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F. V. JOHNSON ET AL
APPARATUS FOR HANDLING STRANDS

2,106,803

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2 Sheets-Sheet 1

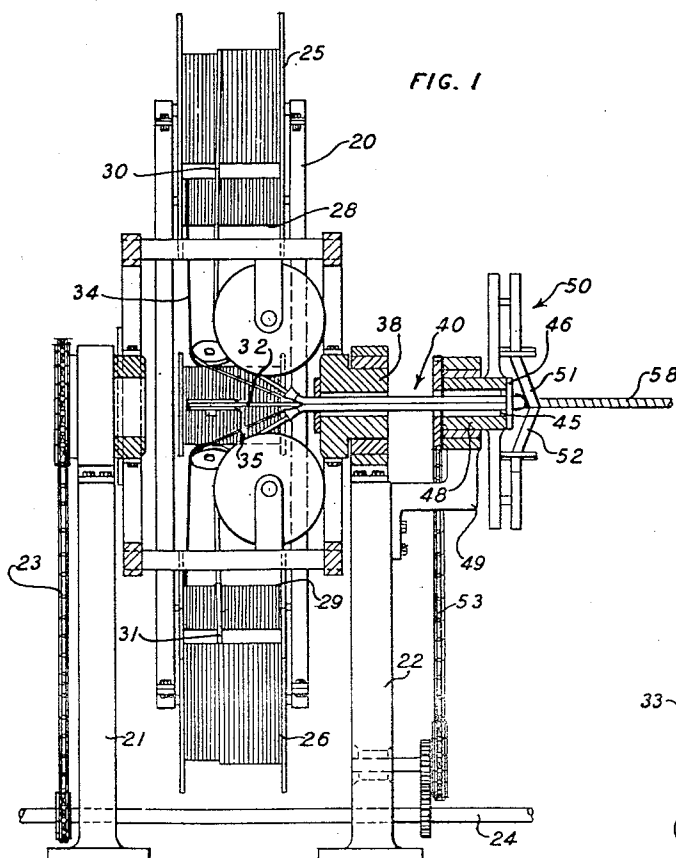


FIG. 1

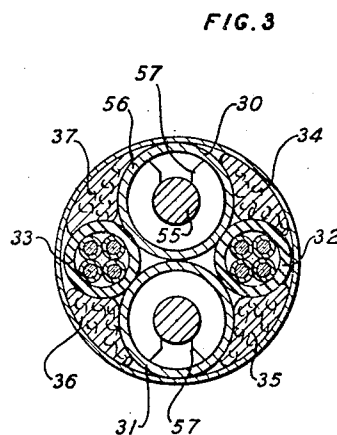


FIG. 3

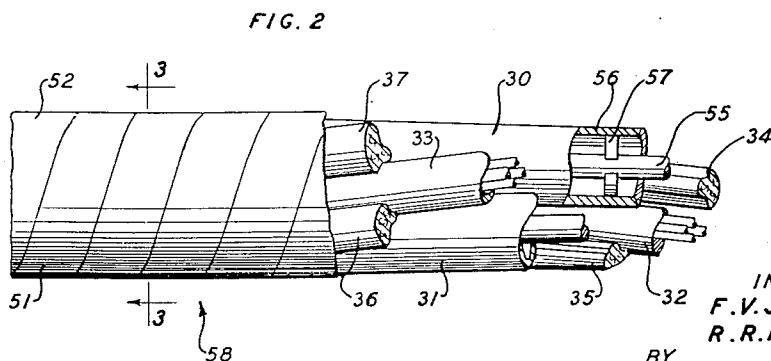


FIG. 2

INVENTORS
F. V. JOHNSON
R. R. NYDEGGER
BY

E. R. Nowlan
ATTORNEY

Feb. 1, 1938.

