Aug. 9, 1949. J. E. BOSH 2,478,454

DEVICE FOR FEEDING AND TENSIONING RAW CORDAGE IN THE PRODUCTION OF COILED CORDS

Filed May 26, 1945 2 Sheets-Sheet 1

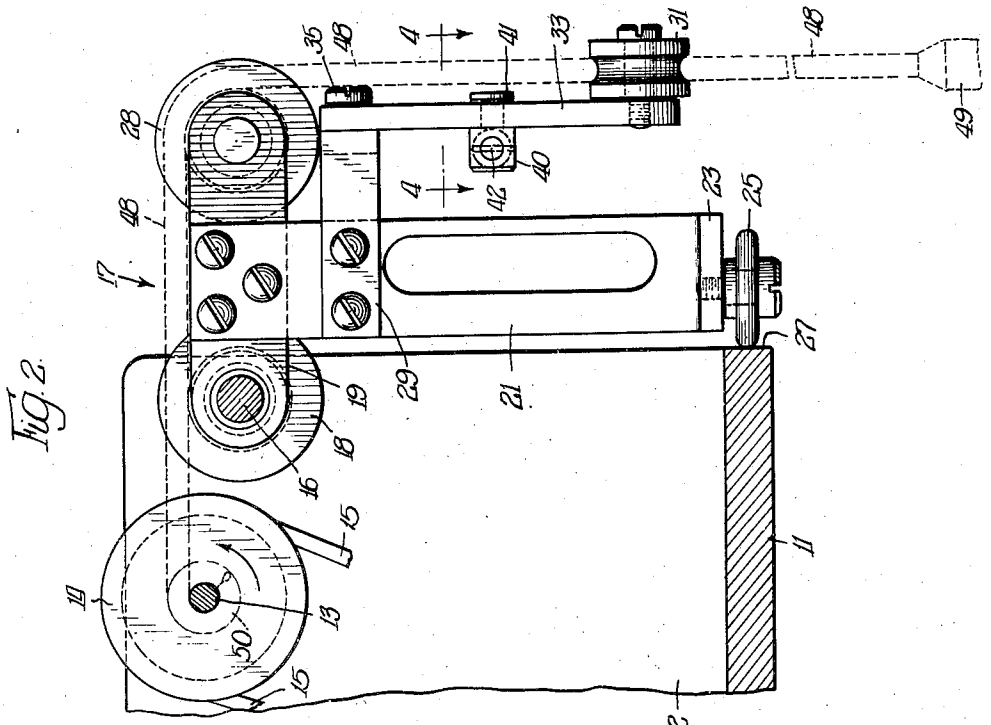


Fig. 2.

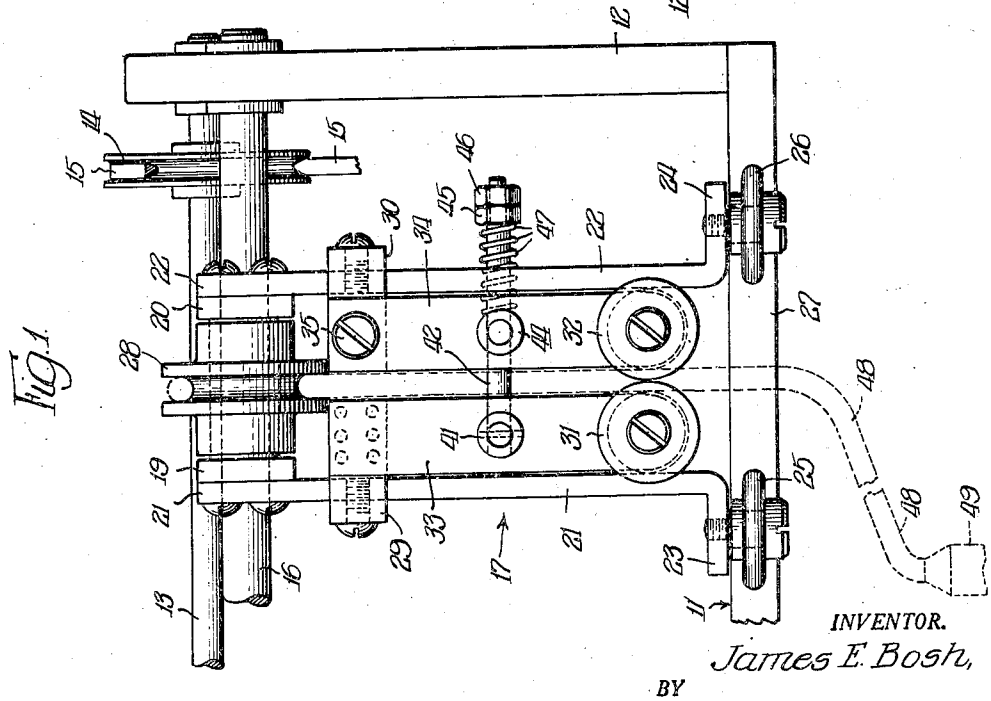


Fig. 1.

