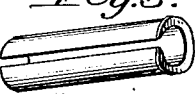
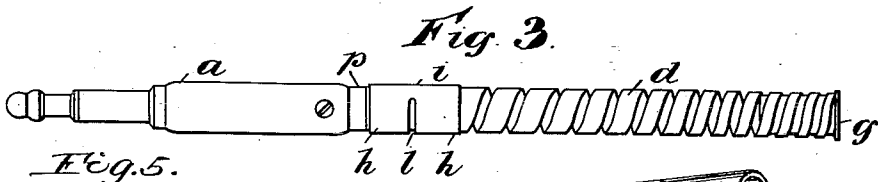
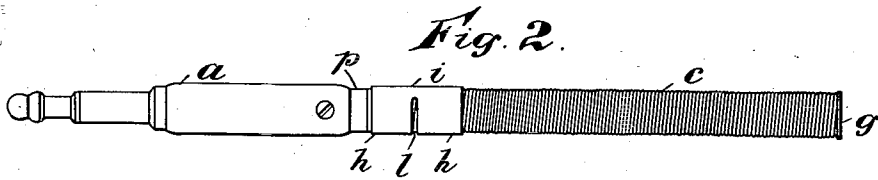
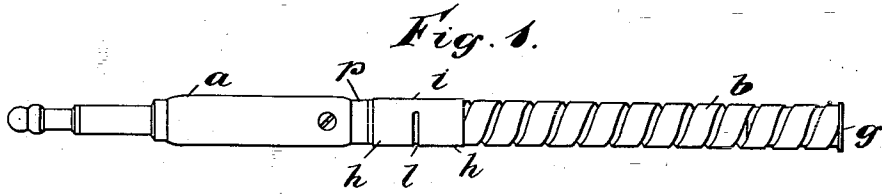


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SWITCHBOARD CONNECTING CORD AND THE LIKE.
APPLICATION FILED MAY 7, 1913.

1,177,307.

Patented Mar. 28, 1916.



Witnesses.
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PHINEHAS PEARSON CRAVEN, OF CHARLTON-ON-MEDLOCK, MANCHESTER, ENGLAND.

SWITCHBOARD CONNECTING-CORD AND THE LIKE.

1,177,307.

Specification of Letters Patent.

Patented Mar. 28, 1916.

Application filed May 7, 1913. Serial No. 766,174.

To all whom it may concern:

Be it known that I, PHINEHAS PEARSON CRAVEN, a subject of the King of Great Britain, residing at Charlton-on-Medlock, Manchester, England, have invented new and useful Improvements in or Connected with Switchboard Connecting-Cords and the like, of which the following is a specification.

This invention relates to improved modes of supporting and protecting switchboard connecting cords, and the like.

It is common knowledge that telephone switchboard connecting cords are very liable to break, more particularly at or about the place where the cord enters the switch-plug, but an absolute break of the cord, though very objectionable as it renders the cord useless and necessitates it being repaired, is not the worst feature of frequent breaks, because breaks attract notice at once, and can be dealt with. Telephone switchboard connector cords mostly consist of two or more strands, each consisting of many fine copper wires or strips suitably wrapped to insulate one strand from another. The cord begins to give way by the breaking of one or more of these fine copper strips, and the more of them break, the less efficiently the cord acts as a transmitter, causing various defects in the telephone service, such as indistinctness of enunciation, intermittent enunciation, buzzing, or modifications of these faults. As the defects develop more or less gradually, there is, in the aggregate, great inconvenience caused both to the staff and to subscribers by inefficient service, through what may be called cord faults; apart from the actual breaking of the cords, and all connecting cords, broadly speaking, go through the varying phases of gradual breakdown before actually breaking, so that any practical arrangement that would minimize the number of cord breaks would obviously be of great utility. The breaks are largely caused by the sharp bending of the cords at the part referred to, more particularly when the plug is being pushed into the jack panel or switchboard.

