Jan. 22, 1929. 1,699,678

N. C. SCHELLENGER

TUBULAR JACK

Filed Dec. 3, 1925

Fig. 1

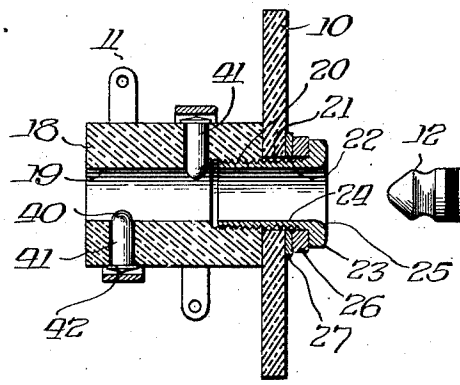


Fig. 2

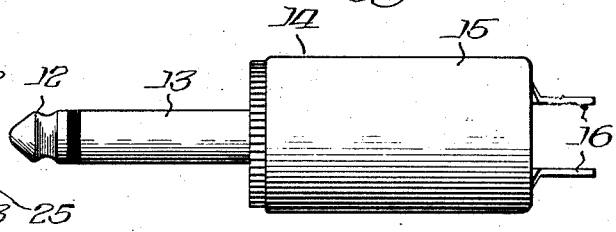


Fig. 4

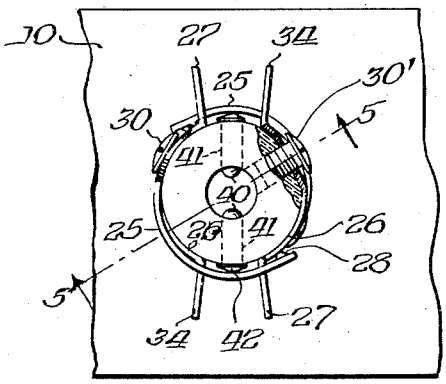


Fig. 3

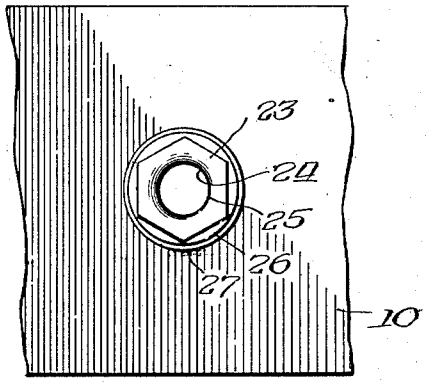


Fig. 6

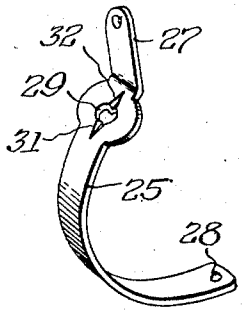


Fig. 7

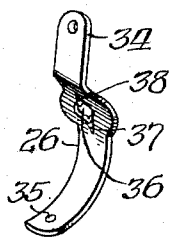
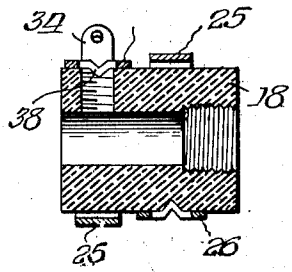


Fig. 5.



Witness:

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UNITED STATES PATENT OFFICE.

NEWTON C. SCHELLENGER, OF ELKHART, INDIANA, ASSIGNOR TO CHICAGO TELEPHONE SUPPLY CO., OF ELKHART, INDIANA, A CORPORATION OF DELAWARE.

TUBULAR JACK.

Application filed December 3, 1925. Serial No. 72,863.

My invention relates to electrical apparatus and more particularly to jacks of tubular construction.

In recent times, especially during the advent and growth of the art of radio communication, there has been an increased demand for electrical apparatus simple in construction and yet efficient in operation. It is the purpose of the present invention to provide a tubular jack characterized by its unusually high degree of simplicity, and yet being capable of performing the functions demanded of it efficiently.

The jacks generally in use at the present time occupy considerable space when mounted, due to the fact that their contact springs are usually disposed in a substantially horizontal plane. Now, obviously, especially in radio apparatus where compactness is highly desirable, a jack of relatively small dimension and one which occupies relatively little space, is in great demand.

