve spring 20 is maintained out of engagement with the extra contact 24 either by the normal setting thereof or by contact with a portion 32 of the switch panel.

The differential spring pressure between the springs 20 and 21 causes the spring 21 to follow the spring 20 when the latter spring is moved outwardly, as by the insertion of a key or plug into the jack, so as to maintain engagement between these contacts until the movement of the spring 21 is arrested by engagement with the rigid contact 24. The advantages of this continuity preserving feature will appear more fully hereafter with reference to Figures 12 and 13, and while the continuity preserving arrangement has been illustrated only with reference to the sleeve contact, it is to be understood that a similar arrangement can be employed with the tip contact 22, if desired.

A strip of insulation 33 is provided at the back of the tip normal 23 to prevent accidental contact with the sleeve normal spring 21.

The hollow rivets or eyelets 28 in addition to enabling the jack assembly to be made up prior to mounting on the switchboard, provides a ready means of attachment of the jack to the switchboard panel. In Figure 2 an arrangement is shown in which two of the jacks are mounted back to back behind a panel strip by a common securing means. The panel strip comprises two insulating strips 33 and 34, shown in section, clamped to each side of a metal plate 35 by bolts 36. The plate 35 extends rearwardly from the panel strip and is provided at the rear thereof with a pair of insulating spacers 37, for each pair of jacks, whereby the jacks are maintained in insulated spaced relation to the plate 35 and are secured thereto by the bolts 38 passing through the eyelets 28 and through the spacers 37.

The panel strip is provided with openings 39 for the insertion of a cord plug or key, and the panel strips are extended rearwardly adjacent the plate 35 to form the seats 32 upon which the sleeve springs 20 rest. The seats 32 are arcuate in shape and form continuations of the cylindrical opening 39. A metallic bushing 40 is disposed in each of the openings 39 to provide a wearing surface and the bushing may be continued into the seat portion 32 as indicated at 41, or it may terminate in advance of the seat portion as indicated at 42, so as not to make electrical contact with the sleeve spring of the jack. The construction of the jack strip or panel unit is more fully described and shown in a copending application, Serial Number 469,131, filed July 19, 1930, and entitled "Jack panel unit".

In Figure 3 the clamping plate 26 is extended parallel to the sleeve spring 20 and has a projection 43 which is bent across the edges of the jack springs and serves as a support for a resistance unit 44. The attachment of the resistance unit to the jack is

desirable in certain circuits as for instance where anti-induction apparatus is employed. One terminal 45 of the resistance unit may be connected electrically to the soldering lugs of one of the jack springs, as for instance the sleeve normal lug 46, the circuit in which the resistance is to be inserted being connected to the jack through a lug 47 extending from the clamping plate 26.

Referring now to Figures 4 to 9, the manner in which the tip and sleeve springs are operated either by a cord plug or a switch key will be described. Upon the insertion of a cord plug 48 the spring 20 is first moved outwardly, the spring 21 following the movement thereof until it engages the rigid contact 24, after which the sleeve spring moves away from the sleeve normal spring 21, thus completing a circuit between the springs 21 and 24 prior to the interruption of the circuit between the springs 20 and 21. Further insertion of the plug forces the tip spring 22 outwardly away from the rigid contact 23, thereby connecting the tip and sleeve springs of the jack to the tip and sleeve of the plug in the usual manner, as shown in Figure 4.

When it is desired to employ the jack as a switch, a key 49 is inserted in the opening 39, the key being shaped as shown in perspective in Figure 10. The key comprises an operating handle or knob 50, a cylindrical sleeve portion 51, a part of which is cut away as at 52 to form the intermediate portion 53, and a rectangular tip portion 54 joined to the intermediate portion by an intermediate inclined part 55. With the key inserted in the jack in the position shown in Figure 5, the intermediate portion 53 of the key rests within the arcuate seat 32 and the end of the sleeve spring is disposed within the cut away portion 52 of the key. The tip spring 22 is out of contact with the key and the normal contacts of the jack are closed. When it is desired to open the jack contacts, the key is rotated 180° to the position in Figure 6, thus forcing the tip and sleeve springs apart and opening their normal contacts. An electrical connection is also made at this time directly between the tip and spring contacts of the jack.