INVENTOR.
James E. Bosh,
BY
C. P. Soper
Attg.

Aug. 9, 1949. J. E. BOSH 2,478,454

DEVICE FOR FEEDING AND TENSIONING RAW CORDAGE IN THE PRODUCTION OF COILED CORDS

Filed May 26, 1945 2 Sheets-Sheet 2

Fig. 4

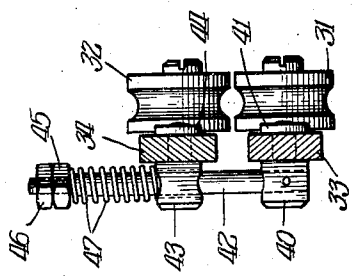
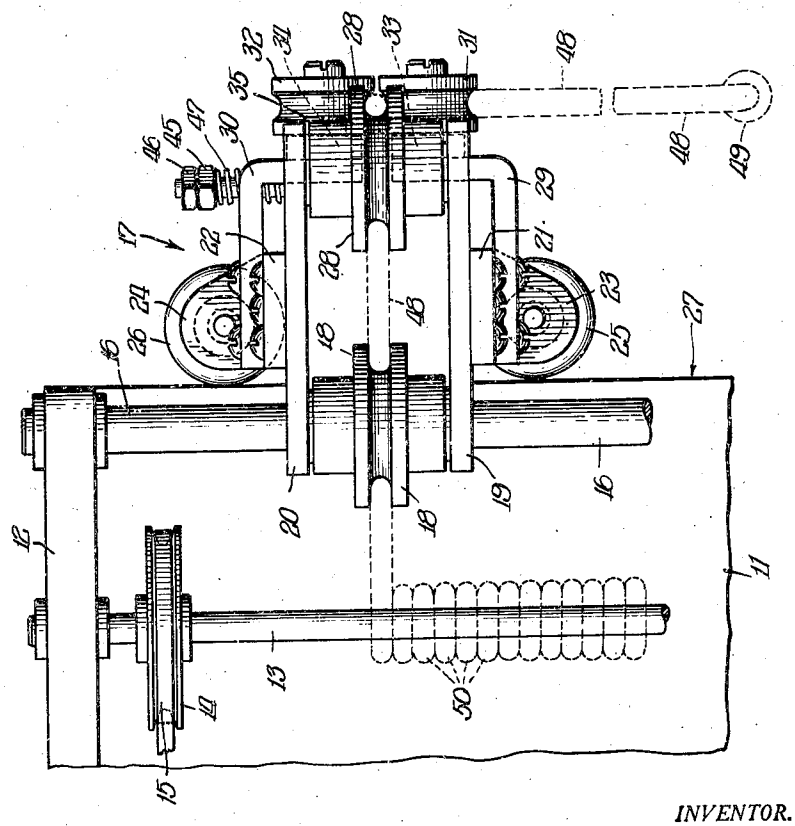


Fig. 3



INVENTOR.
James E. Bosh,
BY
C. R. Soper
attg.

Patented Aug. 9, 1949 2,478,454

UNITED STATES PATENT OFFICE

2,478,454

DEVICE FOR FEEDING AND TENSIONING RAW CORDAGE IN THE PRODUCTION OF COILED CORDS

James E. Bosh, Berwyn, Ill., assignor, by direct and mesne assignments, to Kellogg Switchboard and Supply Company, Chicago, Ill., a corporation of Illinois

Application May 26, 1945, Serial No. 595,952

10 Claims. (Cl. 18—19)

1

This invention relates to apparatus for producing coiled cords for use, for example, in connection with telephone instruments, and is particularly concerned with a device for feeding raw cordage to a winding arbor and for applying tension to the raw cordage on its passage to the arbor.