I propose to provide a jack tubular in contour, having a minimum number of parts occupying relatively little space and being inexpensive, simple, compact and efficient in operation.

I also propose in accordance with the features of my invention, to provide a tubular mounting in the jack for receiving the tip and sleeve of a plug and capable of holding the same in a substantially fixed position, thus preventing side or lateral movement of the plug. Also, in order to reduce the size of the jack, I propose to dispose the contact ring or spring about the periphery of the tubular mounting through which the tip of the plug extends. Thus it is evident that the jack I have designed and invented will not project very far from the panel or other support in which it is mounted.

I also propose to provide means actuated by the insertion of the plug in the tubular mounting for bringing the contact springs together with a wiping action. This wiping action insures good contact between the springs of the jack.

A still further feature of my invention is the provision of means for causing the contact springs to cut further into the tubular mounting to which they are attached when subjected to stresses tending to move them. This results in a highly efficient and simple mounting for the spring contact.

A still further feature of the present invention is to provide improved means in a jack for tightly retaining the plug in position when inserted in the jack.

The object of the present invention, therefore, is to provide an improved jack, tubular in shape, of relatively small size of a minimum number of parts and of a highly simple and inexpensive arrangement.

Other objects and advantages of the present invention will more fully appear from the following detailed description, taken in connection with the accompanying drawings which illustrate one embodiment thereof, and in which,

Fig. 1 is a sectional view of my novel tubular jack attached to a fiber panel;

Fig. 2 is an elevation of a plug adapted to to be inserted in my novel jack;

Fig. 3 is a front view of the fiber panel showing the manner in which my jack is fastened thereto;

Fig. 4 is a rear view of my novel jack and the panel to which it is attached;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 4 looking in the direction indicated by the arrows, illustrating the tubular mounting with certain parts omitted and clearly showing the prong on the contact spring for cutting into the tubular mounting to maintain the spring in a fixed position;

Fig. 6 is a more or less perspective view of one of my novel contact springs employed in my jack; and

Fig. 7 is a perspective view of my other novel contact spring.

Referring now to the drawings in detail, in which like reference numerals designate similar parts throughout the several views, 10 denotes a panel or mounting which may be made of any suitable insulating material, such as fiber, as is well known in the radio art. Attached to this panel 10 is my novel jack of tubular construction, indicated generally by the reference character 11. The jack 11 is adapted to receive a tip 12 and a sleeve 13 of a standard plug 14. In addition to the tip 12 and the sleeve 13, the plug 14 comprises a fiber casing 15 in which the terminal mechanism is disposed. Extending from the casing 15 are a pair of terminals 16 to which the ends of electrical conductors are attached.

My novel jack 11 includes a tubular member 18 equipped with a bore 19 for receiving the tip 12 and sleeve 13 of the plug 14. This

member 18 may be made of any suitable insulating material such, for example, as hard rubber, a phenolic compound or fiber. I prefer to use fiber which has been treated or impregnated with a moisture resisting substance, such as paraffin, wax, or a varnish. One end of the bore 19 is countersunk and threaded, as indicated at 20. The panel 10 is provided with a circular aperture of substantially the same size as the countersunk portion 20 of the bore 19. I have indicated this aperture by the reference numeral 21. The aperture 21 is aligned with the bore 19 of the tubular member 18. A sleeve-like member or thimble 22 extends through the bore or aperture 21 and is threaded into the threaded countersunk portion 20 of the bore 19. The thimble 22 is equipped with a hexagonal or polygonal head 23 for facilitating the mounting of it in position. The thimble 22 is also equipped with a bore 24 of the same diameter as the bore 19 and in alignment therewith. The outer end of the bore 24 is preferably beveled, as indicated at 25, in order to permit the plug to be inserted therein with facility. Disposed intermediate the head 23 of the thimble 22 are a pair of washers 26 and 27 for filling up the space separating the head of the thimble from the panel. Obviously, any number of washers may be employed, depending upon the thickness of the panel, as well as the thickness of the washers used. These washers serve to enable the thimble to be tightly screwed in position. The thimble 22 may be economically manufactured in large quantities from metallic rods, such as brass rods, on automatic screw machines. I preferably make the thimble 22 of brass and then nickel-plate the same to enhance its appearance. Now I shall proceed to describe in detail my novel contact spring mechanism. First, I desire it understood that although I have illustrated in the accompanying drawings two sets of contact springs, that the present invention is not to be in any way limited thereby, for it is of course evident that one or any number of sets of such springs may be used in connection with my novel jack without deviating from the features of the present invention.

