T. B. DOOLITTLE.

Tips for Switch Cords.

No. 208,969. **Patented Oct. 15, 1878.**

Fig. 1.

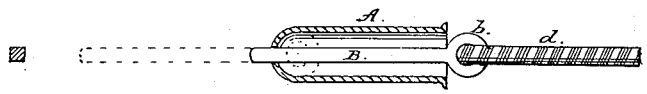


Fig. 2.

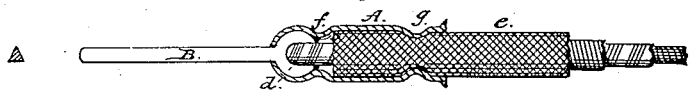


Fig. 3.

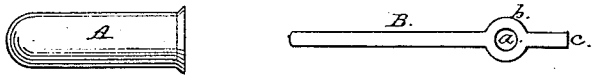


Fig. 4.

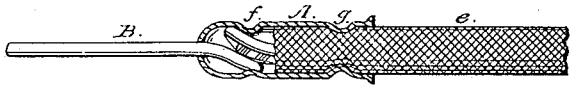


Fig. 5.

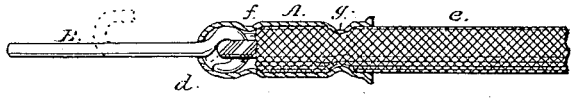


Fig. 6.

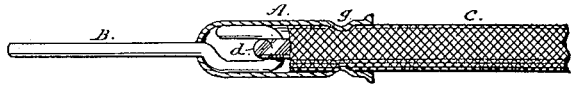
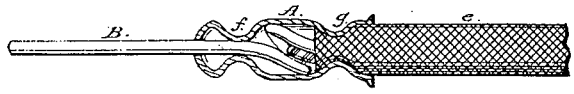


Fig. 7.



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John Tyler

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UNITED STATES PATENT OFFICE.

THOMAS B. DOOLITTLE, OF BRIDGEPORT, CONN., ASSIGNOR, BY MESNE ASSIGNMENT, TO EUGENE F. PHILLIPS, OF PROVIDENCE, R. I.

IMPROVEMENT IN TIPS FOR SWITCH-CORDS.

Specification forming part of Letters Patent No. **208,969**, dated October 15, 1878; application filed February 9, 1878.

To all whom it may concern:

Be it known that I, T. B. DOOLITTLE, of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Tips for Switch-Cords; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, making a part of this specification.

My invention relates to certain new and useful improvements in the tips for electric switch-cords, and in the mode of attaching the same. It has for its objects simplicity of construction and the perfect and durable contact and connection between the cord and tip; and with these ends and objects in view, my invention consists of a metal shell and a needle or carrier adapted to carry and hold the core and end of a cord; and my invention also consists of the method hereinafter described of producing the contact necessary in switch-cords to produce perfect conductivity.

Another feature of my invention relates to the novel form of the tip-wire, whereby it may not only be more firmly held in a screw-post than those of the form heretofore in use, but whereby greater electric conductivity between said tip-wire and the post and its screw is attained; and with these ends in view my invention further consists of a tip-wire rectangular or triangular in cross-section, in combination with electric switch-cords and telephone-conductors, as will be hereinafter explained.

Previous to my invention great difficulty has been experienced in arranging the end of the switch-cord core so that it could be successfully and durably connected with the posts of telephones and with the switch-plates in telegraph offices, and several novel ideas have been suggested, the most approved and generally used being the joining of the core with a metal point or bar by the use of solder to form the contact, and then covering the same with a split-metal cone.

In practice I have found that the connection between the core and metal bar is unreliable and likely to become impaired in use, and that the employment of solder to form the joint has a tendency to render the conductivity less perfect than it should be, owing in a measure to the chemical action of the solder acids upon the comparatively small wires which are employed in the cores of switch-cords.

I have sought by my invention to overcome all these difficulties and disadvantages by avoiding the use of solder altogether, and rendering the contact and conductivity perfect by binding the several parts tightly together by the compression or crimping of the shell, which also holds the braided covering against longitudinal movement or stripping.

In order that those skilled may understand the advantages of my invention and learn how to use the same, I will proceed to describe the construction and application of the same, referring by letters to the accompanying drawing, in which—

Figure 1 is a central longitudinal section of one of my improved tips as applied to the end of a switch-cord, with the cord and carrying-needle shown in elevation, and the latter in two positions, the solid lines showing it in the act of starting it through the forward end of the shell, and the dotted lines showing it in positions longitudinally to be fastened in place by crimping the shell. Fig. 2 is a view similar to Fig. 1, but showing the needle and cord secured permanently in place by the crimping of the shell. Fig. 3 is a side elevation of the shell and needle disconnected; Figs. 4, 5, and 6, similar views, showing modifications of the needle or core carrier; and Fig. 7, a similar view, showing a modification of the mode of crimping the needle in place. In the last four figures the shell is shown in section to expose the needle and cord.

