Sept. 6, 1927. 1,641,286

E. C. MUELLER, JR

TEST PLUG

Filed March 18. 1926

Fig. 1.

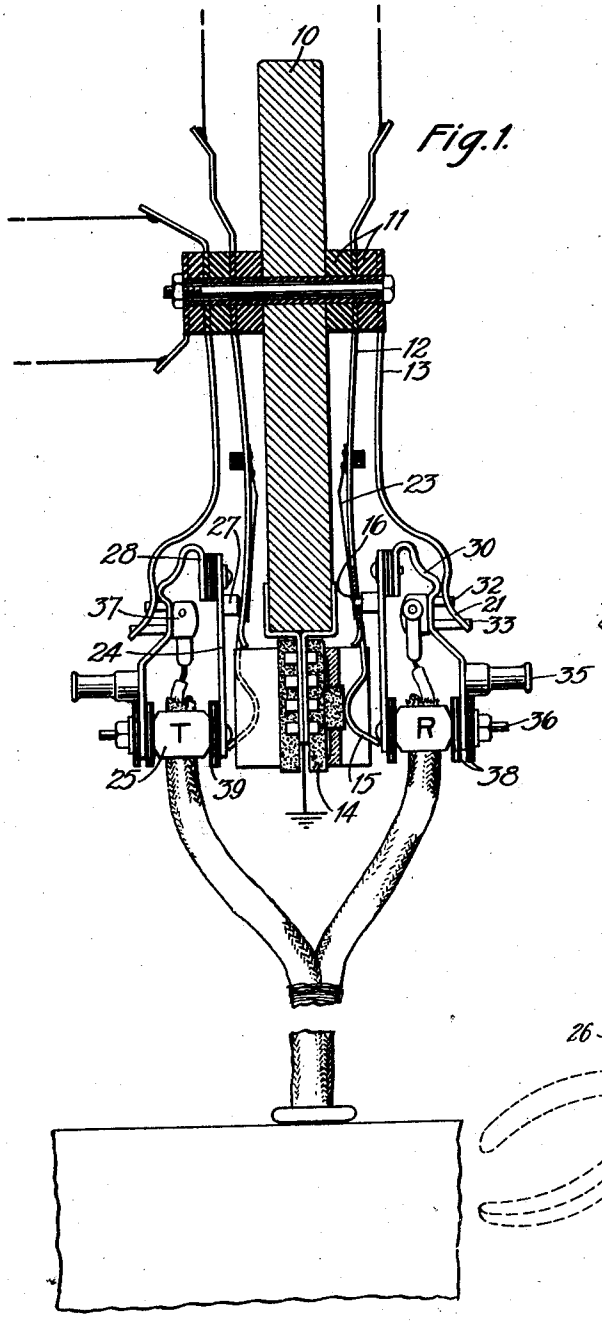


Fig. 2.

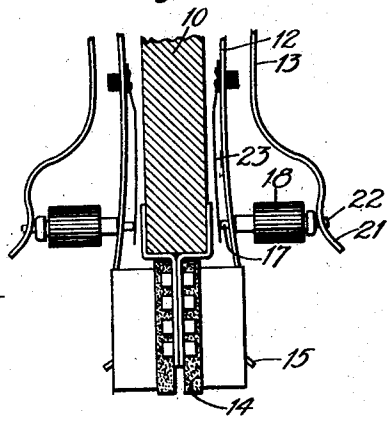
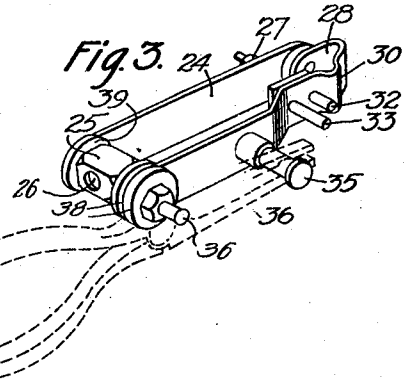


Fig. 3.



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UNITED STATES PATENT OFFICE.

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TEST PLUG.

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This invention relates to electrical switching devices, such as are commonly known in the art as test plugs, and are employed in telephone central offices for testing separately the conditions of a subscriber's line within and without the exchange system.