One set of the contact springs shown, makes contact with the tip of the plug inserted in the jack and the other set makes contact with the sleeve of the plug inserted in the jack. The terminals of the contact springs are arranged diametrically opposite each other upon the tubular member 18 in order to facilitate access thereto and to make it easier to connect the electrical conductors to the said terminals.

The jack that I have illustrated, is particularly adapted for use in connection with radio receivers. That is to say, upon the insertion of a plug therein, the loud speaker associated therewith is connected to the receiving set, whereas, the loud speaker or other instrument normally connected to the receiving instrument is automatically disconnected therefrom. This will be more fully explained hereinafter.

Since both sets of springs are identical in construction with the exception that they are mounted in opposite positions, it is believed that a description of one set will suffice for both and that the same reference characters may be applied to similar parts in both sets. Each set of these springs comprises a pair of arcuate-shaped contact springs disposed about the periphery of the tubular member 18. One of these two springs is longer than the other and is indicated by the reference numeral 25. The shorter of the two springs is indicated by the reference numeral 26.

In Fig. 6 I have illustrated in perspective the relatively large spring 25. It comprises a terminal 27 at one end and a contact point 28 at its other end. It also includes an aperture 29 to which a suitable screw 30 may be inserted. Disposed on opposite sides of the aperture 29 are a pair of prongs 31 and 32. When the screw 30 is in place, it attaches the spring 25 to the tubular member 18. The screw 30 is threaded into an aperture in the tubular member 18. Now, the other spring 26 has a terminal 34 and with a contact point 35 (Fig. 7). It is also equipped with an aperture 36 and a pair of prongs 37 and 38 for biting or cutting into the tubular member 18 in a similar manner as that of the prongs 31 and 32 of the spring 25.

The large spring 25 and the small spring 26 are disposed about the tubular member in diametrically opposite positions. The spring 26 is attached to the tubular member by a screw 30′ in a similar manner to the spring 25. The spring 26 being substantially smaller than the spring 25, has one end disposed under that of the spring 25 so that its contact 35 is disposed immediately under the contact 28 of the other spring. Normally when no plug is in the jack, contacts 28 and 35 are in engagement, closing the circuit existing between the terminals 27 and 34. What has been said with regard to the first set of springs, is also applicable to the other set of springs.

Associated with each set of springs is a small plunger-like pin 40 disposed in an aperture 41 in the tubular member. One end of this plunger 40 normally projects into the bore 19 of the tubular member 18. The other end of the plunger is equipped with a head 42 contacting with the larger spring 25. Upon the insertion of the plug therein, the plunger pins 41 are pushed outwardly, moving the contact spring 25 away from the smaller contact spring 26. This, as is obvious, breaks the circuit existing between the terminals 27 and 34. Also, the terminal 27 of one set of springs is connected to the tip 12 of the plug

14, and the terminal 27 of the other set of springs is connected to the sleeve 13 of the plug, thereby connecting the circuit of the plug to that associated with the jack.

For sake of example, let us assume that normally, when no plug is disposed in the jack 11, a loud speaker is connected to the receiving set through the contacts 28 and 35. Supposing now it is desired to connect a pair of receivers, or rather a head set, to the receiving set and to disconnect the loud speaker therefrom. By inserting the plug in the jack, the circuit of the loud speaker is automatically disconnected from the receiving set and the circuit of the head set is substituted therefor. This is believed to be obvious from the drawing and is well known to those versatile with the art of radio communication. The contact springs may be made of nickel silver to give them the requisite degree of resiliency or, on the other hand, they may be made of nickel-plated brass. The contacts 28 and 35 may consist of any suitable and well known contact metal, such for example, as a platinum alloy. The small plunger pins 41 may be made of any suitable metallic material. The screws 30 and 30′ are preferably made of nickel-plated brass.

