

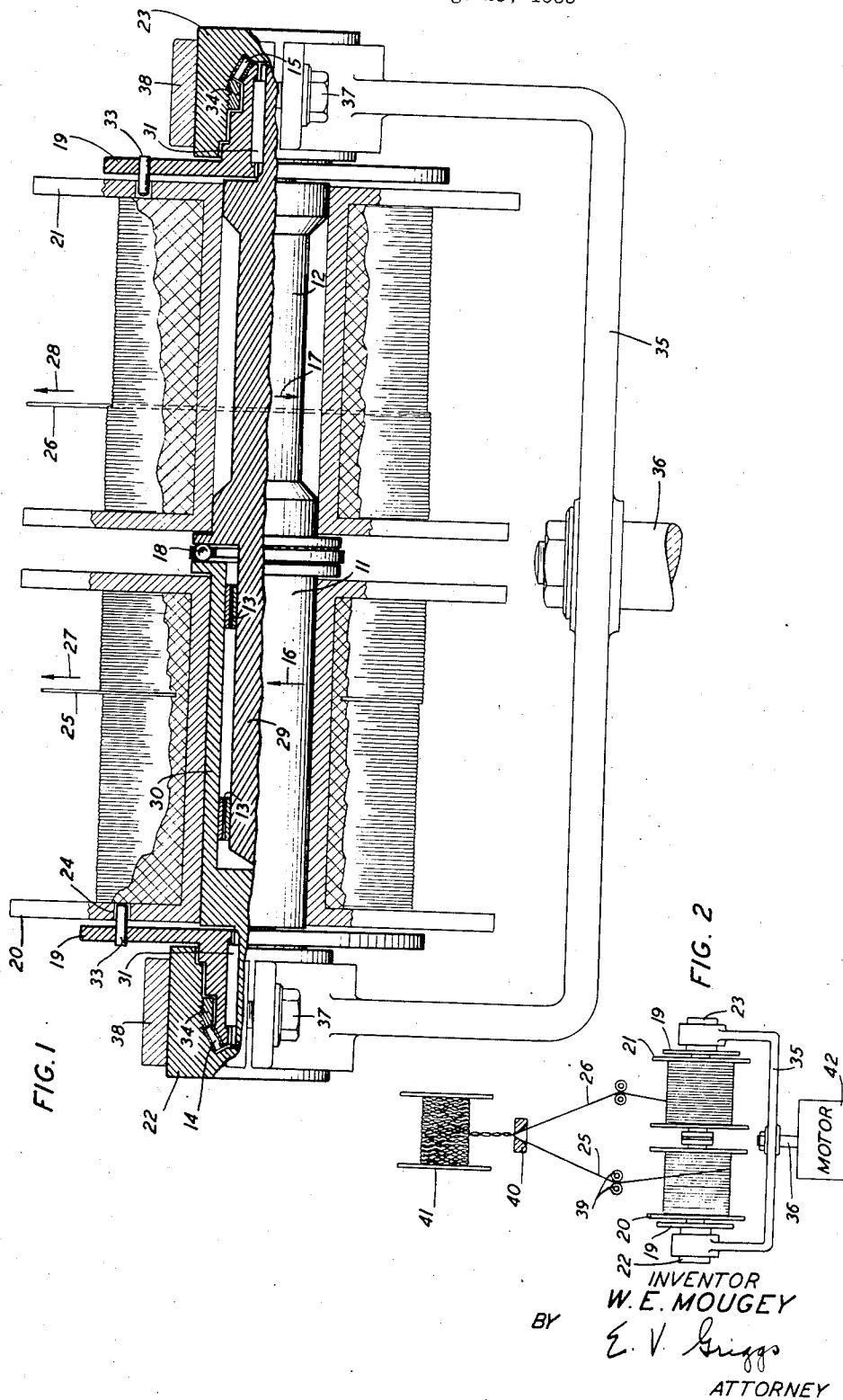
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REELING APPARATUS

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REELING APPARATUS

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This invention relates to reeling apparatus and more particularly to a device for holding a pair of supply reels from which two strands may be drawn off under conditions of equal tension.

5 An object of the invention is to draw off a pair of strands from two supply reels under conditions of equal tension.

Another object is to draw off from separate supply reels a pair of strands which are equal in length.

10 Another object is to provide equal lengths of wires in a twisted pair.

A further object is to improve the electrical and mechanical properties of telephone cable.

15 A feature of the invention is a reeling device comprising two moving parts adapted to rotate in opposite directions, with a common friction surface and two or more individual bearings which have as little friction as possible.

