

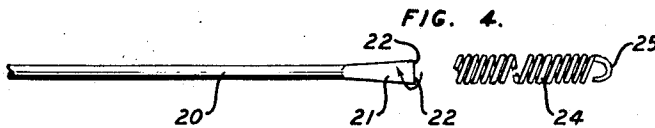
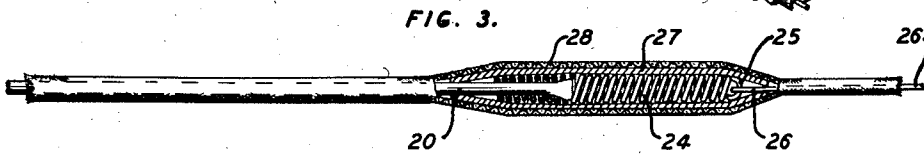
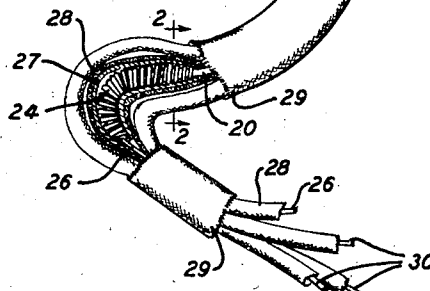
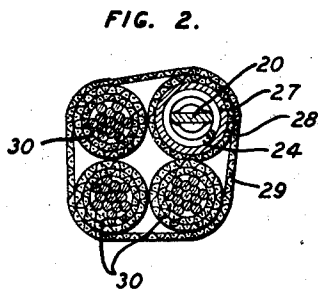
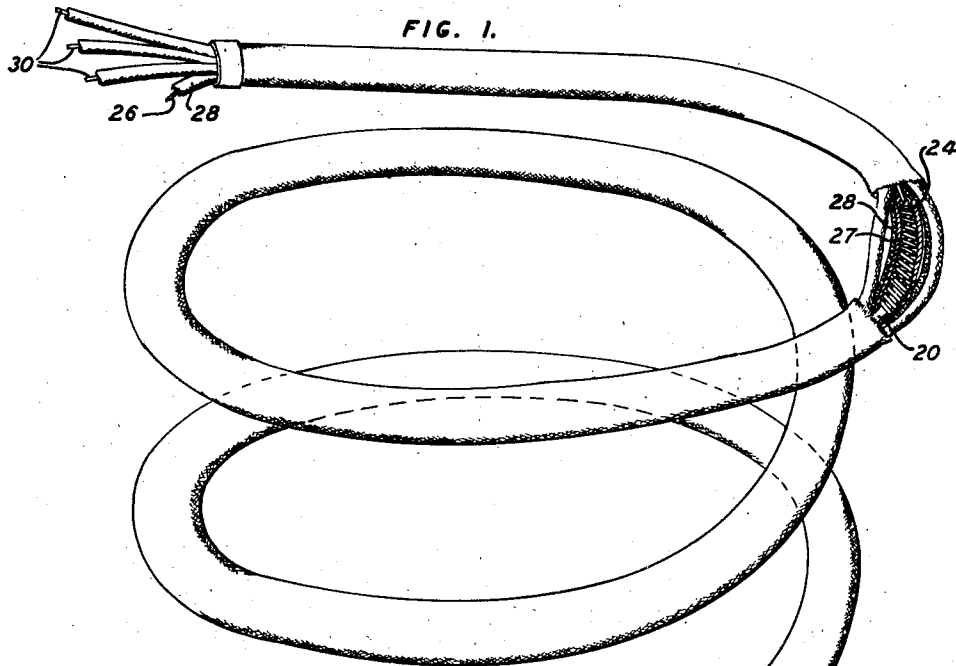
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ELECTRICAL CONDUCTOR

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ELECTRICAL CONDUCTOR

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15 Claims. (Cl. 173—367)

This invention relates to electrical conductors and more particularly to self coiling electrical conductor cords and to a method of making them.

It is desirable to have the ordinarily substan-
tially limply flexible conductor cords used on
telephone subscribers' sets made elastically re-
tractile or self-coiling so that when not in use the
cord will automatically coil itself into a compact
and unobtrusive small bundle.

One object of the present invention is to pro-
vide an improved self-coiling conductor cord for
use in connection with telephone sets and in
analogous applications.

In one embodiment thereof, the invention con-
templates a coiling element to be associated with
the electrical conductor strands within a con-
ductor cord, comprising a precoiled, elastically
tempered length of spring wire, in which the ends
of the wire have been flattened to form slightly
protruding corners and a tightly coiled helix of
spring wire having the inner diameter of the
helix such as to engage the corners above men-
tioned in the screw thread defined between the
coils of the helix, screwed over each end of the
coiling spring and extending out beyond the ends.
A sleeve of flexible wear resisting material such as
a short length of tubular textile braid impreg-
nated and coated with varnish is slipped over
each of the terminal helices and a textile sheath
braided over the whole.