A cord of this type comprises a plurality of insulated electrical conductors encased or enveloped in a flexible protective sheath or covering, for example, a covering of a suitable plastic or rubber composition. The raw cordage, i. e., the conductors encased in the plastic covering, is extruded from a forming nozzle and is then wound around an arbor to form a tubular structure with the coils disposed close to each other. The plastic or rubber material of the coiled structure is then vulcanized so as to set the material in close coiled condition. A desired length of such coiled cord is employed for interconnecting telephone instruments, e. g., a receiver with a desk or a wall set. The cord is normally retracted by the tendency of the coils to assume their close-coil positions and is extended during the use of the telephone instrument to form an open spiral-like structure so as to permit manipulation of the receiver. Upon replacing the receiver, the coils of the cord again retract to normal close-coil position. In other words, the structure functions in the manner of a coiled spring. The use of such a coiled cord eliminates the necessity of employing auxiliary devices for keeping the cord tidy and unraveled, and thus reduces to a minimum annoyance to the user of the telephone instrument as well as wear and tear on the cord.

The invention furnishes a simple and efficient device comprising pressure rollers for engagement with the raw cordage and means for adjusting such rollers to apply desired pressure on the raw cordage as it passes from the extrusion and forming nozzle to the winding arbor or mandrel. The cordage is thus tensioned with respect to the arbor. The new tensioning device contributes toward uniformity of the cord throughout its length and toward uniformity of the coils formed on the winding arbor.

An embodiment of the invention is shown in the accompanying drawings, wherein

Fig. 1 shows a diagrammatic front view of the device;

Fig. 2 illustrates the device in side view as seen from the left in Fig. 1;

Fig. 3 is a top view; and

2

Fig. 4 represents a section taken approximately along lines 4—4 in Fig. 2 to show details.

The drawings are more or less diagrammatic and are intended for illustrative purposes only. Known elements will be described merely to the extent required for an understanding of what is considered new. Identical parts are indicated by identical reference numerals throughout the drawings.

Numeral 11 indicates a base plate having at one end an upright 12. A similar upright is provided at the other end of the base plate. Journalled in these uprights is the winding arbor or mandrel 13. A drive for the arbor 13 is schematically indicated in the form of a V-pulley 14 driven by belt 15. Any other suitable and approved driving means for the arbor may, of course, be used.

Also mounted in the uprights 12 is a supporting member shown as a shaft 16 for holding the new tensioning device which is generally indicated by the numeral 17. This tensioning device is longitudinally movable on the supporting member 16 and is angularly rotatable thereon.

The tensioning device comprises a pair of cord guide rollers 18 and 28 which are rotatably disposed between two forwardly projecting frame members, shown as strips or bar-like members 19 and 20. The frame members 19 and 20 with the guide roller 18 are rotatably disposed on the supporting shaft 16. Attached to the frame member 19 is a downwardly depending bar-like mounting member 21, and attached to the frame member 20 is a similar downwardly depending bar-like mounting member 22. Each of these downwardly depending mounting members is angularly formed at its lower end, to provide brackets 23—24 for rotatably journalling guide rollers 25—26, respectively. The latter ride along the forward edge 27 of the base plate 11, which edge is disposed in a plane extending in parallel with the axes of the arbor 13 and shaft 16.

The supporting structure of the tensioning device is thus rotatable about the shaft 16 and is also movable along the shaft 16 longitudinally thereof and in parallel with the axis of the arbor 13.

Angular brackets 29—30 are attached to the downwardly depending bar-like members 21—22, respectively, forming supports for the downwardly extending holders 33—34 which are provided with grooved pressure or tensioning rollers 31—32. The roller 31 is rotatably mounted at the lower end of the holder 33 which is fixedly attached, e. g., by welding, to the angular bracket

29, and the roller 32 is rotatably mounted on the holder 34 which is hingedly or pivotally attached to the angular bracket 30, for example, by means of a pivot screw 35.

The pressure and tensioning rollers 31—32 thus form a channel for receiving and guiding the raw cordage. The pressure or tensioning roller 31 is mounted in a fixed or stationary position, and the roller 32 is relatively movable thereto around the pivot point formed by the screw 35.

The holder 33, as particularly shown in Figs. 2 and 4, is provided with a rearwardly extending boss 40 which is attached thereto by suitable means, for example, a screw 41. Secured to the boss 40 is a pin 42 extending horizontally in back of the holders 33—34. The holder 34 carries a similar boss 43 which is secured thereto by means of the screw 44. The boss 43 is provided with a boring for accommodating the pin 42 which extends therefrom, as shown, and is threaded at its free end for receiving the adjusting nuts 45—46. A spring 47 is disposed on the pin 42 between the boss 43 and the nut 45. The pressure of the spring 47 tensions the pivotally mounted holder 34 against the stationary holder 33, thereby pressing the roller 32 elastically against the roller 31. The pressure of the spring 47 may be adjusted by means of the nuts 45—46, as desired. The pressure exerted by the roller 32 in the direction of the roller 31 is effective on the raw cordage 48 moving in the channel defined by the rollers, thus determining the tension thereon. Pressure from a few ounces to several pounds may be produced as desired, by using suitable springs and proper adjustment of the nuts 45—46.