It is common practice in telephone central offices to provide distributing frames, which are used to cross-connect the outside portion of the subscribers' lines with terminals corresponding to the subscriber's drop number. Arranged on these frames are the customary protective devices, which protect the apparatus of the central office from dangerous currents and the like and among these protective devices are what are commonly termed "heat coils" which are inserted between contact springs carried by the frame. As such distributing frames and "heat coils" are well known, it is thought further description thereof is unnecessary.

The plugs, to which this invention relates, are inserted between springs on the distributing frame, in place, and after removal of the "heat coils", and are connected by suitable conductors to the testing desk.

The principal object of the invention is to construct a plug which, when in position on the frame is held against accidental removal by pull on the conductor cords leading therefrom or contact therewith, thus assuring uninterrupted connection with the testing desk.

A further object of the invention is to provide for easy manipulation and insertion of the plug into position on the distributing frame.

In carrying the invention into practice the plug is so constructed as to be readily inserted between the protector springs of the distributing frame, and carries means for entrance into an opening in one of said springs, whereby dislodgment of the plug, by pull on the conductor cords leading therefrom, will be obviated, since the leverage exerted by such pull would be insufficient to overcome the tension of the cooperating spring. The plug is also provided with a cam face which engages behind the curved portion of the cooperating spring, so that the tension of said spring will act to more firmly draw the plug into place and in addition lugs are provided by which the plug may be readily removed. Furthermore, it is preferable that the plug be of such a length that when in position on the frame, it will be wholly within the plane of the exposed edges of the protective devices, thereby overcoming danger of accidental dislodgment through contact therewith.

In the drawings: Fig. 1 is a horizontal sectional view through one of the vertical ribs of a distributing frame, showing a test plug constructed in accordance with this invention in place thereon. Fig. 2 is a fragmentary view similar to Fig. 1 showing the "heat coils" in place, and Fig. 3 is a perspective view of one element of a test plug constructed in accordance with this invention, illustrating in dotted outline a pair of pliers in use therewith.

Referring to the drawings in detail, numeral 10 designates one of the vertical ribs of an ordinary distributing frame carrying the customary insulating strips 11, between which are clamped the springs 12 and 13. The free ends of the springs 12 are tensioned inwardly to bear against the usual protective devices 14, which are mounted at the edge of the rib 10, and each of these springs is provided with an outwardly turned tongue 15. Intermediate the ends of the spring 12 is an opening 16 for the reception of the pin 17 at the inner end of the "heat coil" 18 (Fig. 2).

The spring 13 is bent outwardly and again inwardly providing a substantially S-shaped portion which terminates at its free end in an outwardly curved bifurcated portion 21, the inner wall of which aligns with the opening 16 in spring 12.

As illustrated in Fig. 2 this bifurcated portion 21 is designed to receive the pin 22 at the outer end of the heat coil and in the case of an overload, the coil 18 will become heated to such a degree as to melt the fusible material which retains the pin 17, permitting it to move longitudinally through the coil under the influence of the spring 13. The inner end of the pin 17 will then be forced inwardly against the spring 23, thereby grounding the circuit, and avoiding any possibility of injury to the apparatus behind this protective device.

The plug forming the subject matter of this invention comprises two separate and independent plug elements which are in no wise associated with each other except through the medium of the connecting cords

leading therefrom. Each plug element comprises a base plate 24, having secured thereto adjacent one end, a block 25 which is provided with an internally screw threaded opening 26 into which the conductor cord is introduced and secured. The purpose of the screw threads is to secure the cord, this being of such a size that it has to be twisted into the opening as if it were provided with corresponding threads. Attached to the base plate 24 near the opposite end is a shouldered stud 27 which is adapted to enter the opening 16 in the spring 12 previously referred to. It will thus be seen that electrical connection is established between the spring 12 and the block 25 when the plug is in place.

Supported at the inner end of the base plate 24 but insulated therefrom, is a conductor strip 28 which is bent back upon itself and thence outwardly and inwardly to form a cam face 30 which bears against the inner side of the curved portion of the spring 13 when the plug is in position. Extending from the cam face 30 is a portion which lies in a plane parallel to that of the base plate 24 and carries guide pins 32 and 33 which enter the bifurcation in the free end of the spring 13 when the plug is in place. The end of the conductor strip opposite that attached to the base plate is secured to but insulated from the block 25 in any suitable manner.