In order that this invention may be more fully understood I will refer to the accompanying drawings, in which—

Figure 1 represents a helical spring *b* made from flat tape or ribbon-like metal; Fig. 2 shows a helical spring *c* with six wires wound side by side, a compound spring, interwound upon the same mandrel;

Fig. 3 shows a helical spring *d* made from tape or ribbon-like metal, which metal is tapered in width, and the spiral of which varies in pitch or distance between coil and coil; Fig. 4 shows a helical spring *e* made from ribbon-like metal having a clip formed at one end for gripping onto the switch-plug; Fig. 5 is a detail perspective view of the tube for the outer end of the protecting support; and, Fig. 6 is a similar view of the clip which secures the protecting member to the plug.

Ordinary helical springs made from wire of circular cross-section, and helical springs made from wire of rectangular cross-section, surrounding the cords have been used to prevent or minimize the sudden bend of the cords. It has also been proposed to provide the cord attachment with a protective tubular extension, formed of a number of thin flexible strips, to prevent or minimize the sudden bend of the cords. But I prefer to use two or more helical springs wound side by side, see *c*, Fig. 2, which shows six springs wound side by side. Or a helical spring made from flat tape or ribbon-like metal may be used, see *b*, Fig. 1, thus obtaining strength combined with small diameter. The pitch of any or all helical springs may be varied to give an increasing flexibility to the springs as the distance from the plug increases, by coiling the springs with comparatively wide pitched spirals close to the plug and successively decreasing the pitch or distance between coil and coil as the distance from the plug increases, the flexibility increasing proportionately to the length of wire or metal required to make any given length of spring more or less on the principle of the lever.

A short tubular spring *g*, Fig. 2, formed from a piece of flat tempering steel or other suitable metal, and preferably flanged or bell-mouthed slightly at one end, mounted on or surrounding the cord, may be pushed into the openings in the supporting springs, see *g* Fig. 2, at one or both ends until the flange or bell-mouth of the tubular spring *g* comes into contact with the ends of the supporting springs, preferably maintaining its position in said supporting spring by its own outward spring pressure against the internal surface of the cord-supporting springs. The short spring tubes provide smooth surfaces for the cords at this part, and prevent them from coming into contact with ends of

wire, or sharp cut edges of metal of which the supporting springs may be made. Or I may use a short piece of ordinary tube flanged in the same way, and forced into or otherwise fastened in position.

As a means of connecting protecting and supporting devices to the switch-plug of conductor cords and the like, I may use any ordinary mode, such as soldering, but I prefer to use a spring clip made of sheet steel or other suitable metal adapted to grip firmly onto the switch-plug, being sprung on, which clip may be of circular or tubelike section. The other end of the spring clip, projecting from the switch-plug, grips firmly onto the supporting spring or other device, thus connecting the cord protecting device to the plug. This describes what is practically a tubular spring of equal section, gripping the switch-plug with one part, and the protective spring or other device with the other part, and though this form of clip acts when the two parts gripped are of equal diameter, in cases where the diameter of the plug and spring vary, the part with the larger diameter prevents this clip from gripping onto the smaller diameter with sufficient firmness. I may use an alternative form of clip to meet variations in the diameters of the parts clipped, which may be described as a compound or double clip, see *h, h* Figs. 1, 2 and 3, connected together by a strip or finger of metal, see *i* Figs. 1, 2 and 3, of one quarter or any desired proportion of the circumference of the said tubular clip, the remaining three quarters, or other desired proportion of the circumference of said tubular clip, being cut away at that part, see *L* Figs. 1, 2 and 3, thus causing a break or disconnection to a considerable extent between the two clips *h, h* thus formed, which clips will then act to grip onto, or, if pressed to and inserted into the openings in the plug and supporting device respectively, expand against surfaces as required to a great extent independently the one clip of the other. I may use compound clips of this type, one clip of a different diameter to the other to grip onto, or expand against surfaces of different diameters. In all cases described as clipping onto the switch-plug, it may also be understood to mean alternatively onto a part of the plug turned down or made of less diameter (see *p*, Figs. 1, 2, 3 and 4) to such an extent as that the outside of the clip, when sprung on, need not be of greater diameter than the switch-plug *a*, beyond the parts embraced by the clips, see *a* and *h*, Figs. 1, 2 and 3. This feature is of great utility, as combined with the springs made of ribbon-like metal it enables switch-plugs having these attachments being all of small diameter at every part, to be used in the most modern close set jack panel, without any structural alteration in present in-

