

July 11, 1944.

C. J. ARRINGTON

2,353,432

APPARATUS FOR FORMING CORDS

Filed May 12, 1942

2 Sheets-Sheet 1

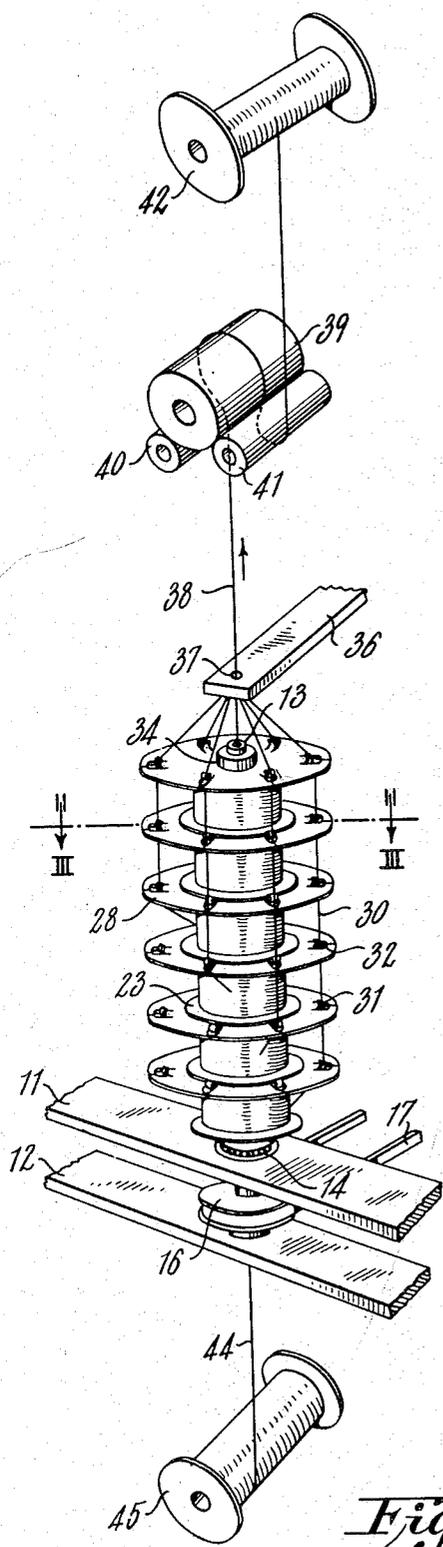


Fig. 1

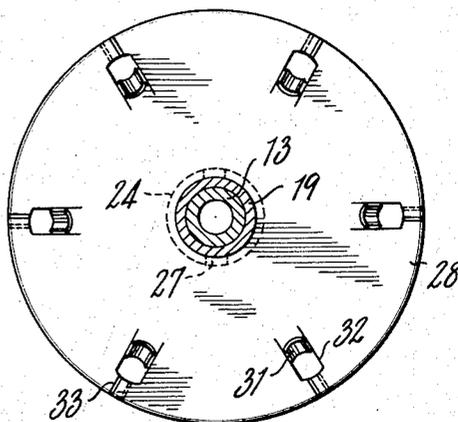


Fig. 3

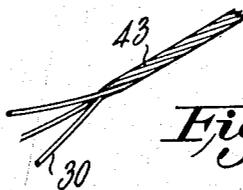


Fig. 4

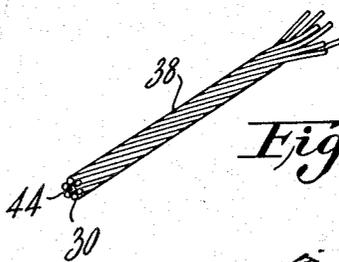


Fig. 5

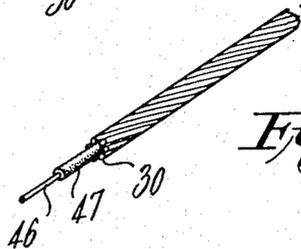


Fig. 6

INVENTOR.
CONARD J. ARRINGTON
BY *Arthur G. Dudley*
ATTORNEY

July 11, 1944.