The key 49 is locked in the jack in both positions thereof. In the position shown in Figure 5 the inclined portion 55 of the key is engaged with the inclined portion 56 of the sleeve spring so that considerable force is required to move the key outwardly, and such outward movement is limited by engagement of the rectangular tip 54 of the key with the inner wall of the panel when the position shown in Figure 7 has been attained. Further outward movement of the key can only be accomplished by tilting the same slightly upward to bring the rectangular tip 54 opposite the center of the opening 39, after which the key may be withdrawn by an outward and upward movement as indicated in full and dotted lines in Figure 9.

In the opposite position of the key shown in Figure 6, outward movement of the key is prevented by engagement of the rectangular tip 54 with the rear wall of the seat portion 32. Accidental removal or displacement of the key is thus prevented in each position thereof.

In Figure 11 there is shown the usual arrangement employed heretofore for connecting and disconnecting a loop circuit to the telegraph line. The line 60 which may first pass through a number of jacks such as line, line battery, wire chief, and anti-induction jacks, is connected to the sleeve contact 61 of a looping jack 62. Sleeve 61 is strapped to the tip normal 63 and the tip spring 64 is connected to line battery. The loops 65 from which it is desired to transmit signals to or receive signals from the line, has its opposite ends connected to the tip and sleeve springs of a jack 65. Connections between the line and the loop are made by means of a patching cord 66 having plugs insertable in the jacks to connect the sleeve and tip contacts thereof and thus connect the line circuit in series with the loop and thence to the battery.

In accordance with the present invention, a single jack 66 only is required for connecting and disconnecting the loop circuit from the line circuit. The line 60′ is connected to the tip normal spring 23, the terminals of the loop are connected to the sleeve and tip springs 20 and 22 respectively; the sleeve normal contact 21 is connected to battery and the extra contact 44 is strapped to the tip normal 23. With the key 49 in the jack in the position shown in Figure 12, the line 60′ is connected in series to the loop through the springs 23 and 22, and thence through springs 20 and 21 to battery. When it is desired to disconnect the loop from the line circuit, the key is rotated to the position shown in Figure 13, thus shunting the line circuit directly to battery through the extra contact 24 and sleeve normal 21. Due to the continuity preserving feature of the jack, thus shunt circuit is completed prior to the opening of the loop circuit between the contacts 20 and 21, and faulty transmission of signals over the line circuit is prevented.

While the combined jack and switch has been described specifically with reference to a telegraph switchboard and its associated circuits, it is to be understood that it is also of a general application, and numerous uses thereof will occur to those skilled in the art. Moreover, the jack springs may be assembled in different arrangements and the continuity preserving feature employed either with the tip or sleeve contacts or both, and if desired a number of extra contacts may be added having differential spring pressures and disposed so as to embody the continuity

preserving principle. Therefore, we do not desire to be limited to the exact details shown and described, except in accordance with the appended claims.

What we claim is:

1. A switch comprising a pair of spring contacts normally biased towards each other, a key insertible between said contacts and rotatable about its longitudinal axis, said key in one angular position electrically connecting said contacts and forcing them away from each other, and in another angular position electrically disconnecting said contacts and allowing them to move towards each other.

2. A switch comprising a pair of spring contacts normally biased towards each other, a key insertible between said contacts and rotatable about its longitudinal axis, said key in one angular position electrically connecting said contacts and forcing them away from each other, and in another angular position electrically disconnecting said contacts and allowing them to move towards each other, and means for restricting removal of said key from the switch in either of said positions.