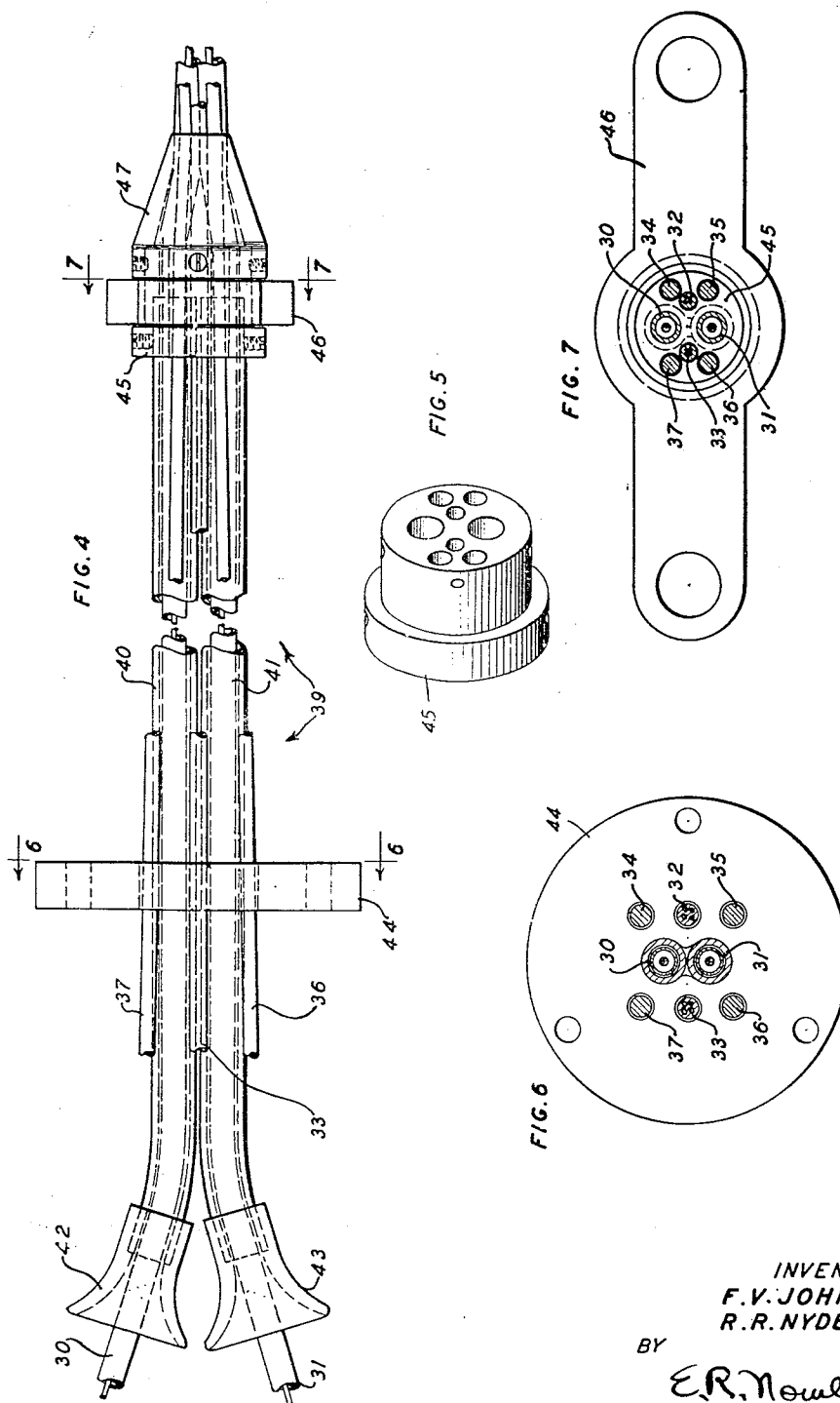
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INVENTORS
F.V. JOHNSON
R.R. NYDEGGER

BY

E.R. Nowlan

ATTORNEY

UNITED STATES PATENT OFFICE

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APPARATUS FOR HANDLING STRANDS

Fred V. Johnson, Baltimore, Md., and Roland R. Nydegger, Wilmington, Del., assignors to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York

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7 Claims. (Cl. 117—46)

This invention relates to a method of and apparatus for handling strands and more particularly to a method of and apparatus for combining strands to form an electric cable.

In the manufacture of multi-conductor electric cables such as are used in the communications arts, it has been customary in some instances to mount supply reels containing strands to be twisted together, within a rotatable frame or cage. The strands are drawn from the supply reels, brought together and guided out of the cage along the axis of rotation of the cage and intertwisted by the rotation of the cage. In so doing an individual twist is imposed on each strand having one turn for each rotation of the cage; and if the strand in question happens to be of a nature to resist the imposition of twist, it will absorb the twist by assuming a helical form until the stress of the accumulated twist overcomes the resistance and the strand yields, receiving in a short length all the twist which should be distributed evenly over a much greater length. This effect may be troublesome to overcome particularly in the case of a cable having coaxial conductor units as component parts.

