

(No Model.)

C. E. SCRIBNER.

PLUG AND SPRING JACK FOR TELEPHONE SWITCHBOARDS.

No. 596,625.

Patented Jan. 4, 1898.

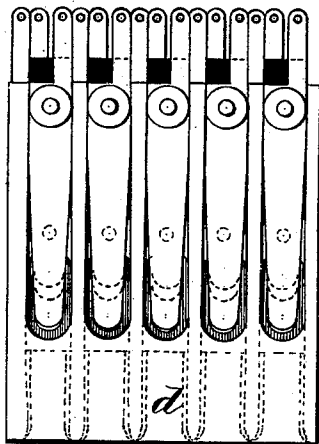


Fig. 1

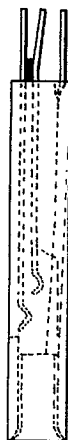
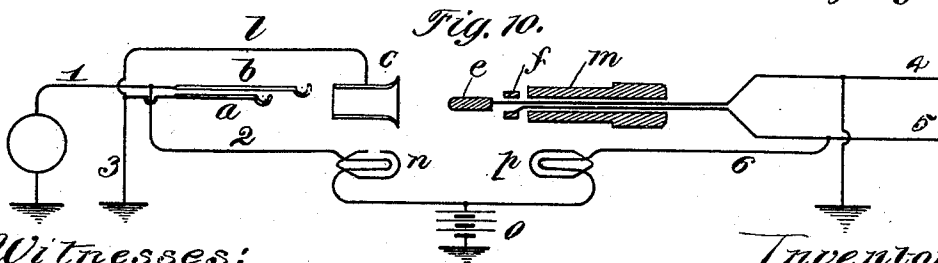
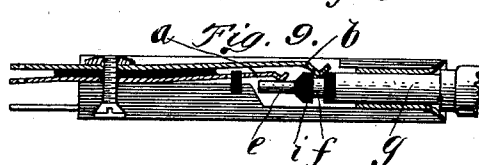
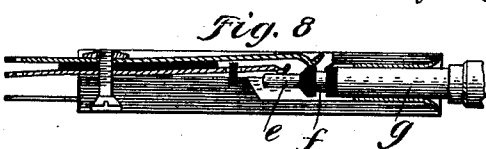
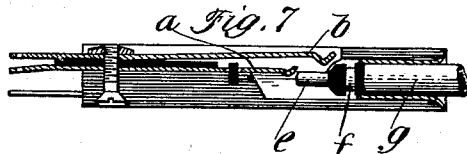
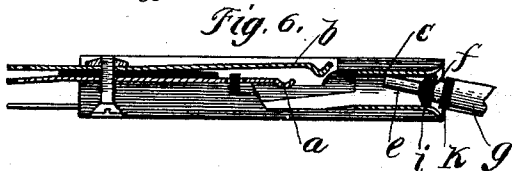
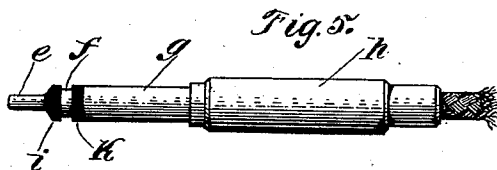
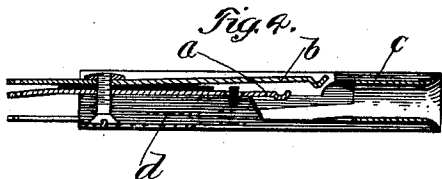


Fig. 2

Fig. 3.



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UNITED STATES PATENT OFFICE.

CHARLES E. SCRIBNER, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE WESTERN ELECTRIC COMPANY, OF SAME PLACE.

PLUG AND SPRING-JACK FOR TELEPHONE-SWITCHBOARDS.

SPECIFICATION forming part of Letters Patent No. 596,625, dated January 4, 1898.

Application filed November 29, 1895. Serial No. 570,520. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. SCRIBNER, 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 Plugs and Spring-Jacks for Telephone-Switchboards, (Case No. 412,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention concerns the construction of spring-jacks for telephone-switchboards, having several contact portions, and connecting-plugs designed for use with them, having corresponding contact-pieces.

The purpose of the invention is to avoid contact between incongruous or dissimilar portions of the spring-jack and plug in the act of inserting the plug, which might result injuriously in a momentary crossing together of different circuits.

The invention consists in so conforming the parts of the plug and spring-jack as to render connection between unlike line contact portions of the appliances impossible. It comprises a number of different features, some of which may be used independently, but which coöperate to attain the desired result.

As affording an instance of the utility of the invention, it may be explained that in the act of inserting a double or triple contact-plug of the ordinary type into a spring-jack adapted to it the spherical tip of the plug first makes contact with the thimble or one spring of the jack and later with the spring with which it is designed to register. Intermediate contact-pieces of the plug also may touch first the thimble of the jack and then the springs or other portions corresponding to them. When these different contact-pieces are made the terminals of distinct circuits including sources of current and various instruments, objectionably or dangerously large currents may be created in the accidental circuits thus momentarily formed. When signaling instruments such as sensitive incandescent lamps are used in the circuits, the lamps may be destroyed by such currents.