C. J. ARRINGTON

2,353,432

APPARATUS FOR FORMING CORDS

Filed May 12, 1942

2 Sheets-Sheet 2

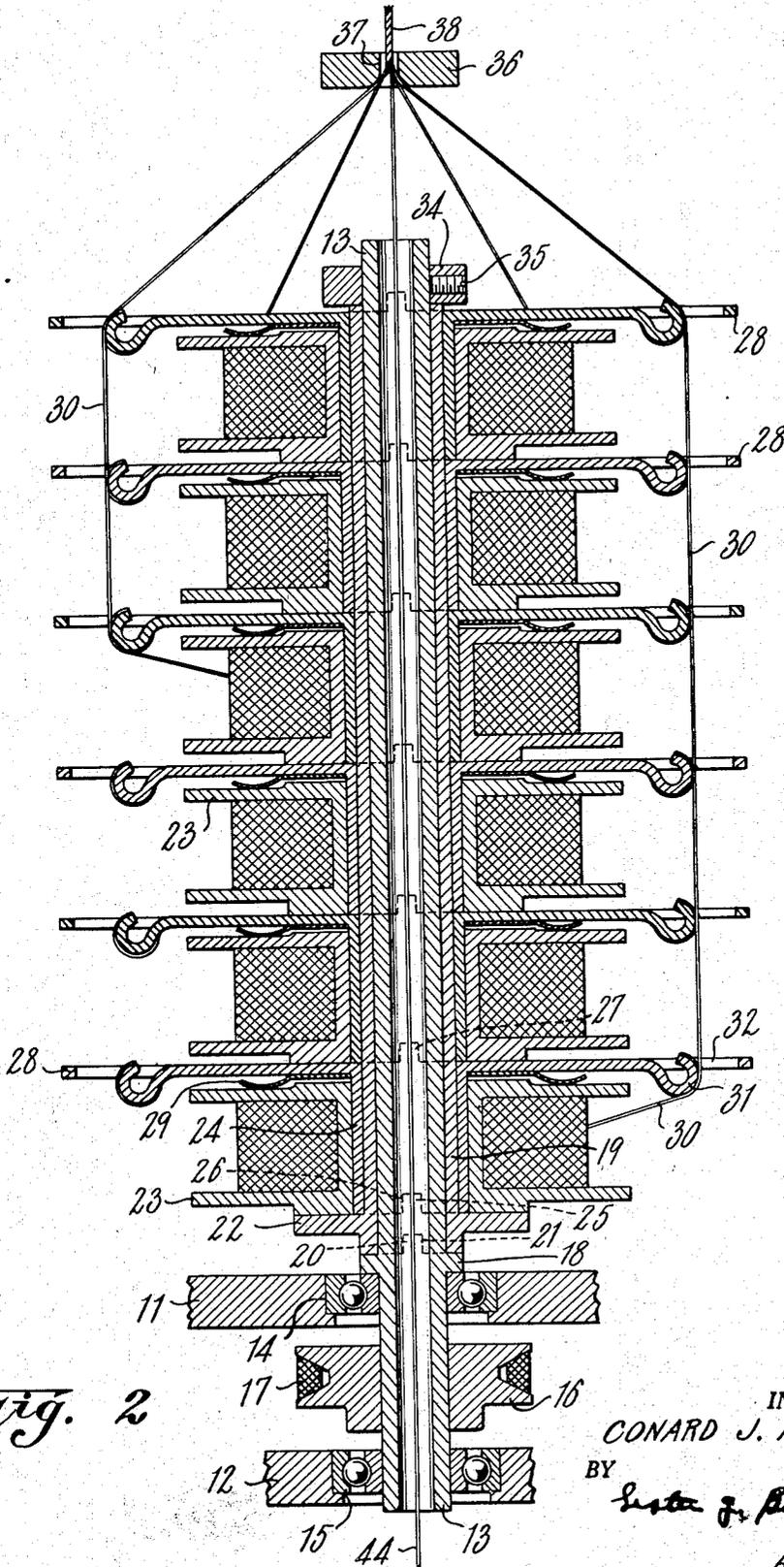


Fig. 2

INVENTOR.
CONARD J. ARRINGTON
BY *Walter J. Buckley*
ATTORNEY

UNITED STATES PATENT OFFICE

2,353,432

APPARATUS FOR FORMING CORDS

Conard J. Arrington, Detroit, Mich., assignor
to United States Rubber Company, New York,
N. Y., a corporation of New Jersey

Application May 12, 1942, Serial No. 442,651

10 Claims. (Cl. 57-17)

This invention relates to apparatus for forming twisted strands or cords from filamentary material. More particularly, the invention relates to apparatus for forming twisted strands or cords from metallic filaments.