An object of the present invention is to provide a method of and apparatus for combining strands by which strands having a relatively high degree of torsional rigidity may be combined, alone or with other strands of other kinds, in such fashion that deformation imposed on individual strands will be distributed evenly along the strands even though they be of relatively high torsional rigidity.

One embodiment of the invention contemplates a method of and an apparatus for intertwisting strands in which one or more of the strands in question are prevented from any substantial lateral deformation or movement out of a predetermined path immediately and for some distance before they approach the point at which they are twisted together.

Other objects and features of the invention will appear from the following detailed description of one embodiment thereof taken in connection with the accompanying drawings, in which the same reference numerals are appended to identical parts in the several figures and in which

Fig. 1 is a view in vertical axial section of an apparatus for intertwisting strands, constructed in accordance with the invention;

Fig. 2 is a broken view in side elevation of a portion of cable produced by the apparatus of Fig. 1;

Fig. 3 is an enlarged section on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged detached view in side

elevation of the strand guide of Fig. 1 with its supports;

Fig. 5 is an enlarged detached view in perspective of the forward assembly collar thereof;

Fig. 6 is a section on the line 6—6 of Fig. 4, and

Fig. 7 is a section on the line 7—7 of Fig. 4.

In the embodiment of the invention herein shown, Fig. 1 discloses diagrammatically, the supply end of a cable stranding machine of simple and well known form. The take-up and possible intermediate portions are not shown, being irrelevant to the invention, but may be of any suitable and well known construction and mode of operation.

The portion disclosed comprises fundamentally a rotatable cage 20 journaled in supports 21, 22 and driven by a sprocket chain 23 from a shaft 24 driven in turn by a motor not shown. Within the cage 20 is mounted a plurality of spools or reels to supply the component strands of the cable to be manufactured. In the example disclosed, these consist of two reels 25 and 26 containing supplies of coaxial conductor units 30 and 31 respectively, two reels to supply two four conductor auxiliary strands 32 and 33 of which only one reel 27 is shown in Fig. 1, and four reels to supply four relatively soft non-metallic filler strands 34, 35, 36 and 37 of which only two reels 28 and 29 are shown.

A right hand bearing member 38 of the cage has an axial passageway in which is positioned a strand guide generally indicated by the numeral 39. The body of this guide consists of two tubes 40 and 41 of internal diameter triflingly greater than the external diameter of the identically similar coaxial units 30 and 31 which pass freely through the tubes but are constrained therein against any lateral distortion. The tubes preferably have bell mouthed entrance members 42 and 43 secured thereon. The tubes are rigidly mounted in a mounting plate 44 secured to the cage 20 so that the tubes rotate with the cage. The plate 44 is further provided with appropriate apertures about the tubes to permit the other strands 32, 33, 34, 35, 36 and 37 to pass in a direction generally parallel to the tubes and their contained strands 30 and 31.

Near the outer or right hand end of the tubes 40 and 41 these are rigidly mounted in a journal member 45 supported in a crossbar 46. The member 45 rotates with the tubes 40 and 41 within the crossbar 46, and is provided with two apertures in which the tubes 40 and 41 are mounted and with six other apertures to pass the remaining strands of the cable to be.

On the extreme outer ends of the tubes is mounted a twisting head 47 having a plurality of passages therethrough, corresponding in number and size to the component strands of the

cable to be. Each passage leads from the corresponding aperture of the journal member 45 at the left or entrance end of the head 47 to blend into a single axial opening at the right or exit end of the head, where the component strands are applied to each other and are twisted together by the rotation of the cage.

The crossbar 46 is secured on the outer end of a journal member 48 rotatably mounted in a bracket 49 secured on the support 22. This member 48 is coaxial with the member 38 and has an axial passage to house the guide 39. A serving head 50 for applying a wrapping of paper tapes 51 and 52 over the intertwisted strands is mounted on the member 48 which is driven in rotation in the opposite direction to that of the cage 20 by a sprocket chain 53 from the shaft 24.

The coaxial unit 30 shown consists of an inner axial conductor 55 and an outer hollow conductor 56 spaced apart by a plurality of insulating disks 57. The unit 31 shown is of similar structure.

