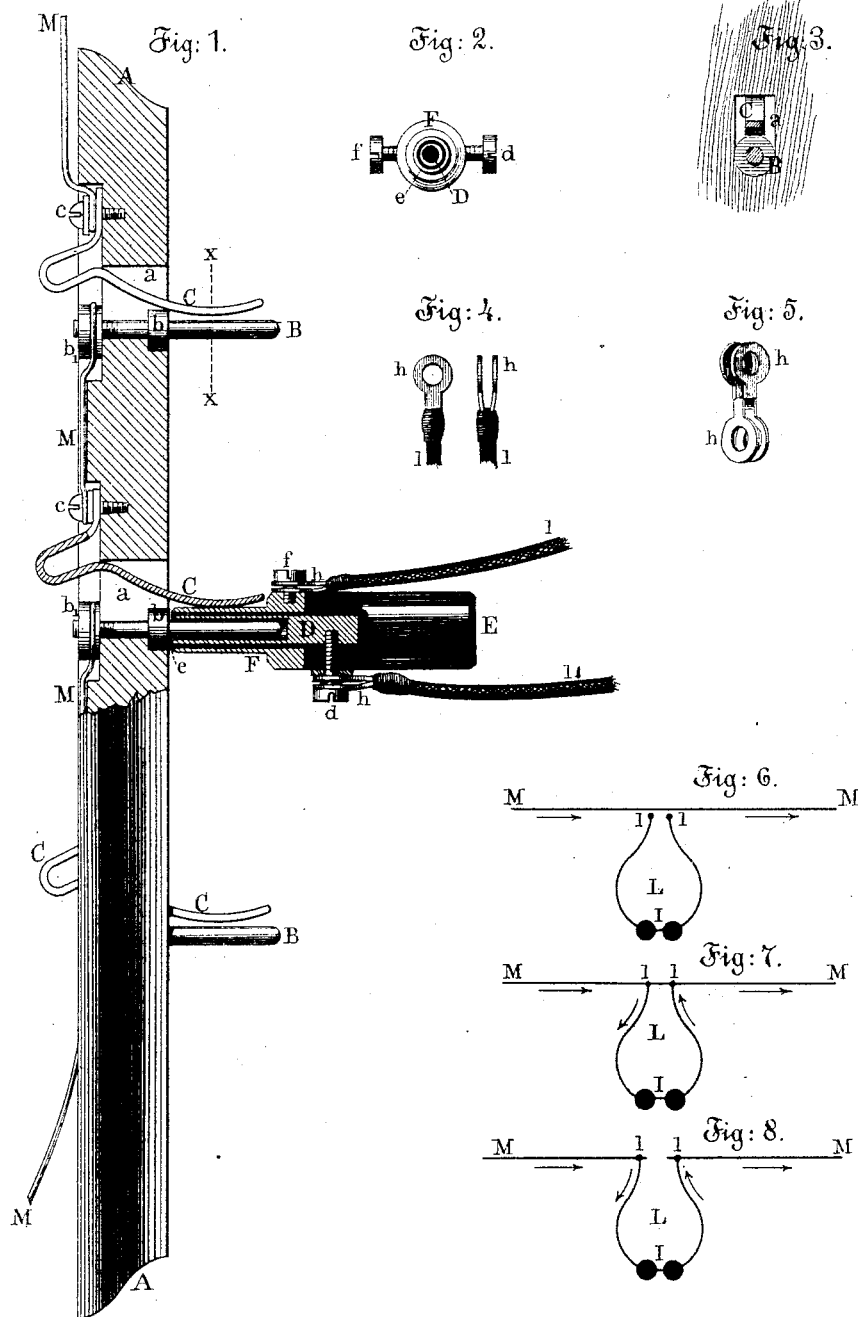


J. H. BUNNELL.
Telegraph Switch-Board.

No. 215,568.

Patented May 20, 1879.



Witnesses:

Wm R Roberts
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Inventor,

Jesse G. Bunnell,
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Frank L. Pope.

UNITED STATES PATENT OFFICE.

JESSE H. BUNNELL, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN TELEGRAPH SWITCH-BOARDS.

Specification forming part of Letters Patent No. **215,568**, dated May 20, 1879; application filed December 6, 1878.

To all whom it may concern:

Be it known that I, JESSE H. BUNNELL, of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Telegraphic Switch-Boards, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

Figure 1 is a vertical section of a telegraphic switch-board embodying my improvements. Fig. 2 is an end view of the plug or connector. Fig. 3 is a vertical cross-section of the spring-jack and plug, taken in the plane of the dotted line *xx* in Fig. 1. Figs. 4 and 5 are detached views, showing the device for attaching the conducting-wires to the plug or instrument; and Figs. 6, 7, and 8 are diagrams illustrating the electrical connections which may be made by means of my invention.

In the practical operation and manipulation of telegraph-lines, it is necessary to provide some convenient means whereby a branch line, or, as it is technically termed, "a loop" may be instantaneously connected with or disconnected from the main line without, in either case, interrupting the continuity of the latter.

A loop is a wire which goes out from and returns to the main line, and usually includes an instrument or a battery, or both. This will be understood by reference to Fig. 6, in which *MM* represent a main line of telegraph, and *L* is a loop containing an instrument, *I*. Now, suppose it is required to bring this instrument into the circuit of the main line without interrupting the latter. It is first necessary to form a connection between the terminals *l* of the loop and the main line, as shown in Fig. 7, when the current of the line will in part pass through the loop and in part by the main line, and then to divide or separate the main line at *m*, as shown in Fig. 8, after which the entire current of the main line will traverse the loop *L*. In order to disconnect the loop, the same operation is performed in reverse order.

