Feb. 25, 1936. G. P. TROMP ET AL 2,032,191

CIRCUIT CONTROLLER

Filed June 16, 1932

FIG. 1

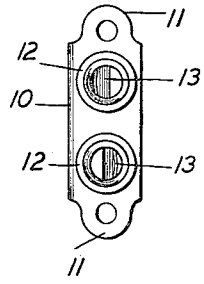


FIG. 2

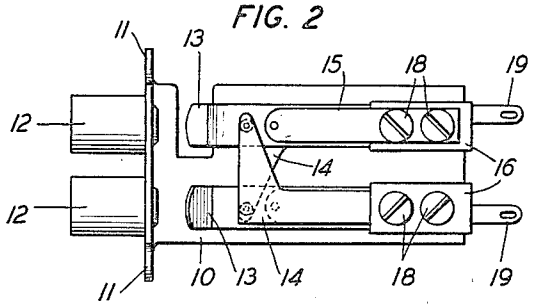


FIG. 3

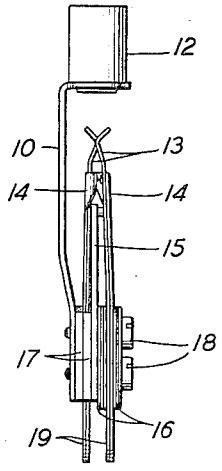


FIG. 4

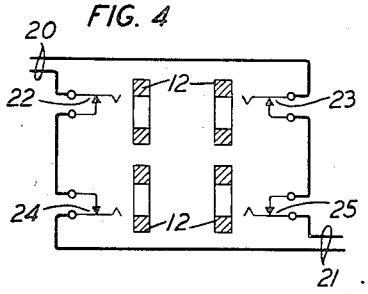


FIG. 5

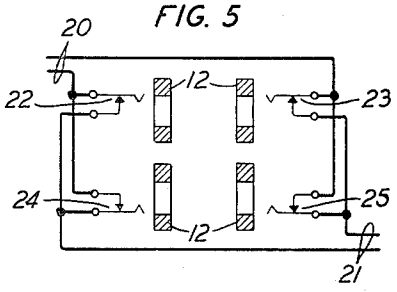
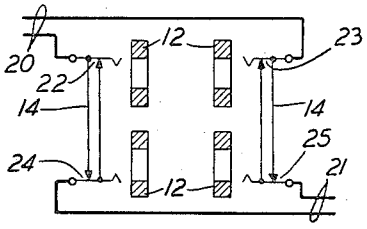


FIG. 6



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2,032,191

CIRCUIT CONTROLLER

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7 Claims. (Cl. 179—96)

This invention relates to circuit controllers and more particularly to spring jacks of the type commonly used at telephone test boards.

In telephone practice, telephone toll stations are interconnected by means of toll lines which are usually relayed through several central offices intermediate the calling and called ends thereof and are accessible at these several offices for testing purposes. At such intermediate central offices, jacks are furnished whereby a test operator or attendant may plug into the toll line to associate therewith the necessary testing apparatus. A twin jack designed for this purpose which minimizes the probability of circuit troubles due to contact resistance and other defects between the elements of the jack is disclosed in U. S. Patent 1,718,280, issued June 25, 1929 to P. G. Edwards.

In order to insure satisfactory functioning under varying conditions of service, it is necessary in this type of jack that the jack springs be furnished with a particular adjustment with respect to the center line of the jack sleeve and also meet certain contact pressure requirements between cooperating jack springs and between the jack springs and their associated plugs. Heretofore, as in the jack disclosed in the above identified patent, it was impracticable to adjust the contact pressure without altering the center line adjustment of the jack spring. It was also evident that any adjustment made upon one jack spring would alter the adjustment of its associated jack spring.

It is therefore, an object of this invention to improve the design of twin jacks of this type so as to facilitate and simplify the adjustments of the various elements of which the jack is constituted.

This object is attained in accordance with a feature of the invention by the provision of stop plates for the jack springs which limit the follow of the springs and provide a stable stop therefor by virtue of which the springs can be adjusted to definite requirements relative to the jack sleeve center lines.