Now, upon the insertion of a plug in the jack 11, the contacts 28 are slid out of engagement with the contacts 35. Upon the removal of the plug, the springs 25 spring back toward the tubular member, bringing the contacts 28 into a wiping engagement with the contacts 35, thereby insuring good contact between the two springs. That is to say, due to the fact that one end of the spring 25 is secured to the tubular member, the other end, in springing back to place, must, of necessity, slide over a certain part of the other end of the spring 26 associated therewith. This results in the contact 28 being brought into wiping engagement with the contacts 35. It is evident that should there be any foreign substance on the contacts, the same will be readily rubbed off by the aforesaid wiping action.

Also, in moving the spring 25 away from the tubular member 18 through the medium of the pin 41, there is a tendency for the spring to move or, rather, turn about the tubular member, due to the force exerted upon them by the pin 41. I propose to counteract this action by means of the prongs on the spring. This is true of both the springs 25 and 26. By tightening the screw associated with the spring tightly in place, the prongs of the spring are caused to bite or cut into the fiber of the tubular member 18. Now, obviously, any movement on the part of the spring will cause these prongs to bite or cut all the further into the fiber base or tube member, thus completely preventing the spring from moving or turning.

From the foregoing description, it will be seen that my jack is of a minimum number of parts and may be assembled or disassembled with facility. Moreover, my novel jack is relatively compact and occupies much less space than similar jacks heretofore.

Then, too, the tubular member 18, through the medium of the bore 19, tends to maintain the plug rigidly in place, once it is inserted therein. The tension of the plug within the bore 19 is augmented by the pins 41 which engage the tip 12 and sleeve 13, respectively, of the plug. These pins exert a binding action upon the plug and in order to remove the plug from the jack 11, one must exert some force. That is to say, the plug will not of its own accord, fall out of the jack. In order to remove it from the jack, it must be pulled therefrom.

Although I have described in detail the preferred embodiment of my invention, it is of course to be understood that my invention is not to be limited by this disclosure, but only in so far as defined by the scope and spirit of the appended claims.

I claim:

1. In combination in a jack, a cylindrical tubular member and a plurality of curved contact springs disposed about the periphery of the said member and engaging each other.

2. In combination in a jack for receiving a plug, an annular member and contact springs disposed about the arcuate periphery of the said member and engaging each other.

3. In a jack, a tubular member, an arcuate-shaped contact spring having a fastening prong for fastening said spring to said member.

4. In a jack, an arcuate shaped contact spring having an aperture for the insertion of fastening means therein, and a pair of fastening prongs, one on each side of the aperture for augmenting the fastening of the spring.

5. In combination in a jack, a tubular member and a contact spring disposed on the periphery of the said member having a prong for cutting into the member for augmenting the fastening of the spring thereto.

6. In combination in a jack, a tubular member, a contact spring disposed about the periphery of the member, and means for fastening the said spring to the member, the said contact spring having a fastening prong for cutting into the member to more firmly secure the spring thereto, said prong being arranged to cut further into the member upon the imposition of stresses on the spring tending to loosen the fastening means.

7. In combination, in a jack, a tubular member adapted to receive a plug, an arcuate shaped spring disposed on a portion of the periphery of the member, and a second arcuate shaped spring disposed on another por-

tion of the periphery of the member, one of said springs overlapping the other to make electrical contact therewith.

8. In combination in a jack, a tubular member adapted to receive a plug, a spring disposed on a portion of the periphery of the member, a second spring disposed on another portion of the periphery of the member, one of said springs overlapping the other to make electrical contact therewith, and means for fastening the springs to the member, each of said springs having a prong for cutting into the member to augment the fastening of the spring thereto.

9. In combination in a jack, a cylindrical tubular member, a spring disposed on a portion of the curved periphery of the member, a second spring disposed on another portion of the curved periphery of the member, one of said springs overlapping the other to make electrical contact therewith, and means disposed in the wall of the tubular member for moving one of the springs out of contact with the other when a plug is inserted in said tubular member.

10. In combination in a jack, a tubular member, a curved spring disposed on a portion of the periphery of the member, a second curved spring disposed on another portion of the periphery of the member, one of said springs overlapping the other to make electrical contact therewith, means for fastening the springs to the member, and means engageable by a plug and mounted in the wall of the tubular member for breaking the electrical contact between the springs.