In the manufacture of wire cord, it has been the general practice to form the cord on twisting machines conventionally employed in the manufacture of relatively large diameter cables. Such equipment for twisting wire usually comprises heavy machinery which essentially is expensive and which is slow in operation. One form of such machinery commonly employed heretofore is provided with a revolving table having mounted thereon in spaced relation about the center of the table the filament supply spools, so that the whole resembles a merry-go-round. Such a construction necessarily requires considerable space. The present invention contemplates the twisting of wire filaments of relatively small gauge and therefore because of the high flexibility of the individual filaments, it is possible to employ twisting equipment which differs substantially from and is more compact than the conventional type of wire cabling machines.

The present invention contemplates the stranding or cording of high tensile steel wire filaments having a diameter in the order of .006 inch. Filaments of this kind when formed into twisted strands or cords are useful in the manufacture of articles such as the plies of pneumatic tires and transmission belts.

According to the present invention I have provided a novel arrangement in which a plurality of supply spools may be stacked in axial position on a spindle of a twister frame conventionally employed for twisting textile elements. By providing a drive for the spindle and rotating therefrom let-off guides associated with the different spools, it is possible to converge the metallic filaments at a point axially of the spindle in such a manner that the wire may be twisted at a rapid rate and, a large number of similar units may be operated simultaneously on a single twister frame.

Among the objects of my invention are to provide a twisting device for filamentary material which is compact and will operate rapidly; which may be associated with textile twisting frames; which may be employed to form metallic twisted strands or cords employing a central plastic coated core; and, which will result in a cord which is economical and efficient of manufacture and uniform in quality. These and other objects and advantages will appear more fully in the

following detailed description when considered in connection with the accompanying drawings in which:

Fig. 1 is a perspective view partly diagrammatic of a twisting device embodying my invention;

Fig. 2 is an enlarged view in longitudinal section of the embodiment shown in Fig. 1;

Fig. 3 is a transverse view in section taken along lines III-III of Fig. 1;

Fig. 4 is an enlarged view in perspective illustrating a metallic strand as made in accordance with my invention;

Fig. 5 is an enlarged view in perspective of a cord having a central core as made in accordance with my invention; and,

Fig. 6 is an enlarged view in section of a modification of the cord as shown in Fig. 5 in which the core element is coated with a plastic material.

Referring to the drawings and in particular to Figs. 1 and 2, I show a preferred form of my invention applicable for association with a conventional textile twister frame, and as here embodied the invention comprises upper and lower horizontal rails 11 and 12 such as conventionally associated with a twister frame. Extending vertically from these rails is a tubular spindle 13 associated with the rails 11 and 12 by means of ball bearings 14 and 15, respectively. A pulley 16 is attached to the spindle between the rails 11 and 12 and serves as a means for driving the spindle. A belt 17 for the pulley connects with a suitable means on the conventional twister frame for supplying energy for driving the spindle 13. Directly above the bearing 14, a shoulder 18 extends from the spindle 13 and provides a support for a tubular member 19 which is axially slidable on the outside of the spindle 13. A projection 20 extending from the spindle shoulder 18 and a complementary notch 21 at the end of the tubular member 19 provide a suitable lock between the spindle and the tubular member so as to cause the tubular member to rotate with the spindle. A flange 22 provided on the tubular member 19 near the lower end serves as a base upon which a supply spool 23 rests. Between the supply spool and the tubular member 19 is a collar 24 axially slidable on the outside of the tubular member 19 and this collar is rotatable with the tubular member 19 by means of a projection 25 extending from the flange 22 to engage a complementary slot 26 formed at the lower end of the collar 24. The upper end of the collar 24 is likewise provided with a projection 27 which engages with another collar similar to the collar 24.

Extending radially from each collar 24 is a disc 28 secured to or forming an integral part of the collar. The disc acts as a support for another supply spool such as 23 while the collar 24 functions as a spacer to allow free rotation of the spool 23, and relieves each spool from the weight of the spools above it. A spring washer 29 is attached to the under side of the disc 28 and bears against the flange of the spool 23 so as to retard its rotation and thereby tension the metallic filament 30 as it is withdrawn from the supply spool 23.

Each disc 28 is provided with the let-off guides 31. These guides extend below the outer face of the top flange of the spool 23 and are formed with a sufficient radius to prevent kinking of the wire filament 30 as it passes around the guide. As shown in Fig. 3 the guide members 31 are concave transversely so as to retain the wire 30 centered thereon. The let-off guides 31 may be formed by partially punching material from the disc 28 and bending it in the shape shown while at the same time forming an aperture 32 in the disc. Only one let-off guide 31 is required for each spool, except for the top disc 28, but for the sake of manufacturing expediency, six such guides are formed in each disc thus making the discs interchangeable at any position. Furthermore, since it is necessary to provide a plurality of apertures 32 in all of the discs 28, except the lowermost disc, through which the let-off wires may pass, the efficiency of the uniform treatment is further emphasized. Each aperture 32 has a slot 33 extending thereto from the outer perimeter of the disc 28. These slots permit quick assembly of the wires 30 and proper contact with the let-off guides. In order to prevent the possibility of the wire 30 jumping out of the slot 33, the slot is preferably cut at an angle relative to the axis of the disc. While a various number of spools and associated collars 24 and discs 28 may be assembled in stacked relationship, I illustrate as a preferred example, six such units associated together and retained in that position by means of a collar 34 secured to the spindle 13 by a set screw 35.