Similar letters indicate like parts in the several figures.

A is a brass or other suitable sheet-metal shell, made in any desirable manner, and having its open end slightly flared to prevent abrasion of the braided covering of the cord. The practically closed or forward end of the shell has a central hole or perforation, adapted to permit the passage of the needle B, which is formed, as shown, with an eye, *a*, through which the core-wire is threaded, and enlarged

around the eye, as seen at *b*, so that the said portion will just fit snugly the inside of the shell A. Behind the eye *a* is a short tail, *c*. *d* is the metal core of the switch-cord, which is composed of a series of small wires wound spirally around a flexible core, or formed in any other manner; and *e* is the braided covering.

At Figs. 1 and 2 I have shown the manner of attaching the tip, which consists in first cutting away the binder and braided covering of the cord, exposing the core *d*, which is then passed or threaded into the eye *a* or hook end of the needle, and bent back upon the tail *c*, or upon itself, according to the character of the needle employed. The forward end or point of the needle is then forced through the hole in the front end of the shell, the needle being sufficiently longer than the shell to permit the same. The protruding end or point of the needle is then grasped and the needle drawn forward until the swell around the eye reaches the end of the shell, as shown in dotted lines at Fig. 1 and solid lines at Fig. 2, the relative diameters of the needle proper and the hole in the forward end of the shell and the swell at the eye and the inside diameter of the shell being such that when drawn to the position shown at Fig. 2 they will bind snugly. When the needle is in the position just described, it will have drawn the braided portion of the cord within the back edge of the shell, and the latter is then, by means of a suitable press, crimped just behind the eye of the needle, as shown at *f*, whereby the core of the cord is pinched between the walls of the shell and the needle to produce perfect contact between the three, and the needle is also firmly held in place against vibration; and in order that the braided covering may be insured against slipping back upon the core, and also to form a secondary grasp upon the cord as a whole, the shell is also crimped at *g*. The result of the two crimpings accomplishes the objects sought, and makes a strong, stiff joint and perfect contact of metals. The projecting end or point of the needle, if too long, may be clipped off at any suitable or desirable distance from the shell.

The form of wire which I prefer is rectangular or triangular in cross-section, as by reason of such form I am enabled to hold the same more firmly within the post and obtain more than a single point of contact between the tip-wire and post; and an additional advantage resulting from such form rests in the fact that the angular needle or tip-wire, in passing through the round puncture or orifice in the front end of the shell, cuts or spreads the edge of said orifice and induces to a tight fit and close contact.

At Figs. 4, 5 and 6 the needle is shown with different formations of the eye or hook, and these are only designed to show a few of many different ways in which I have applied the principle of my invention, preferring in practice to use the form shown in Figs. 1, 2 and 3. The point of the needle may be bent, as shown in dotted lines at Fig. 5, to adapt it to some kinds of posts. Many other changes will suggest themselves, which may be made without departing from the spirit of my invention, and I do not therefore wish to be understood as at all limiting myself in this direction, nor in the exact point within the shell where the eye of the needle is secured, as it may be immediately adjacent to the forward end, or at any point between the front and back ends, and the shell crimped behind the eye, or behind and in front of the same, as clearly shown in Fig. 7, in which case the shell would have a practical swell between the grooves or crimps.

I do not wish to be understood as confining myself to a seamless shell, for, although I prefer such a shell, they may be made with a longitudinal seam.

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

1. As a new article of manufacture, a tip for switch-cords consisting of a metallic shell and a metallic needle, the latter adapted to carry the core of the cord within the shell, and to be secured in place substantially as hereinbefore described.

2. As an improved article of manufacture, a switch-cord provided with a metallic tip, secured in position to produce conductivity by compression of the shell, substantially as hereinbefore set forth.

3. The method herein described of securing metal tips to switch-cords and producing conductivity by compressing the outer shell and confining the core between the said shell and an interior spear or needle.

4. In combination with an electric switch-cord, a tip-wire or needle of rectangular or triangular form in cross-section, substantially as and for the purposes set forth.

In testimony whereof I have hereunto set my hand and seal this 8th day of February, 1878.

T. B. DOOLITTLE. [L. S.]

In presence of—
WM. C. MCINTIRE,
F. W. HOWARD.