20 The conductors in telephone cable are usually associated in pairs, each pair consisting of two insulated wires twisted together. For electrical and mechanical reasons, it is desirable that the two strands forming a pair should be as nearly equal in length as is reasonably possible. One of the causes of inequality in length is unequal tensions in the two wires as the twist is being formed. This inequality in tension is, in turn, partly caused by differences in the retarding frictional forces acting on the bearings of the two supply reels from which the two wires are drawn off in the twisting process. Another cause is the difference in the radii of the turns of wire as they leave the reels. This latter cause of inequality can be practically eliminated by using reels having the same diameter of drum and by carefully winding the material onto the reels. In the present state of the art, when it is desired to twist two strands from separate reels under conditions of equal tension, the retarding frictional forces effective upon the two reels are independent of each other. They may be independently adjusted to be equal, but there are no positive means of maintaining equality even if it is once obtained.

45 In accordance with the present invention, this inequality in the tensions in the two strands which are being twisted together to form a pair may be reduced to any desired extent. In order to accomplish this, there is provided a special type of arbor for holding the two supply reels. The arbor comprises two moving parts, which rotate in opposite directions, with one common friction surface and separate bearings in which the friction has been reduced to a minimum. A

reel is rigidly mounted on each of the moving parts and, since substantially all of the frictional resistance to motion occurs in the common friction surface, the retarding forces acting upon the two reels will thus be maintained equal under all conditions. As a result, the tensions in the two wires as they are drawn off from the two reels will also be kept equal, if the radii of the turns as they leave the two reels are equal at all times. In this way, wires of equal length may be drawn off simultaneously from two separate supply reels and formed into a twisted pair, if desired.

The nature of the invention will be more fully understood from the following detailed description and by reference to the accompanying drawing, of which:

Fig. 1 is a front view, partly in elevation and partly in section, of a reeling device embodying one form of the invention; and

20 Fig. 2 illustrates diagrammatically how the device shown in Fig. 1 may be used in a twisting machine.

As shown in the drawing, the device comprises two moving parts 11, 12, having common friction surfaces 13 and individual end bearings 14, 15. The inner end of part 12 is in the form of a spindle 29 which extends into the sleeve portion 30 of part 11, with enough clearance therebetween to allow for the two sets of annular bearings 13, which may be spaced apart as shown in the drawing. Self-aligning roller bearings are provided for the end bearings 14, 15 in order to reduce the friction at these points to a minimum. The common bearing 13, being of the plain annular type, furnishes practically the entire frictional resistance to motion when the two parts 11, 12 of the arbor are rotated in opposite directions, as indicated by the arrows 16, 17. Now, if part 11 of the arbor be rotated in one direction, the friction in the common bearing 13 tends to rotate part 12 in the same direction, and if part 12 be held fast or turned in the opposite direction, the force required to hold or turn the latter will be exactly equal to the force required to hold or turn part 11. By increasing or decreasing the friction between the contacting parts of the common bearing 13 the magnitude of the force retarding the motion of the two rotating parts of the arbor may be regulated as desired. The ball bearing 18 is provided to take care of any thrust which may be applied in an axial direction to either part of the arbor. The flange 19 is keyed to the outer end of the part 55

11 by means of the key 31, and rotates therewith. A similar flange is keyed to the moving part 12. The roller bearings 14, 15 are placed in their respective housings 22, 23 before the threaded retaining rings 34 are screwed into place. The housings 22, 23 are supported by the yoke 35 which is mounted upon the end of the shaft 36. The entire reeling apparatus may be removed from the yoke 35 by taking off the four nuts 37 and lifting off the two caps 38.

In order to mount the supply reel 20 on the arbor part 11, the flange 19 and housing 22 are removed, the reel is slid into place and the parts reassembled. The reel 20 is keyed to the moving part 11, and caused to rotate therewith, by means of the pin 33 which projects from the flange 19 and engages a hole 24 in one end of the reel. The supply reel 21 is mounted on the other moving part 12 of the arbor in a similar manner. When constructed as described, the arbor is free to turn on the end bearings 14, 15. If the wire 25 is drawn off from the top of the reel 20 and the wire 26 is drawn off from the bottom of the reel 21, in the direction shown by the arrows 27, 28 the two reels will be caused to rotate in opposite directions, and consequently the two parts 11, 12 of the arbor will be rotated in opposite directions. Since practically the entire frictional force tending to retard the rotation of the two reels is furnished by the common bearing 13, it follows that the force required to turn each reel will be of the same magnitude, provided the two reels are wound to the same fullness with wire. Consequently, the two wires will be under equal tensions as they are drawn off from their respective supply reels. In this way a pair of wires having equal lengths may be obtained.