The raw cordage 48, comprising a plurality of conductors enveloped or encased in a plastic sheath, for example, a rubber composition, is extruded from the forming nozzle indicated in dotted lines at 49.

The operation of the device is as follows:

The free end of the raw cordage 48, as it emerges from the extrusion and forming nozzle 49, is initially threaded through the channel formed by the pressure rollers 31—32 and is then placed on the cord guide rollers 28, 18, and finally attached to the arbor 13. At the start of the operation, the tensioning device is positioned substantially in line with the extrusion nozzle 49; that is to say, the channel formed by the pressure rollers 31—32 is positioned above the extrusion nozzle with the median center line approximately in alignment therewith. The nuts 45—46 are adjusted to hold the rollers 31—32 with desired pressure against the raw cordage. The drive for rotating the arbor 13 is now started and adjusted to proper speed in accordance with the speed of extrusion of the raw cordage from the nozzle 49.

The raw cordage is wound on the arbor 13, forming the close-coil structure indicated in Figs. 2 and 3 at 50. The forming of the coil structure on the arbor proceeds from left to right, as seen in Fig. 1. The tensioning device accordingly follows from left to right in the direction of the winding of the cord coil, being guided in its displacement on the shaft 16 which is disposed in parallel with the axis of the arbor 13. The rollers 25—26 carried by the brackets 23—24 at the lower end of the downwardly depending mounting members 21—22, respectively, guide the displacement of the device along the surface formed by the forward edge 27 of the base plate 11, which surface extends in parallel with the axes of the supporting shaft 16 and the arbor 13.

The median center line extending through the channel formed by the pressure and tensioning rollers 31—32 is thus progressively shifted or displaced with respect to the extrusion and forming nozzle 49, as seen in Figs. 1 and 3. The plastic raw cordage extruded from the nozzle 49 follows the displacement of the tensioning device.

The entire structure is thus elastically and yieldably mounted for sliding displacement in parallel with the axis of the shaft 16 and is rotatable about the shaft 16 to prevent any interference with the winding operation and undesired stresses on the cordage. The adjusted tension supplied by the pressure rollers 31—32 is uniformly effective throughout the winding of the cord coil.

The primary function of the pressure rollers 31—32 is, of course, to supply the tension required for winding the cordage on the arbor. The raw cordage extruded from the nozzle 49 is, however, in a somewhat plastic condition, and the pressure exerted thereon by the rollers 31—32 contributes to the final forming of the cordage or, rather to say, it secures the form of the cordage determined by the forming nozzle. If desired, the tension of the pressure rollers 31—32 may be adjusted so as to supply a forming pressure on the cordage.

Control means for signalling the end of the winding operation and, if desired, for automatically stopping the operation when the coil on the arbor has reached a certain point, may be provided as desired or necessary.

Changes may be made within the spirit and scope of the appended claims.

I claim:

1. In a machine for winding raw cordage which consists of a plastic sheath containing conductors, to form a coiled cord of the type used for interconnecting telephone instruments, a positively driven rotatable arbor for winding said cordage, a guide frame, a pair of freely rotatable grooved tensioning rollers carried by said guide frame for engagement with the raw cordage on its passage to said arbor, means for adjusting the pressure of said tensioning rollers on said cordage for the purpose of tensioning the cordage with respect to the arbor, a pair of serially related freely rotatable grooved guide rollers carried by said guide frame for guiding the cordage on its passage from said tensioning rollers to said arbor, means for mounting said guide frame for free sliding displacement in parallel with the axis of said arbor, and roller means carried by said guide frame for guiding the sliding displacement thereof.

2. In a machine for winding raw cordage which consists of a plurality of conductors encased in a plastic sheath, to form a coiled cord of the type adapted for interconnecting telephone instruments, a rotatable positively driven arbor for winding said cordage, a supporting member disposed in parallel with the axis of said arbor, a pair of arms pivotally and longitudinally slidably disposed on said supporting member, means rigidly connected with one of said arms forming a stationary holder extending therefrom, means pivotally secured on the other arm forming a movable holder extending therefrom, a grooved roller carried by each of said holders for engagement with the raw cordage on its passage to said arbor, spring-controlled means for resiliently coupling said stationary holder with said pivotally secured holder, means for adjusting

said spring-controlled means to determine the pressure exerted on the cordage by the rollers carried by said holders, means forming a bracket extending from each of said arms, a guide roller carried by each of said brackets, and means forming a stationary guide extending in parallel with the axis of said arbor for engagement with said guide rollers.