It is to be understood that the tubular member 19 may be omitted if desired and that the collars 24 may be slidable directly onto the spindle 13. The use of the tubular member 19, however, enables all of the collars and spools to be assembled onto the tubular member prior to the assembly of the tubular member with the spindle 13. This expedites the setting-up operation in that it is merely necessary to remove from the spindle 13 the entire stack of spools as a single unit and replace on the spindle a completely assembled and treaded unit comprising the tubular member 19 with full spools and with the spacer collars 24 and discs 28.

Directly above the spindle 13 is a bracket or guide 36 having an aperture 37 in direct alignment with the axis of the stack of spools. The bracket 36 may be supported from some part of the conventional twister frame. The wire filaments 30 as they are drawn upwardly from the spools 23 pass around the let-off guides 31 upon the upper disc 28 and converge and pass through the aperture 37 in the bracket 36. Since the discs 28 are positively connected to the spindle 13 to rotate therewith the aperture 32 in these different discs will remain in vertical alignment one above the other as this spool-supporting assembly is rotated to twist the wire filaments 30 together in the region of the aper-

ture 37 to form a strand or cord 38. This strand or cord is pulled at a constant rate of speed relative to the speed of the spindle 13 by a driving roll 39 associated with a pair of idler rolls 40 and 41. This group of rolls, illustrated diagrammatically in Fig. 1, is supported by conventional means associated with the twister frame, and the roll 39 is also driven at a constant rate of speed relative to the spindle 13 by conventional means. After the twisted strand or cord 38 passes around the roll 39 and 41 as illustrated, the strand or cord is wound upon a spool 42. The spool 42 is likewise supported from and rotated by conventional means associated with the twister frame.

From the foregoing description, it is apparent that various strands or cords may be twisted from the assembly. An example of such a strand is illustrated in Fig. 4 in which three filaments 30 are twisted together to form a strand 43. In order to form such a strand, it is merely necessary to utilize three supply spools on the spindle 13 and thread the filaments through the let-off guides at equally distant positions around the disc 28. A proper driving speed of the spindle in combination with the rate of speed at which the strand is drawn through the aperture 37 determines the number of turns per inch in the completed strand. An example of such a strand is formed of three wire filaments 30 each having a gauge of .006 inch and these are twisted together with ten turns per inch in the resulting strand.

Another form of cord may be produced on the present apparatus as illustrated in Fig. 1 in which six filaments are twisted about a central core member 44. Such a cord is further illustrated in Fig. 5 in which six wire filaments 30 are twisted around a central wire filament 44 to form a completed cord 38. This cord is assembled by passing the central or core filaments 44 axially through the tubular spindle 13 and through the aperture 37 in the bracket 36. The wire 44 is withdrawn from a supply spool 45 supported by the conventional twister frame. To form the cord 38, six supply spools are stacked about the spindle and the wire filaments 30 are withdrawn from the supply spools 23 so that they converge in the region of the aperture 37 and are twisted around the core filament 44 which moves axially through the aperture 37. As the wire filaments 30 are withdrawn from the spools 23 these spools are individually rotatable by the pull of the wire thereupon. The spring members 29 exert a sufficient amount of friction upon the spools to maintain the filaments 30 in a properly taut condition throughout the twisting operation. The tension members 29 also prevent the spools 23 from over-running in the event the spindle 13 is stopped. Preferably the cord 38 is formed with a twist of three turns per inch.

As a modification and as shown in Fig. 6, a cord is illustrated having a core filament 46 coated with a plastic composition 47 such as rubber, and having twisted therearound six wire filaments 30 in substantially the same manner as in the formation of the cord 38.

It is therefore to be understood that twisted strands or cords having various filament combinations may be formed in accordance with the apparatus of the present invention, and reference to cord elements should be understood to include a plurality of single filaments or of multiple filaments of wire or other materials twisted together to form a strand or cord.