Other objects and features of the invention
will appear from the following detailed descrip-
tion of one embodiment thereof taken in connec-
tion with the accompanying drawing in which the
same reference numerals are applied to identical
parts in the several figures and in which

Fig. 1 is a broken view in perspective of a tele-
phone cord constructed in accordance with the
invention;

Fig. 2 is an enlarged section on the line 2—2 of
Fig. 1;

Fig. 3 is an enlarged view partly in longitudinal
section of one end of the coiling element of Fig. 1,
and

Fig. 4 is an exploded view of one end of the
coiling spring and of the tight helix to be threaded
thereon.

In the embodiment of the invention herein dis-
closed, a suitable length of piano wire 20, or of
material having similar elastic properties, is
formed into a permanent elastically deformable
helix, and its ends are flattened as at 21 to form
corners 22 extending laterally beyond the normal
contour of the wire. Another appropriate length
of spring wire is formed into a tight helical coil

24 whose inner diameter approximates the diam-
eter of the wire 20 and is less than the distance
between the two corners 22, 22. This helix 24 is
then put in place on the end of the wire 20, as
shown best in Fig. 3, by being screwed into place
thereon, the corners 22, 22 engaging in the helical
trough or space between the coils of the helix 24.
Such a helix 24 is preferably placed over each end
of the wire 20. The outer end of each helix 24 is
preferably also formed with an axially oriented
loop 25.

After the helices 24, 24 are in place, textile
threads or cords 26, are secured to the loops 25,
and then a protective sleeve 27 is slipped over
each helix 24. Each sleeve 27 may preferably be
a short section of what is commercially known as
"varnish tubing", i. e. a length of braided textile
tubing impregnated and coated with linseed oil
varnish or cellulose acetate enamel or the like.
A series of elements thus prepared is connected
in sequence by the cords 26 being attached at each
end to a first loop 25 of one element and a last
loop 25 of another forming a continuous chain of
such elements. This chain is then fed through
a braiding machine and a continuous braided
cover 28 formed thereon.

The customary three insulated electrical con-
ductors 30, 30, 30 for a telephone cord are then
associated with the chain strand of coiling ele-
ments produced as described above and these four
strands are then fed through a braiding machine
together and covered together with a braided
textile sheath 29. When completed, the indi-
vidual cord lengths are formed by cutting the
whole midway between the ends of successive
coiling elements. Each cord thus made is like
that shown in Fig. 1. The coiling element 20
plus its end helices 24, 24 extends continuously
throughout most but not all of the length of the
cord, there being at each end a portion preferably
some four to eight inches long extending beyond
the ends of the helices 24, these parts being rela-
tively limp and flexible as compared with the
greater central length of the cord containing the
coiling spring. Hence when the two ends of the
cord are secured, e. g., to the receiver and base of
a telephone, the coiling element forces the greater
part of the cord into a compact helix. When this
helix is forced to lengthen by the receiver being
removed from the base, the coil in straightening
tends to twist and the relatively limp and flexible
ends of the cord beyond the spring yield to and
take up this twist freely, and lose it again when
the helix is permitted to close again by replacing
the receiver.

The helices 24, 24 prevent any sharp bending or kinking of the cord over the ends of the spring 20 and the sleeve 27 prevents the coils of the helices 24, 24 from nipping or unduly wearing the threads of the sheath 28.

The loops 25 and link threads 26 are not necessary but are convenient for continuous manufacture, as without them consecutive coil springs 20 must be fed at intervals by hand through a braider to receive the sheath 28.

The entirely limp sheath 28 outside of the loops 25 may be conveniently used as tie cords to fasten the ends of the cord in place and so relieve the conductors of any longitudinal jerks and strains in use.

Although herein disclosed as embodied in a telephone cord, the invention is not limited to such and this embodiment may be widely varied and departed from without departing from the spirit and scope of the invention as pointed out in and limited solely by the appended claims.

What is claimed is:

1. In a self coiling element for flexible electrical conductors, an elastic coiled core strand, a sheath over the core strand and flexible means on an end of the core strand within the sheath to prevent the end of the core strand from damaging the inside of the sheath.

2. In a self coiling element for electrical conductors, an elastic coiled core strand, a sheath over the core strand and means to prevent an end of the core strand from damaging the inside of the core strand sheath, the means comprising a strand coiled into a helix part of which encloses the end of the core strand.

3. In a self coiling element for electrical conductors, an elastic coiled core strand, a sheath over the core strand and means to prevent an end of the core strand from damaging the inside of the core strand sheath, the means comprising a strand coiled into a helix part of which encloses the end of the core strand, the end of the core strand being provided with projections engaging in the helical trough between adjacent coils of the helix thereon.