Extending outwardly from the conductor strip near the end which is secured to the block 25 is a stud 35 which is adapted to be gripped between the jaws of a pair of pliers or similar instruments in order that the device may be readily inserted in the proper position. To facilitate handling and prevent twisting of the plug during the process of insertion, an outwardly extending pin 36 is formed on the conductor strip attaching means and cooperates with the stud 35 in a manner which will be readily appreciated upon examination of Fig. 3.

The conductor cord is introduced through the opening 26 and one terminal is bared and bent back upon itself, re-entering said opening and establishing electrical connection between the block 25 and one of the conductors. The terminal of the other conductor of the cord is carried forwardly between the base plate 24 and the conductor strip 28 to which it is electrically connected by means of an angle plate 37 carrying a binding screw beneath which the bared terminal of the conductor is clamped.

In order to prevent electrical contact of plugs placed next to each other between adjacent pairs of springs, the insulating washers 38 separating the rear end of the conductor strip 28 from the block 25 are of a diameter greater than the width of the strip and the block. A similar washer 39 is carried at the opposite end of the block 25 for a like purpose, but does not insulate the block from the base plate.

In use, it is to be understood that the "heat coils" 18 are first removed from their positions between the springs 12 and 13 and the plug is then inserted by placing the reduced end of the shouldered stud 27 in the opening 16. Upon pushing the plug into position the studs 32 and 33 enter the bifurcation in the spring 13 and electrical connection between the plug terminals and the springs is effected. Such movement causes the spring 13 to move outwardly over the cam face 30 in such a manner that the inward pressure of the spring tends to draw the plug more firmly into position. Owing to the position of the cord with relation to the stud and the opening 16, it will be obvious that accidental removal of the plug from its position by pull on the cord will be prevented due to the lack of sufficient leverage. In order to remove the plug, it is but necessary to exert pull on the stud 35 which causes the outer end of the base plate 24 to engage and rock on the end 15 of the spring 12, thus lifting the reduced end of the shouldered lug 27 from its position in the opening 16. The spring 13 is thus moved outwardly, and simultaneously both pins 32 and 33 are withdrawn from the bifurcation in the end 21 of said spring.

From the foregoing, it will be seen that a plug is provided which, while permitting of ready insertion and removal, cannot be accidentally dislodged from its position in the frame.

What is claimed is:

1. A test plug comprising a base plate, a stud carried by the base plate for entrance into an opening in a distributing frame spring, a conductor strip associated with but insulated from the base plate, and a cam face on the conductor strip for engagement behind the curved portion of the cooperating distributing frame spring.

2. A test plug comprising a base plate, a stud carried by the base plate for entrance into an opening in a distributing frame spring, a conductor strip associated with but insulated from the base plate, a cam face on the conductor strip for contact with and engagement behind one curved portion of the cooperating distributing frame spring, and guide pins for entrance into a bifurcation in the free end of the last named spring.

3. A test plug comprising a base plate, a cord retaining block secured to one end of the base plate, a conductor strip secured to but insulated from the base plate and the block, a shouldered stud near the end of the base plate opposite that to which the block is secured, and a cam face on the conductor strip.

4. A test plug comprising a base plate, a

cord retaining block secured to one end of the base plate, a conductor strip secured to but insulated from the base plate and the block, a shouldered stud on the base plate near the end opposite that to which the block is secured, and a cam face on the conductor strip, the crest of the cam face being slightly offset to one side of the longitudinal axis of the stud.

5. A test plug comprising a base plate, a conductor strip secured to but insulated from one end of the base plate, a cord retaining block secured to the opposite end of the base plate, the end of the conductor strip opposite that secured to the base plate being secured to but insulated from the block, a shouldered stud carried by the base plate near the end to which the conductor strip is secured, a cam face on the conductor strip, the crest of the cam face being slightly offset to one side of the longitudinal axis of the stud, guide pins on the conductor strip, a second stud on the conductor strip, and means to prevent the plug from turning on said second stud when held in the jaws of a positioning instrument.

In witness whereof, I hereunto subscribe my name this 15th day of March, A. D., 1926.

EMIL C. MUELLER, JR.