The object of my invention is to furnish a more simple, economical, and efficient device than those heretofore in use, whereby the operation of connecting and disconnecting such loops from the main line and other similar manipulations may be performed.

My invention consists, first, in an improved construction and arrangement of the device for opening and closing the main-line circuit, technically termed the "spring-jack;" second, in an improved construction and arrangement of the device to which the terminals of the loop are attached, technically termed the "plug" or "connector;" and, third, in an improved device for attaching the conductors which form the terminals of the loop to the said plug or connector, or to the instrument.

Referring to Fig. 1, *A* is an upright slab, of wood, vulcanite, slate, or any other suitable material which is a non-conductor of electricity. Into this are inserted any required number (from one upward) of metallic pins *B*, preferably of cylindrical form. These may be secured to the slab *A* by means of a collar, *b*, in front, and a nut, *b'*, at the back, which works upon a screw-thread formed upon the pin *B*. Just above the pin *B* a slot, *a*, is formed in the slab *A*, of sufficient size to admit a strong metallic spring, *C*, which is secured to the back of the slab *A* by a screw, *c*, and is bent in the manner shown in the figure, so as to pass through the slot *a*, and press firmly, by virtue of its own elasticity, against the edge of the collar *b*. The severed ends of the main line *MM* are attached to and electrically connected with the pin *B* and the spring *C* in any convenient manner, the circuit being completed between the two latter by the pressure of the spring *C* against the collar *b* on the pin *B*.

The arrangement of parts just described constitutes my improved spring-jack, and any required number of these spring-jacks may be placed upon the same slab, (three are shown in the figure,) according to the requirements of the service, the line *ll* passing successively from one to another.

In order to enable the operator to connect the terminal wires of the loop with the main line without violating the conditions hereinbefore referred to, I make use of an improved plug or connector, constructed as follows: *D*, Fig. 1, is a cylindrical metallic rod having a hole bored in its end of such diameter as to fit closely over the pin *B*, which may be made slightly conical or tapering, if preferable, or be split toward its end in order to insure more

perfect electrical contact between it and the inner surface of the tubular rod D. The rod D is inserted into a cylindrical block, E, of vulcanite or other insulating material, which serves as a handle for manipulating the apparatus. An outer metallic cylinder or tube, F, surrounds the tubular rod D, but is separated from it by a thin concentric layer of non-conducting material, *e*. Thus it will be understood that the metallic parts D and F are effectually insulated from each other.

One of the terminal conductors *l* of the loop is attached to and electrically connected with the tube F by means of the screw *f*, and the other terminal in the same manner is attached to and electrically connected with the hollow rod D by means of the screw *d*, which passes through the insulating-handle E in the manner shown in the figure.

The operation of connecting a loop with the main line may, therefore, be performed simply by placing the open end of the plug over the pin B, and then pressing it underneath the spring C and against the collar *b*. The spring C will, by this operation, be lifted off from the collar *b* and made to rest upon the outer metallic portion, F, of the plug, so that the main-line circuit, entering the spring C, will pass through F to the wire *l* of the loop, returning by the wire *l*, and going thence through D to the pin B, and so on. It is obvious that this result will be effected without interrupting the main line, because the circuit must necessarily be closed between F and C before it can be broken between C and B, and vice versa.

When the flexible conductors *l l* are rigidly attached to the plug or connector in the manner which has heretofore been practiced they are very liable to break, after a time, in consequence of being so frequently bent at or near the point of attachment. To obviate this difficulty, I attach to the end of the conductor eyes *h h*, constructed of metal, thin enough to possess considerable elasticity, and preferably of the form shown in Fig. 4. These are secured to the plug by means of flat-headed

screws *d* and *f*, Fig. 1. The elasticity of these when compressed beneath the heads of the screws causes them to form a good electrical connection therewith, while the arrangement of the parts is such as to allow them to turn freely upon the screws without interrupting the circuit.

A modification of this device, which is so constructed as to permit of a swiveling motion in two different directions, at right angles to each other, so as to form a universal joint, is shown in Fig. 5. This arrangement is more particularly designed to be used in connection with a telephonic instrument when the latter is attached to a loop, as in this case the conductors are liable to be bent and twisted in various directions by the handling of the instruments.

I claim as my invention—

1. A spring-jack for telegraphic switches, consisting of a stationary pin provided with a collar or projection, in combination with a movable spring so arranged as to press against said collar by its own elasticity, substantially as specified.

2. A movable plug or connector for telegraphic switches, consisting of two concentric hollow cylinders or tubes of metal, separated from each other by a layer of insulating material, and provided with devices for the attachment thereto of electric conductors, in combination with a stationary pin, substantially as described.

3. An electrical conductor for telegraphic switches and instruments, having its terminal or terminals provided with elastic metallic eyes, constructed and arranged substantially as described, in combination with a flat-headed screw or pin, substantially as described.

In witness whereof I have hereunto set my hand this 4th day of December, A. D. 1878.

JESSE H. BUNNELL.

Witnesses:

FRANK L. POPE,
WM. ARNOUX.