4. In a self coiling element for electrical conductors, an elastic coiled core strand, a sheath over the core strand and means to prevent an end of the core strand from damaging the inside of the core strand sheath, the means comprising a strand coiled into a helix part of which encloses the end of the core strand and an inner sheath over the last named helix and within the first named sheath.

5. In a self coiling element for electrical conductors, an elastic coiled core strand, a sheath over the core strand and means to prevent an end of the core strand from damaging the inside of the core strand sheath, the means comprising a strand coiled into a helix part of which encloses the end of the core strand and an inner sheath over the last named helix and within the first named sheath, the end of the core strand being provided with projections engaging in the helical trough between adjacent coils of the helix thereon.

6. A self coiling electrical conductor cord comprising an electrically conductive conductor strand, a coiling element having an elastic coiled core strand, a sheath over the core strand and means to prevent an end of the core strand from damaging the inside of the core strand sheath, the means comprising a strand coiled into a helix part of which encloses the end of the core strand,

and an outer sheath over both the conductor strand and the coiling element.

7. A self coiling electrical conductor cord comprising an electrically conductive conductor strand, a coiling element having an elastic coiled core strand, a sheath over the core strand and means to prevent an end of the core strand from damaging the inside of the core strand sheath, the means comprising a strand coiled into a helix part of which encloses the end of the core strand, the end of the core strand being provided with projections engaging in the helical trough between adjacent coils of the helix thereon, and an outer sheath over both the conductor strand and the coiling element.

8. A self coiling electrical conductor cord comprising an electrically conductive conductor strand, a coiling element having an elastic coiled core strand, a sheath over the core strand and means to prevent an end of the core strand from damaging the inside of the core strand sheath, the means comprising a strand coiled into a helix part of which encloses the end of the core strand and an inner sheath over the last named helix and within the first named sheath, and an outer sheath over both the conductor strand and the coiling element.

9. A self coiling electrical conductor cord comprising an electrically conductive conductor strand, a coiling element having an elastic coiled core strand, a sheath over the core strand and means to prevent an end of the core strand from damaging the inside of the core strand sheath, the means comprising a strand coiled into a helix part of which encloses the end of the core strand and an inner sheath over the last named helix and within the first named sheath, the end of the core strand being provided with projections engaging in the helical trough between adjacent coils of the helix thereon, and an outer sheath over both the conductor strand and the coiling element.

10. A self coiling electrical conductor cord comprising an electrically conductive conductor strand, a coiling element having an elastic coiled core strand, a sheath over the core strand and means to prevent an end of the core strand from damaging the inside of the core strand sheath, the means comprising a strand coiled into a helix part of which encloses the end of the core strand, and an outer sheath over both the conductor strand and the coiling element, the conductor strand and the outer sheath extending beyond the free end of the helix on the end of the coiling element.

11. A self coiling electrical conductor cord comprising an electrically conductive conductor strand, a coiling element having an elastic coiled core strand, a sheath over the core strand and means to prevent an end of the core strand from damaging the inside of the core strand sheath, the means comprising a strand coiled into a helix part of which encloses the end of the core strand, the end of the core strand being provided with projections engaging in the helical trough between adjacent coils of the helix thereon, and an outer sheath over both the conductor strand and the coiling element, the conductor strand and the outer sheath extending beyond the free end of the helix on the end of the coiling element.

12. A self coiling electrical conductor cord comprising an electrically conductive conductor strand, a coiling element having an elastic coiled core strand, a sheath over the core strand and

means to prevent an end of the core strand from damaging the inside of the core strand sheath, the means comprising a strand coiled into a helix part of which encloses the end of the core strand and an inner sheath over the last named helix and within the first named sheath, and an outer sheath over both the conductor strand and the coiling element, the conductor strand and the outer sheath extending beyond the free end of the helix on the end of the coiling element.

13. A self coiling electrical conductor cord comprising an electrically conductive conductor strand, a coiling element having an elastic coiled core strand, a sheath over the core strand and means to prevent an end of the core strand from damaging the inside of the core strand sheath, the means comprising a strand coiled into a helix part of which encloses the end of the core strand and an inner sheath over the last named helix and within the first named sheath, the end of the core strand being provided with projections engaging in the helical trough between adjacent coils of the helix thereon, and an outer sheath over both the conductor strand and

the coiling element, the conductor strand and the outer sheath extending beyond the free end of the helix on the end of the coiling element.

14. A method of making electrical conductor cords which includes the steps of forming a plurality of permanently helically coiled elastically deformable lengths of self coiling strands, flexibly interlinking the lengths of strand, forming a continuous textile cover over the lengths of strand and the links therebetween, forming a textile cover over the interlinked covered strands and a flexible electrical conductor placed in parallel with the strands and severing the assembly into separate self coiling cords.

15. An electrical conductor cord having a conductive strand, a self coiling strand assembled in parallel engagement therewith, a textile sheath over the self coiling strand individually, and tie-cords consisting of integral extensions of the sheath extending beyond the ends of the strand therein.

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