The invention is applied particularly to a

"triple" plug and to a corresponding three-part spring-jack. The plug consists of three cylindrical contact-pieces arranged coaxially to form the cylindrical stem or spindle of the plug. The spring-jack consists of a tubular thimble surrounding the front portion of the opening for the plug, and two springs having their contact portions presented at different distances in the rear of the thimble, the disposition of the contact-pieces in the spring-jack being similar to that of the contact-surfaces of the plug. In these coöperating appliances the aim of the invention is attained as follows: The tip or front contact of the plug is constructed of smaller diameter than the succeeding contact-pieces, and in the spring-jack the spring corresponding to that portion of the plug projects nearer the axis of the plug than the others. An insulating-bushing is placed at the rear of the tip or front contact of the plug, of larger diameter than the succeeding second contact of the plug, and the tip of the plug is made of such length that the said second contact cannot touch the thimble of the jack while the plug is being inserted, and behind the second contact is still another enlarged bushing of insulating material, the contact-surface being short, and the front of the thimble is flared or opened to such a curve that it cannot touch the contact-surface thus protected. These three devices constitute the essential features of the invention.

The accompanying drawings represent practical forms of this improved plug and spring-jack.

Figure 1 is a portion of a strip of spring-jacks. Fig. 2 is an end elevation of the strip, and Fig. 3 is a front elevation of the same. Fig. 4 is a sectional view of a single spring-jack, taken on the center line of the jack. Fig. 5 is a side elevation of the plug. Figs. 6, 7, 8, and 9 represent the plug in different positions in the spring-jack, such as may be assumed at different stages in the insertion of the plug, illustrating functions of the different improvements. Fig. 10 is a diagram of a typical circuit whose conditions necessitate a plug and spring-jack having such relations as this invention provides.

The spring-jack comprises, essentially, two springs *a* and *b*, which constitute the line-contacts of the spring-jack, and a tubular thimble *c* before these springs, which may form a terminal of a local circuit. These parts are mounted in a block *d*, of rubber or other insulating material, the two springs being laid in a transverse groove in the block of rubber and held in place by a nut extending through the block. The thimble *c* is placed in a perforation of the block meeting this groove, the bore being continued into the groove to leave a space underneath the curved extremities of the springs. A number of spring-jacks may be mounted in the usual way, side by side, on a plate of insulating material. The mode of mounting the parts is not involved in the present invention.

The plug, Fig. 5, contains three contact-pieces *e*, *f*, and *g*, corresponding to the three contact parts *a*, *b*, and *c* of the spring-jack. These are assembled in any suitable way to constitute a substantially cylindrical stem provided with a handle *h* and with means within the handle or body of the plug for attaching flexible conductors to the different contact-pieces.

Since this invention concerns a relation between the contact parts of the spring-jack and those of the plug, the construction of each of these appliances must be described in connection with that of the other. The contact-tip *e* of the plug is made of rather small diameter. The contact ring or collar *f* is made of somewhat larger diameter, and the sleeve *g* of still larger diameter. The last-mentioned contact should be of nearly the same diameter as the internal dimensions of thimble *c*, very slight play being allowed to the plug when in the spring-jack. The extremity of spring *a* of the jack is bent so that it lies in the path of the tip *e* of the plug and will be raised slightly thereby when the plug is in the jack. The end of spring *b* is similarly bent, but does not approach sufficiently near the axis of the spring-jack to touch the contact *e* of the plug as the latter is inserted. It is adjusted to bear with pressure upon the collar *f*, however. Between the tip *e* and the collar *f* of the plug lies a disk or ring *i* of insulating material, as hard rubber. This disk is made of nearly the same diameter as that of the sleeve *g*, so that it may pass through the thimble *c*. Its edges are rounded to permit of a slight rotational movement while in the thimble. Between the collar *f* and the sleeve *g* lies another bushing or ring *k*, of insulating material, which is also of the same diameter as sleeve *g* and is slightly rounded on its edge near the collar *f*. The contact-collar *f* is made as short as is practicable for obtaining a sufficient extent of surface for contact of spring *b* with it, allowing for wear and inaccuracy in manufacturing. The tip *e* should be comparatively long to afford means for directing the plug into the spring-jack. The presented extremity of the thimble *c* is widely flared with a regularly-

curved section. The function of the peculiar conformation of these parts may be traced in connection with Figs. 6 to 9, inclusive. These figures show the plug in different positions in the spring-jack, such as may be assumed in the act of thrusting the plug into the spring-jack.