3. In combination with a panel, a switch mounted to one side of said panel, said switch having a pair of contacts normally biased towards each other, other contact members in engagement therewith, and means insertible through said panel between said spring contacts and rotatable about its longitudinal axis, said means being shaped so that in one position of rotation thereof the spring contacts are moved away from each other to disengage the same from their cooperating contact members and in another position of rotation to permit said spring contacts to move towards each other to reestablish engagement with their cooperating contact members.

4. In combination with a panel, a switch mounted to one side of said panel, said switch having a pair of contacts normally biased towards each other, other contact members in engagement therewith, and means insertible through said panel between said spring contacts, said means being shaped so that in one position thereof the spring contacts are moved away from each other to disengage the same from their cooperating contact members and in the other position to permit said spring contacts to move towards each other to reestablish engagement with their cooperating contact members, said means engaging with a portion of said panel to prevent removal thereof in one position and engaging with one of said spring contacts to resist removal thereof in the other position, said means being removable from the switch and panel by a special manipulation thereof.

5. In combination with a switch panel, a jack mounted behind said panel having tip and sleeve contacts, other contacts in engagement therewith, a key insertible through said panel between said tip and sleeve contacts, said key being shaped so that in one position thereof the tip and sleeve contacts will be moved apart and in the other position the tip and sleeve contacts are permitted to move towards each other, said key being removable from said jack whereby a cord plug may be inserted therein with the tip and sleeve of the plug in engagement with said tip and sleeve contacts.

6. A jack having a plurality of contact springs, insulating members disposed between said springs at one end thereof, a metal eyelet extending through said springs and insulating members for clamping said members rigidly together, and an insulating sleeve surrounding said eyelet and extending through said spring contacts.

7. A jack having a plurality of contact springs, insulating members disposed between said springs at one end thereof, a metal eyelet extending through said springs and insulating members for clamping said members rigidly together, an insulating sleeve surrounding said eyelet and extending through said spring contacts, and mounting means for said jack passing through said eyelet.

8. A jack having a plurality of contacts, insulating members disposed between each contact, a metal plate at one side of said jack assembly, securing means passing through said contacts and plate for rigidly securing said parts together, said plate having a portion thereof extending transversely over the edges of the several contacts for attachment of a resistance unit or similar device thereto.

9. In combination, a jack, a line circuit and a loop circuit connected to the jack contacts, said line circuit normally being completed through said loop circuit, the arrangement of said jack contacts being such that upon insertion of a key into said jack said line circuit is completed directly through the key and jack contacts independently of said loop.

10. In combination, a jack, a line circuit and a loop circuit connected to said jack contacts, said line circuit normally being completed through said loop circuit, the arrangement of said jack contacts being such that upon insertion of a key or plug into said jack, said loop circuit will first be shunted through the jack contacts and subsequently disconnected from said line circuit.

11. In combination, a jack, a circuit associated therewith, a second circuit associated with said jack, means comprising said jack contacts for connecting said circuits in series through said contacts in one position of the jack and means for completing said first circuit directly through said jack contacts, disconnecting said second circuit therefrom and

completing the same independently of first circuit, in another position of said jack.

12. In combination, a jack, a circuit associated therewith, a second circuit associated with said jack, means comprising said jack contacts for connecting said circuits in series through the jack contacts in one position thereof and means for completing the first circuit directly through the jack contacts and disconnecting said second circuit therefrom in another position of said jack.

13. A jack having a plurality of contact springs, insulating members disposed between said springs at one end thereof, a hollow metal rivet extending through said spring insulating members for clamping said members rigidly together and means for insulating said rivets from at least some of said contact springs.

14. In combination, a jack, a line circuit and a loop circuit connected to the jack contacts, said line circuit normally being completed through said loop circuit, the arrangement of said jack contacts being such that the presence or absence of a cord plug or similar member in said jack causes said line circuit to be completed directly through said jack contacts either independently of said loop or through said loop, and independently of the plug circuit.

In testimony whereof we affix our signatures.

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