stallations, and without reducing the diameter of the cords at present in use. In all cases described as clipping onto the switch-plug, or the cord protecting device, it may also be understood to mean alternatively, the clip being pressed to, and inserted into the openings in the switch-plug and cord-protecting devices respectively, and to maintain their position firmly by their outward spring pressure against the metal surrounding the said opening. All the spring clips and the tubular springs may be made from sheet metal folded or formed into shape appropriate for being sprung open or pressed to a less diameter, to meet the case of being sprung onto or inserted into the switch-plugs or springs as may be, there being a slight opening in the case of the tubular spring and in the case of the spring clips, or the edges of the metal can be sprung apart.

For insulating the aforesaid devices I may cover them with an insulation such as plaited braid, knitted or textile fabric with or without resin or gum, such as shellac or indiarubber, preferably melted or in solution for convenience of application; or I may interpose between the plug and the clip, or between the clip and the supporting device resin or gum as aforesaid, and which would harden or set after being applied, with or without other material, such as glass, emery, or the like, which would form a good gripping surface.

Claims:

1. The combination with a switch-plug and cord connected therewith, of a protective support for the cord in the form of a helical member made from a ribbon-like strip cut from a uniformly thick sheet of resilient material adapted to inclose the cord, the said member being of uniform diameter and having its convolutions decreasing in pitch in direct proportion to the increase in distance from the plug, and means for connecting the plug detachably with the adjacent end of the helical member.

2. The combination with a switch-plug and cord connected therewith, of a protective support for the cord in the form of a helical member of resilient material adapted to inclose a portion of the cord, means for connecting the plug detachably with the adjacent end of the helical member, and a protecting tube engaged within the opposite end of the helical member and having its outer end flared to afford a bell-mouth.

3. The combination with a switch-plug and cord connected therewith, of a protective support for the cord in the form of a helical member of resilient material adapted to inclose a portion of the cord, means for connecting the plug detachably with the adjacent end of the helical member, and an expansible protecting tube of resilient material adapted to be wedged into

the free end of the helical member and having its outer end flared to afford a bell-mouth.

4. The combination with a switch-plug and cord connected therewith, of a protective support for the cord in the form of a helical member made from a ribbon-like strip cut from a uniformly thick sheet of resilient material, the said member being of uniform diameter and having its convolutions decreasing in pitch in direct proportion to the increase in distance from the plug, and means for connecting the plug detachably with the adjacent end of the helical member, the strip forming the helical member being tapered to decrease in axial width away from the plug.

5. The combination with a switch plug and cord connected therewith, of a protective support for the cord in the form of a helical member made from a ribbon-like strip cut from a uniformly thick sheet of resilient material and arranged to inclose the cord adjacent to the plug, and means for connecting the plug detachably with the adjacent end of the helical member, the strip forming said member being tapered to decrease in axial width away from the plug.

6. The combination with a switch-plug and cord connected therewith, of a protective support adapted to inclose the cord adjacent to the plug, and being in the form of a helical member of resilient material, and a longitudinally split tubiform clip of resilient material adapted to grip terminally

the plug and helical member to connect the same.

7. The combination with a switch-plug and cord connected therewith, of a protective support adapted to inclose the cord adjacent to the plug and being in the form of a helical member of resilient material, and a longitudinally split tubiform, compound clip of resilient material adapted to grip terminally the plug and helical member to connect the same, the said clip being provided medially with an arcuate slot extending oppositely from the longitudinal edges of the same.

8. Switch-plug connected cord protecting support comprising in combination, a helical spring made from a strip of ribbon-like metal tapered in width, said spring having a relatively wide pitch near its connection to the plug and decreasing in proportion to the increase of distance from said plug, a cord protecting tube with a bell-mouth inserted in one end of the protecting support and a compound tubular clip mounted on the other end thereof, said clip forming a connection between the plug and the protecting support and being formed with a narrow neck between its end portions.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

PHINEHAS PEARSON CRAVEN.

Witnesses:

ELDON ALFRED KING,
FRANK ADAMSON.