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WINDING DEVICE FOR WINDING WIRE ONTO RUBBER CORES

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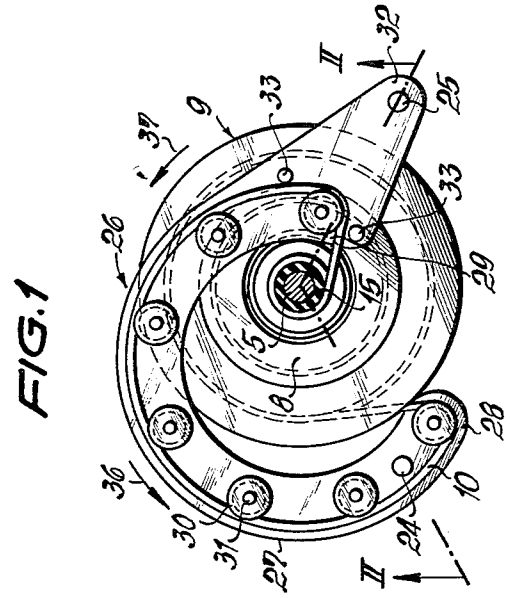


FIG. 1

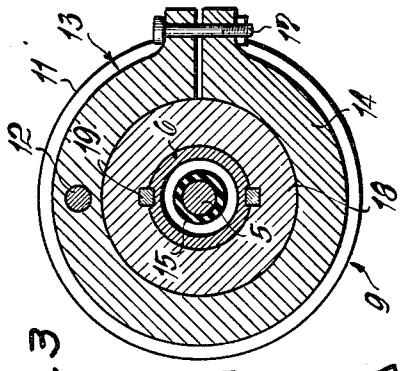


FIG. 3

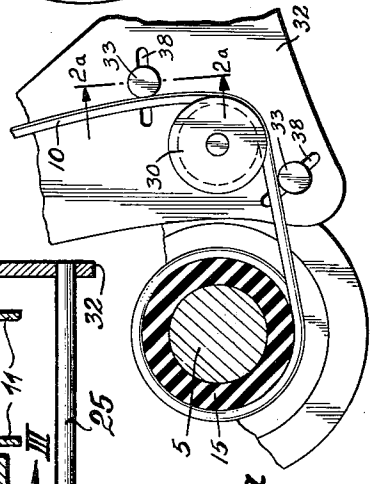


FIG. 1a

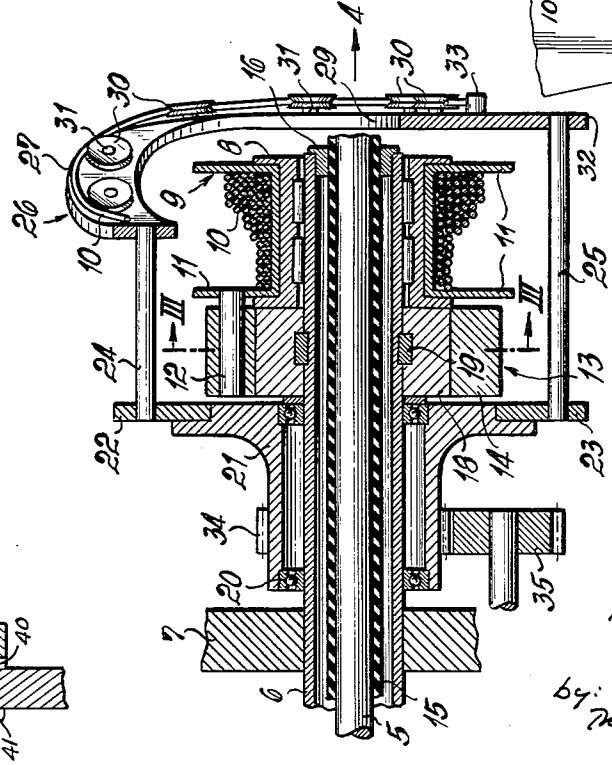


FIG. 2

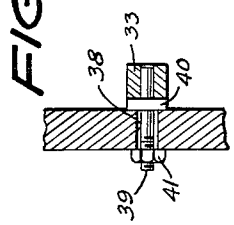


FIG. 2a

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# WINDING DEVICE FOR WINDING WIRE ONTO RUBBER CORES

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This invention relates to winding devices, and more specifically to a winding device for coiling wire onto or into suction hoses, in which an extruded rubber core, with the interposition of a textile or wire netting, is wrapped with wire of which several coils may be provided adjacent one another, and an outer coating is applied onto the wire coil or coils with the interposition of a further textile or wire netting.

It is already known to coil springs onto a mandrel on a turning lathe or on a vise with the aid of a winding device which serves as a guide means for the wire and can be adjusted by means of a lever during the coiling operation. Further, automatic spring coilers are known which work without the aid of a mandrel and let the springs freely come off. Both these arrangements, however, are not suitable for coiling wire onto hoses because of the limited lengths of the mandrels or automatic coilers, respectively.

It is the object of the invention to provide a winding device for coiling wire onto rubber cores and the like, of great lengths, particularly in braiding or winding machines.

According to the invention, this object is attained by the provision of a winding device which comprises a reel carrying the wire to be wound onto the rubber hose, and a rotatable guide member for guiding said wire when being reeled off said reel to the point of application on said rubber hose.

The rubber core may be drawn off in a known manner by means of a mandrel. Instead of the rubber core also harder elastic materials, such as Teflon, may be used onto which the wire can be coiled without a mandrel.

The winding device may conveniently be used in the known braiding or winding machines having a chain, caterpillar or the like extractor and can be positioned between the braiding or winding heads of the machine.