3. In combination, a positively driven rotatable arbor for winding thereon a member fed thereto to form a coil thereof, means forming a guide frame, means for mounting said guide frame for free sliding displacement parallel to the axis of said arbor and for angular displacement relative thereto, means carried by said guide frame forming a stationary holder and a movable companion holder thereon, a grooved roller carried by each holder for free rotation thereon, said rollers forming a channel for receiving said member, means for resiliently pressing the roller carried by said movable holder against the roller carried by said stationary holder for the purpose of exerting pressure on said member to tension it on its passage to said arbor, a freely rotatable guide roller on said frame for guiding said tensioned member on its passage from said channel to said arbor, means forming a guide surface extending in parallel with the axis of said arbor, bracket means carried by said guide frame, and roller means carried by said bracket means for guiding engagement with said guide surface.

4. In combination with a rotatable mandrel for winding a member fed thereto to form a coil thereof, a device for feeding said member to said mandrel and for tensioning it during such feeding, said device comprising a stationary shaft disposed in parallel with said mandrel, a pair of frame members carried by said stationary shaft, said frame members extending generally radially from said stationary shaft and being angularly and axially freely movable relative thereto, a mounting member extending angularly from each frame member, a guide roller carried by each mounting member, means forming a guide surface for engagement by said guide rollers which extends in parallel with said stationary shaft, a pair of tensioning rollers one carried by each of said mounting members, said tensioning rollers forming a channel for the passage of said member to said mandrel, and a roller journalled on said stationary shaft between said frame members for guiding said member on its passage from said tensioning rollers to said mandrel.

5. The structure and combination defined in claim 4, together with a holder for each tensioning roller, means for firmly securing one of said holders in connection with one of said mounting members, means for pivotally securing the other holder in connection with the other mounting member, and spring-controlled means for resiliently adjustably interconnecting said holders.

6. The structure and combination defined in claim 4, together with a roller journalled between said frame members at the free end thereof for connection with the roller journalled on said stationary shaft between said frame members to guide said member on its passage to said mandrel.

7. In combination with a rotatable mandrel for winding a member fed thereto to form a coil thereof, a device for feeding said member to said mandrel and for tensioning it during such feeding, said device comprising a stationary shaft disposed in parallel with said mandrel, a pair of frame members pivotally secured to said stationary shaft and generally radially extending therefrom for substantially unimpeded angular and longitudinal displacement relative thereto, a mounting member depending from each frame member, a guide roller carried by each mounting member at the free end thereof, means forming a guide surface for engagement by said guide rollers which is disposed underneath said stationary shaft and which extends in parallel therewith, a bracket carried by each mounting member, a first holder relatively firmly secured to one of said brackets and depending therefrom, a second holder pivotally secured to the other bracket and depending therefrom, a tensioning roller carried by each holder at the free end thereof, said tensioning rollers forming a channel for the passage of said member to said mandrel, and means associated with said holders for resiliently adjustably biasing said pivotally secured holder with respect to said firmly secured holder to press said tensioning rollers against said member during passage thereof through the channel formed thereby.

8. The structure and combination defined in claim 7, together with a roller journalled rotatably between said frame members to guide said member on its passage from said tensioning rollers to said mandrel.

9. In combination with a rotatable mandrel for winding a member fed thereto to form a coil thereof, a device for feeding said member to said mandrel and for tensioning it during feeding, said device comprising a pair of frame members disposed in spaced parallel relationship, means for mounting said frame members for substantially unimpeded displacement longitudinally and angularly relative to said mandrel, means forming a guide surface extending in parallel with the axis of said mandrel, a guide roller associated with said frame members for engagement with said guide surface to guide the displacement of said frame members longitudinally relative to said mandrel, a holder extending from each frame member, and a tensioning roller carried by each holder for coacting pressure engagement with said member on its passage to said mandrel, the axes of said tensioning rollers being disposed perpendicular to the axis of said mandrel.

10. The structure and combination defined in claim 9, together with a freely rotatable roller disposed between said frame members for guiding said member on its passage from said tensioning rollers to said mandrel, the axis of said roller extending in parallel with the axis of said mandrel.

JAMES E. BOSH.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,139,872	James	May 18, 1915
1,797,331	Dale	Mar. 24, 1931
2,021,276	Weinhart	Nov. 19, 1935