11. In combination in a jack, a tubular member for receiving a plug, a spring disposed on a portion of the periphery of the member, a second spring disposed on another portion of the periphery of the member, one of said springs overlapping the other to make electrical contact therewith, and plunger means mounted in the tubular member adapted to be actuated upon the insertion of a plug in the member to break the electrical contact between the springs.

12. In combination in a jack, a tubular member for receiving a plug, a spring disposed on a portion of the periphery of the member, a second spring disposed on another portion of the periphery of the member, said springs normally contacting each other to establish an electrical connection, and a plunger mounted in the tubular member adapted upon the insertion of the plug therein to move one of the springs out of contact with the other to break the electrical connection therebetween.

13. In combination in a jack, a tubular member for receiving a plug, a spring disposed on a portion of the periphery of the member, a second spring disposed on another portion of the periphery of the member, said springs normally contacting each other to establish an electrical connection, said springs each having a terminal portion for enabling the attachment of an electrical conductor thereto, and a plunger mounted in the tubular member normally projecting in the bore of the tubular member adapted upon the insertion of a plug in the tubular member to move one of the springs out of engagement with the other to break the electrical connection therebetween.

14. In combination in a jack, a tubular member, a curved spring disposed on a portion of the periphery of the member, a second curved spring disposed on another portion of the periphery of the member, each of said springs having one end formed into a terminal and having a contact point attached to the other end, one of said springs overlapping the other to cause its contact point to engage that of the other spring, and means for fastening the springs to the member adjacent their terminal.

15. In combination in a jack, a tubular member for receiving a plug, a spring disposed on a portion of the periphery of the member, and a second spring disposed on another portion of the periphery of the member, one of said springs overlapping the other to make electrical contact therewith, the said springs being mounted to the member in such a manner as to be engageable and disengageable with a wiping contact.

16. In combination in a jack, a tubular member for receiving a plug, a spring disposed on a portion of the periphery of the member, a second spring disposed on another portion of the periphery of the member, one of said springs overlapping the other to make electrical contact therewith, the said springs being mounted to the member in such a manner as to be engageable and disengageable with a wiping contact, and means mounted in the tubular member operable by the insertion of a plug therein to move one of the said springs out of engagement with the other spring with a wiping contact.

17. In combination in a jack, a tubular member for receiving a plug, a spring disposed on a portion of the periphery of the member, a second spring disposed on another portion of the periphery of the member, one of said springs overlapping the other to normally make electrical contact therewith, means for fastening the springs to the member in such a manner that the overlapping spring will be at all times due to its own resiliency urged toward the overlapped spring, the said springs being mounted to the member in such a manner as to be engageable and disengageable with a wiping contact, and means associated with the tubular member for holding the overlapping spring out of engagement with the other spring.

18. In combination with a mounting, a jack comprising a tubular member, a thim-

ble threaded into the bore of the said member for attaching it to the mounting, and contact mechanism mounted wholly on the periphery of the said tubular member.

19. In combination in a jack, a tubular member for receiving a plug, a spring disposed on a portion of the periphery of the member, a second spring disposed on another portion of the periphery of the member, said springs being normally in engagement to establish an electrical connection, and means mounted in the tubular member adapted upon the insertion of a plug in the tubular member to break the electrical connection between the springs and to retain the plug within the tubular member.

20. In combination in a jack, a tubular member for receiving a plug, a spring disposed on a portion of the periphery of the member, a second spring disposed on another portion of the periphery of the member, one of said springs overlapping the other to make electrical contact therewith, said springs being normally in engagement, and plunger means mounted in the said tubular member adapted upon the insertion of a plug in the member to move the overlapping spring out of engagement with the other spring breaking the electrical connection therebetween and to also retain the plug in place within the tubular member.

21. In combination in a jack, an annular tubular supporting member of insulating material adapted to receive a plug and a plurality of contact springs mounted thereon.

22. In combination in a jack, an annular tubular supporting member of fiber impregnated with a moisture resisting substance adapted to receive a plug, and contact springs disposed about the periphery of the said member.

In witness whereof, I hereunto subscribe my name this 25th day of November, 1925.

NEWTON C. SCHELLENGER.