In forming a twisted pair, two reels of insulated wire are placed upon the arbor described above and the arbor is mounted in the yoke of a twisting machine, as shown diagrammatically in Fig. 2. Each of the wires 25, 26 passes between a pair of idling rollers 39, from which both wires pass through the die 40 and onto the take-up reel 41, which is rotated by means not shown in the drawing. The motor 42 turns the shaft 36 and the yoke 35, forming the twist in a manner well known in the art. If the two insulated wires 25, 26 are similar in regard to diameter and stiffness of wire, diameter over insulation and resistance to deformation of insulation, and if the radii of the turns on the two reels are equal as they leave the reels, the two conductors in the finished pair will be equal in length. A telephone cable made up of twisted pairs formed in this way will have greatly improved electrical and mechanical properties.

The reeling apparatus described above illustrates one embodiment of the invention, but alternative forms falling within its scope will readily occur to one skilled in the art.

What is claimed is:

1. A reeling device comprising an arbor made in two parts rotatable in opposite directions, the inner end of one of said parts being hollowed to receive the inner end of the other of said parts, means for supporting said arbor with negligible retardation to rotation, and a contacting surface having appreciable friction common to said two parts, said contacting surface being internal to said hollowed part.

2. An arbor comprising two parts adapted to rotate in opposite directions, the inner end of

one of said parts being in the form of a sleeve which fits over the end of the other of said parts, bearings having minimum friction for supporting said arbor, and frictional means internal to said sleeve for bringing equal retarding forces to bear upon each of said parts.

3. An arbor comprising two parts rotatable in opposite directions, the inner end of one of said parts being hollowed to receive the inner end of the other of said parts, an annular bearing surface having appreciable friction common to said two parts, and a separate bearing having minimum friction for supporting said arbor.

4. A reel arbor comprising two parts, the inner end of one of said parts being in the form of a sleeve, the inner end of the other of said parts being in the form of a spindle which extends into said sleeve, a plain annular bearing between said two parts, and roller bearings at each end of said arbor.

5. A reel arbor comprising two parts, a hollowed portion of one of said parts fitting over the end of said other part to form a bearing surface internal to said hollowed portion, a thrust bearing between said parts, and roller bearings at each end of said arbor.

6. An arbor comprising two parts rotatable in opposite directions, a supply reel mounted integrally with each of said parts and rotating therewith, the inner end of one of said parts being supported by said other part, an annular bearing surface having appreciable friction common to said two parts, and a separate roller bearing having minimum friction at each end of said arbor.

7. In a twisting machine, an arbor comprising two parts adapted to rotate in opposite directions, a wire filled reel rigidly mounted upon each of said parts, the inner end of one of said parts extending into a hollowed portion of the other of said parts, and frictional means internal to said hollowed portion for exerting equal retarding forces upon each of said parts, whereby two wires may be drawn off from said reels under conditions of equal tension.

8. A device for mounting two supply reels comprising two moving parts, the inner end of one of said parts being in the form of a sleeve, the inner end of the other of said parts being in the form of a spindle which extends into said sleeve, plain annular bearings between said spindle and said sleeve, a flange on each of said moving parts, a thrust ball bearing between said flanges, and roller bearings at each end of said device.

9. A device for supplying two strands under conditions of equal tension comprising an arbor having two parts rotatable in opposite directions, two reels of stranding material wound to the same degree of fullness, one of said reels being mounted integrally with each of said parts, the inner end of one of said parts being in the form of a sleeve which surrounds the end of said other part, bearings having the least possible friction for supporting said arbor, and frictional means internal to said sleeve for exerting equal retarding forces upon each of said arbor parts.

10. In a twisting machine, a reel arbor comprising two parts adapted to rotate in opposite directions, an annular bearing surface between said two parts, and end bearings for supporting said arbor, the frictional resistance to rotation in said annular bearing surface being large compared to the frictional resistance of said end bearings.

11. Apparatus for supplying two strands having equal lengths comprising an arbor in two parts adapted to rotate in opposite directions, a reel mounted rigidly upon each of said parts, material in the form of strands wound upon each of said reels to the same diameter, bearings having slight friction for supporting said arbor, and an annular bearing surface having appreciable friction common to said two parts.
12. A reeling device comprising two parts rotatable in opposite directions, a reel rigidly associated with each of said parts, each of said reels being wound to the same degree of fullness with stranding material, bearings having as little friction as possible for supporting said two parts, and a plain annular bearing between said two parts, whereby a strand may be drawn off from each of said reels under conditions of equal tension.
13. A machine for forming a twisted pair comprising an arbor made in two parts rotatable in opposite directions, the inner end of one of said parts being hollowed to receive and support the end of the other of said parts, a reel integrally mounted upon each of said two parts, material in the form of strands wound upon each of said reels to the same degree of fullness, means offering minimum retardation to rotation for mounting said arbor in a yoke, means for rotating said yoke, idling rollers for guiding said strands as they are drawn off from said reels, a die through which said strands pass, a take-up reel upon which said twisted pair is wound, and means internal to said hollowed part for applying a retarding frictional force which is common to the two parts of said arbor, whereby the lengths of the strands in said twisted pair are made equal.

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