Another feature of the invention resides in the use of an auxiliary contact spring which is adjustable independently of the main jack spring and which is actuated by the main jack spring when a plug is inserted in the jack. This feature permits an adjustment of the spring contact pressure to be made without interfering in any way with the center line adjustment of the main jack spring or altering the adjustment of an associated jack spring.

These and other features of the invention will be readily understood from the following detailed description made with reference to the accompanying drawing in which:

Fig. 1 is a front end view of the twin jack as it would appear on the test board;

Fig. 2 is a side elevation of the improved spring jacks.

Fig. 3 is another side view of the jack embodying the features of this invention;

Fig. 4 is a diagrammatic view of a circuit arrangement in which an incoming toll line at an intermediate or repeater station is carried through a pair of twin jacks in which the jack contacts are connected in series;

Fig. 5 is a diagrammatic view of a circuit arrangement corresponding to Fig. 4 and in which the jack contacts are connected in parallel; and

Fig. 6 is a diagrammatic view of a circuit arrangement corresponding to Figs. 4 and 5 in which the jack contacts are connected in parallel and which constitutes an improvement over the arrangement shown in Fig. 5 as will appear from a later description.

Referring now to Figs. 1, 2 and 3, the numeral 10 designates a sheet metal plate which is adapted to be secured to the face of a switchboard at an intermediate or repeater station by means of screws which pass through openings in semi-circular lugs 11. The plate 10 is provided with circular openings through which the tubular sleeves 12 extend. The sleeves 12 are secured to the plate 10 in any well known suitable manner. The plate 10, by virtue of its formation constitutes a support for the elements of the spring jacks as will appear presently.

Mounted on the rear end of the plate 10 are two spring pile-ups each of which consists of a main tip spring 13, an auxiliary spring member 14, a stop plate 15, the necessary insulators 16 and metallic spacers 17, and screws 18 which serve to secure the pile-ups on the plate 10.

Each auxiliary spring member 14 is in substantial contiguous relation with its associated main tip spring throughout its length and is provided with a right angle projection or bridge portion which terminates in a contact which is normally in engagement with the main tip spring of the adjacent spring pile-up. By virtue of this arrangement a parallel contact connection is effected between the conductors which may be associated with the respective main tip springs 13 through the instrumentality of terminal lugs 19.

The stop plates 15 are so located on the plate 10 as to occupy a definite position with respect to the center lines of their respective jack sleeves 12. These plates limit the follow of the main tip springs and provide stable stops therefor which permit the springs to be adjusted to definite requirements relative to the jack sleeve center line.

The auxiliary spring members 14 which interconnect the tip springs in a parallel connection, facilitate the adjustment of the jack to meet necessary contact pressure requirements. It will be observed that the contact pressure may be adjusted by virtue of the auxiliary springs 14 with-

out disturbing the adjustment of the tip springs relative to the jack sleeve center lines. This is not practicable in other jacks designed to perform the same functions.

Referring to Fig. 4 an incoming toll line is represented at 20, the other line 21 in general practice, leading to other toll line apparatus, such as amplifiers, etc., which in turn are connected to a set of jacks similar to the set shown in Fig. 4 from whence the outgoing end of the toll line leads to another intermediate or terminal station. The jack sleeves 12 shown in this figure correspond to the sleeves 12 shown in Figs. 1, 2 and 3, it being understood that the pair of jacks 12 shown on the right of the figure constitutes a structure as shown in Figs. 1, 2 and 3 and the pair shown on the left constitutes another similar structure. Two twin jacks of the type shown in Figs. 1, 2 and 3 are mounted side by side on the switchboard to permit testing the toll line portion represented by the numeral 20 as well as the toll line apparatus associated with the leads 21.

To test the toll line 20 a twin plug is inserted in the upper pair of jacks 12 thereby interrupting the continuity of the toll line 20 at the contacts 22 and 23. To test the toll line equipment at the repeater station a twin plug is inserted in the lower pair of jacks 12 thereby disconnecting the incoming end of the toll line 20 from the equipment associated with the line 21 at the contacts 24 and 25. It will be noted that when no tests are being undertaken the contacts 22 and 24 are connected in series as are contacts 23 and 25.