As thus shown and described it is believed apparent that I have provided a novel apparatus for manufacturing cords or strands of wire or other materials, and while I have shown a preferred embodiment of my invention, it is to be understood that it is susceptible of those modifications which appear obviously within the spirit of the invention and as defined within the scope of the appended claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. An apparatus for twisting cord elements comprising, a driven spindle, a plurality of cord element spools positioned axially about the spindle in concentric relation therewith, means mounted on the spindle between the spools and positively rotated by the spindle and provided with guides for guiding the cord elements from the spools, a guide positioned above the spindle and having an aperture located axially of the spindle, and means for drawing the cord elements from the spools and through said aperture.

2. An apparatus for twisting cord elements comprising, a driven spindle, a plurality of cord element spools positioned axially about the spindle in concentric relation therewith, means mounted on the spindle for spacing the spools a fixed distance apart and rotatable with the spindle and provided with guides for guiding the cord elements from the spools, a guide positioned above the spindle and having an aperture located axially of the spindle, and means for drawing the cord elements from the spools and through said aperture.

3. An apparatus for twisting cord elements comprising, a driven spindle, a tubular member positioned around the spindle and locked with the spindle for rotation therewith, a plurality of cord element spools positioned axially about the tubular member in concentric relation therewith, means rotatable with the spindle for guiding the cord elements from each spool, a bracket positioned above the spindle and having an aperture located axially of the spindle, and means for drawing the cord elements from the spools and through said aperture.

4. An apparatus for twisting cord elements comprising, a driven spindle, a plurality of cord element spools positioned axially about the spindle in concentric relation therewith, a plurality of collars positioned around the spindle and positively driven with the spindle and adapted for spacing the spools a fixed distance apart, means extending from each collar for guiding the cord element from the adjacent spool, a bracket positioned above the spindle and having an aperture located axially of the spindle, and means for drawing the cord elements from the spools and through said aperture.

5. An apparatus for twisting cord elements comprising, a driven spindle, a plurality of cord element spools positioned axially about the spindle in concentric relation therewith, means rotatable with the spindle for guiding the cord elements from each spool, means for tensioning the filament from each spool, a bracket positioned above the spindle and having an aperture located axially of the spindle, and means for drawing the cord elements from the spools and through said aperture.

6. An apparatus for twisting cord elements

comprising, a driven spindle, a plurality of collars positioned around the spindle and positively driven with the spindle, a plurality of cord element spools positioned axially about the collars and spaced axially along the spindle by said collars, means rotatable with the spindle for guiding the cord elements from the spool, a bracket positioned above the spindle and having an aperture located axially of the spindle, and means for drawing the cord elements from the spools and through said aperture.

7. An apparatus for twisting cord elements comprising, a driven spindle, a tubular member positioned around the spindle and locked with the spindle for rotation therewith, a plurality of collars positioned around the tubular member and positively driven with the tubular member, a plurality of cord element spools positioned axially about the collars and spaced axially along the spindle by said collars, means rotatable with the spindle for guiding the cord elements from each spool, a bracket positioned above the spindle and having an aperture located axially of the spindle, and means for drawing the cord elements from the spools and through said aperture.

8. An apparatus for twisting cord elements comprising, a driven spindle, a tubular member positioned around the spindle and locked with the spindle for rotation therewith, a plurality of collars positioned around the tubular member and positively driven with the tubular member, a plurality of cord element spools positioned axially about the collars and spaced axially along the spindle by said collars, means extending from each collar for guiding the cord elements from each spool, means acting frictionally on each spool to tension its cord element, a bracket positioned above the spindle and having an aperture located axially of the spindle, and means for drawing the cord elements from the spools and through said aperture.

9. An apparatus for twisting cord elements comprising, a driven spindle, a plurality of cord element spools positioned about the spindle in concentric relation therewith, means rotatable with the spindle for guiding the cord elements from each spool comprising discs for the spools and provided with aligned apertures for guiding the cord elements in spaced parallel relation to the spindle, a guide positioned above the spindle and having an aperture located axially of the spindle, and means for drawing the cord elements from the spools and through said aperture.

10. An apparatus for twisting cord elements comprising, a driven spindle, a tubular member removably positioned around the spindle in locked relation therewith for rotation with the spindle, a plurality of collars positioned around the tubular member so that they are supported and rotated thereby, a plurality of cord element spools positioned on said collars, and means extending from each collar for guiding the cord elements from each spool, whereby the tubular member with the collars and spools thereupon may be removed from the spindle as a unit, a guide positioned above the spindle and having an aperture located axially of the spindle, and means for drawing the cord elements from the spools and through said aperture.

CONARD J. ARRINGTON.