In Fig. 6 the plug is inserted into the spring-jack to a slight distance at an angle with the axis of the spring-jack. It will be observed that the angle is determined by the distance from the extremity of tip *e* to the collar *f*. This collar lies adjacent to the curved portion of the thimble *c*, but is prevented from touching this thimble by the rings *i* and *k* of insulating material. It will be obvious that this condition is attained by a suitable proportioning of the diameters of the insulating-rings and of the collar *f* to the curvature of thimble *c*. Having determined the diameter of the thimble *c* and the minimum length of collar *f*, this collar must be made sufficiently small and the radius of curvature of the flared opening sufficiently great so that the two parts escape contact.

In Fig. 7 the plug is shown inserted so far that the tip *e* lies underneath the contact-surface of line-spring *b*. This line-spring does not, however, make connection with the tip. Obviously the collar *f* is still insulated from the thimble *c*.

A slight further insertion of the plug, as shown in Fig. 8, forces the tip *e* under the curved extremity of line-spring *a* and thrusts the insulating-ring *i* under spring *b*, raising the latter. In its still further movement the plug reaches its normal position in the spring-jack, as shown in Fig. 9. Then the spring *a* rests upon the tip *e*. The spring *b* lies against the collar *f*, making contact with it, having closed upon the rear surface of insulating-ring *i*. The sleeve *g* makes connection with the thimble *c* of the spring-jack. The accidental withdrawal of the plug from the spring-jack is prevented by the friction between the curved extremity of spring *b* and the insulating-ring *i*, these parts taking the place in this respect of the former spherical tip of the plug.

The diagram Fig. 10 illustrates in a simplified manner an arrangement of circuits which sometimes occurs. The spring-jack *l* forms the terminal of a grounded-circuit telephone-line provided with signal-lamps, while the plug *m* may be assumed to represent the terminal of another line or of a plug-circuit associated with a different line. The line-spring *b* of the spring-jack is connected directly with line-wire 1 to the station. From this line-wire a branch 2 is led through an individual signal-lamp *n* to a battery *o*. The line-spring *a* of the spring-jack is grounded by a wire 3 to create a return-circuit for the telephone-line, while the thimble *c* is also connected to earth for testing purposes. The contact *e* of the plug may constitute one terminal of a grounded conductor 4 of the plug-

circuit, the contact collar or ring *f* being the terminal of the other conductor 5 of the same circuit. From the conductor 5 is led another branch 6 through a supervisory signal-lamp *p* to the same battery *o*.

It will be understood that in practice other appliances would be associated with these circuits to permit of their use in telephonic transmission and to secure the practical operation of the signals, or that a quite different system of circuits might be employed, if desired.

In inserting the plug *m* into the spring-jack *l* the accidental contact between tip *e* and thimble *c* can do no harm. Such contact would in practice be made in the operation of testing. If, however, the collar *f* should touch thimble *c*, a ground-circuit would be formed through wire 6, including the lamp *p*, to the thimble and thence to earth, creating a short circuit of battery *o* through the lamp. This might injure or destroy the signal-lamp. Similarly, if at a later stage in the act of inserting the plug the tip *e* should make connection with line-spring *b*, a short circuit would be formed from battery *o* through individual lamp *n* and wires 2 and 4, which would destroy the latter lamp. With the improvements which constitute the subject of this application, however, no such contact is possible.

I claim as new and desire to secure by Letters Patent—

1. The combination with a spring-jack having a tubular contact-thimble and a contact-spring, of a plug having a contact-ring for the said contact-spring and an insulating-ring of larger diameter than the said contact-ring placed before the said contact-ring, whereby

the ring is prevented from touching the contact-thimble, as described.

2. The combination with a spring-jack having a tubular contact-thimble with a flared orifice and a contact-spring, of a plug having a contact-ring for the spring sunk between two collars of insulating material, whereby the said contact-ring is prevented from touching the contact-thimble, as described.

3. The combination with a connecting-plug provided with a cylindrical tip, a contact-ring, and a collar of insulating material in the rear of said tip, larger than the said contact-ring, of a spring-jack provided with a spring adapted to enter behind the said insulating-collar to make contact with the ring and to hold the plug in the spring-jack, as described.

4. The combination with a plug having a cylindrical tip, a contact-ring in the rear of said tip, and a collar of insulating material, of larger diameter than the said contact-ring, between the said ring and the tip, of a spring-jack provided with two contact-springs, one adapted to rest on the said tip and the other adapted to rest on the said ring, substantially as described.

5. The combination in a connecting-plug, of a cylindrical tip of small diameter, a contact-collar of larger diameter at the rear of said tip, a contact-sleeve of still larger diameter at the rear of said collar, and insulating-collars separating the different contact portions, substantially as described.

In witness whereof I hereunto subscribe my name this 5th day of November, A.D. 1895.

CHARLES E. SCRIBNER.

Witnesses:

ELLA EDLER,
MYRTA F. GREEN.