In order to minimize operating troubles caused by contact failures as well as to reduce the resistance introduced into the toll line by the serially connected contacts, such as 22 and 24, and 23 and 25 at the points of accession to the toll lines, it was deemed advisable to substitute a parallel connection of jack contacts for the previously employed series contacts. This led to the circuit arrangement shown in Fig. 5. In this arrangement, to test the incoming toll line 20, a twin plug is inserted in the upper pair of jacks 12. It will be noted that this act merely opens the contacts 22 and 23 and that the toll line portion 20 is still connected to the line 21 leading to the toll line repeater equipment by way of contacts 24 and 25. It is accordingly necessary that a dummy twin plug be inserted in the lower pair of jacks 12 in order to complete the separation of lines 20 and 21 and permit testing of the former. It is obvious that the procedure would be reversed when it was found desirable to test the repeater equipment associated with line 21, that is, the dummy plug would be inserted in the upper pair of jacks 12 and the regular circuit plug would be inserted in the lower pair.

In order to obviate the necessity of using a dummy plug and preserve the parallel contact connections, the arrangement shown in Fig. 6 was devised. In connection with Fig. 6 it will be observed that to test the line 20 a plug is inserted in the upper pair of jacks 12, whereupon all the contacts 22, 23, 24 and 25 are opened. This is made possible by the auxiliary springs 14 included in the jack structures. To test the line 21 and its associated equipment a twin plug is inserted in the lower pair of jacks 12 which results in the same circuit interruptions just described in connection with the testing of the line 20.

Applicants have disclosed and described Figs. 4 and 5 merely to set forth the objectionable characteristics overcome by the circuit arrangement shown in Fig. 6 and to afford a clearer understanding of applicants' invention.

What is claimed is:

1. A spring jack comprising a frame, a pair of parallel springs extending longitudinally thereon and each adapted to be operated independently by plugs, and auxiliary contact springs in contiguous relation with said parallel springs and provided with extensions each normally contacting with the other parallel spring whereby a parallel connection is established over conductors connected to said parallel springs.

2. A spring jack comprising a frame, a pair of parallel springs extending longitudinally thereon and each adapted to be operated independently by plugs, said springs adapted to be moved laterally, auxiliary contact springs in contiguous relation with said parallel springs, and extensions carried by each said contact springs and normally contacting with the other of said parallel springs, said extensions breaking contact with the springs thereof upon the lateral movement of said parallel springs.

3. A spring jack comprising a frame, a pair of parallel spring members mounted on said frame, a separate contact spring for each of said parallel springs and each in contiguous relation with its associated parallel spring throughout its length, and an extension carried by each of said contact springs normally engaging the other of said parallel springs.

4. A spring jack comprising a frame, a sleeve mounted on said frame, a rigid stop member immovably positioned on said frame, a spring member tensioned against said stop member and normally held thereby in alignment with the center line of said sleeve and a contact spring in electrical contact with said spring member throughout its length and adapted to be actuated by said spring member upon the insertion of a plug in said sleeve, said spring member and said contact spring being independently and separately adjustable.

5. In a spring jack, a current conducting element comprising a plurality of conductively contacting laminæ, one of said laminæ provided with a contact and another with a hump for engagement with an actuating member, said laminæ remaining in conductive contact when engaged by an actuating member.

6. A twin jack comprising a frame, a pair of sleeves mounted on said frame, a spring pile-up for each of said sleeves adjacently mounted on said frame, each of said pile-ups comprising a tip spring and a contact spring, each of said contact springs having an integral projection normally in engagement with the tip spring of an adjacent pile-up and a stop member for each of said tip springs for maintaining its respective tip spring in a definite position with respect to its associated sleeve.

7. A spring jack comprising a frame, a pair of sleeve members mounted on said frame, a tip spring for each of said sleeve members and having a predetermined setting with respect thereto and an L-shaped contact spring for each of said tip springs having one leg thereof in contiguous relation with its associated tip spring throughout its length and the other leg terminating in a contact engaging the other tip spring, said L-shaped contact springs being adjustable independently of their associated tip springs and without disturbing the predetermined setting thereof.

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