In operation the finished product 58 of the apparatus shown is drawn along to the right (Fig. 1) by any appropriate means not shown, while the shaft 24 is rotated. The cage 20 then rotates say counterclockwise as seen from the right and the serving unit 50 rotates in the opposite direction. The eight strands 30, 31, 32, 33, 34, 35, 36 and 37 are drawn from their respective supply reels, the two coaxial units 30 and 31 passing through the guide tubes 40 and 41 respectively and the other six strands passing through the corresponding apertures in the members 44, 45 and 47. In passing through the twisting head 47 the eight strands are combined in the relation shown in Figs. 2 and 3 and on emerging from the head 47 are twisted together and immediately wrapped with the tapes 51 and 52.

Each revolution of the cage 20 effects one turn of the lay of the cable, i. e. of the intertwist of the cable components, but each revolution of the cage also tends to impose one turn of individual twist upon each strand by itself. The textile strands 34, 35, 36 and 37 naturally accept this twist without resistance and the four conductor cables 32 and 33 are ordinarily of such nature as to do so also. But a coaxial conductor strand, such as 30 or 31, is ordinarily far more rigid in torsion than the others and therefore tends to resist the imposition of this twist and to escape it partially by taking on a helical form. This helix then tends to be pushed back after being formed and to pile up at the guide sheave or even back at the supply reel. This piling up continues until, in the worst forms, the strand yeids abruptly, kinks and jams, or, in milder cases, a short length of the strand is sharply twisted and absorbs all the twist that should properly be distributed evenly over a vastly greater length. In the latter case the sharp twisting may very well rupture one or both conductors of the strand.

In the present invention, however, it is found that, if the helix distortion is never permitted to begin but the strand is forced to run straight for a considerable distance up to the twisting point, the strand will accept the imposed twist evenly and will enter into and lie in the cable evenly and with uniform properties along its length.

As herein disclosed, the invention is applied to the manufacture of a cable consisting of two coaxial conductor units, two four conductor

ordinary units, and four textile filler strands with a wrapping of two paper tapes. Obviously, however, the number of each kind of strand is immaterial to the invention which is applicable and useful wherever a strand of high torsional rigidity is to be intertwisted with one or more other strands.

The embodiment herein disclosed is merely illustrative and may be modified and departed from in many ways 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. An apparatus for combining strands which comprises a rotatable frame, a plurality of strand supplies in the frame, and a strand delivery guide mounted axially of the frame to receive the strands and deliver them from the frame, the said guide comprising an elongated hollow member to receive and pass one of the strands and having a passage therefor sufficiently narrow to prevent lateral deformation of the strand therein.

2. An apparatus for combining strands which comprises a rotatable frame, a plurality of strand supplies in the frame, and a strand delivery guide mounted axially of the frame to receive the strands and deliver them from the frame, the said guide comprising a plurality of elongated hollow members each to receive and pass one of the strands and having a passage therefor sufficiently narrow to prevent lateral deformation of the strand therein.

3. In a strand handling apparatus, guiding means for a longitudinally advancing strand which comprises an elongated member formed with a passage therethrough dimensioned to permit the strand to pass freely through the passage but to be prevented from lateral deformation while in the passage.

4. In a strand handling apparatus, guiding means for a longitudinally advancing strand which comprises an elongated member formed with a cylindrical passage therethrough dimensioned to permit the strand to pass freely through the passage but to be prevented from lateral deformation while in the passage.

5. In a strand handling apparatus, guiding means for a plurality of longitudinally advancing strands which comprises a plurality of elongated members each formed with a passage therethrough dimensioned to permit one of the strands to pass freely through the passage but to be prevented from lateral deformation while in the passage.

6. In a strand handling apparatus, guiding means for a plurality of longitudinally advancing strands which comprises a plurality of elongated members each formed with a cylindrical passage therethrough dimensioned to permit one of the strands to pass freely through the passage but to be prevented from lateral deformation while in the passage.

7. In a strand handling apparatus, guiding means for a plurality of longitudinally advancing strands which comprises a plurality of elongated members each formed with a cylindrical passage therethrough dimensioned to permit one of the strands to pass freely through the passage but to be prevented from lateral deformation while in the passage, the several passages being mutually parallel.

FRED V. JOHNSON.
ROLAND R. NYDEGGER.