The reel supplying the wire may be arranged concentrically to the mandrel.

That part of the rotatable guide member which extends towards the reel may be arranged above the reel substantially in the middle of the length thereof and may have an arcuate portion arranged eccentrically with respect to the mandrel and to the longitudinal middle axis of the wire coil or coils.

The wire may be guided by means of rollers rotatably mounted on the rotatable guide member.

The rotatable guide member may have two arms one of which has an extension provided with additional rollers which are preferably adjustably movable towards and away from the winding axis so that the wire can be permanently deformed by simple means. This deformation is sufficient to provide a tight grip of the wire on the intermediate layer and to prevent the wire ends from uncoiling after the wire has been cut off.

If a plurality of wire threads are to be wound simultaneously, several reels with their associated rotatable guide members may be arranged in series on a bearing bushing. Each reel may be provided with an adjustable brake for giving the wire when being reeled off the reel a predetermined pre-tension. Such a brake may be either a disc brake or a block brake.



A preferred embodiment of the invention will now be described by way of example and with reference to the accompanying drawing, in which:

FIG. 1 is an elevational view of a winding device according to the invention;

FIG. 1*a* is an elevational view showing part of FIG. 1 to an enlarged scale;

FIG. 2 is a section on the line II—II of FIG. 1;

FIG. 2*a* is a section on line IIa—IIa of FIG. 1*a*; and

FIG. 3 is a section on the line III—III of FIG. 2.

In the figures, the reference numeral **5** designates a mandrel which may form part of a known braiding or winding machine (not shown) and can be pulled out therefrom in the direction of the arrow **4** (FIG. 2). The mandrel **5** is guided in an exchangeable bushing **16** which is arranged in a bearing bushing **6** provided in a housing **7**. On its free end the bearing bushing **6** is provided with a bearing **8** for a reel **9** having on one of its flanges **11** a pin **12** which carries a brake **13**. Wire **10** has been wound onto the reel **9**. The brake **13** comprises a brake clutch **14** circumferentially engaging a ring **18** secured by means of at least one key **19** (FIG. 3) to the bearing bushing **6**, the brake clutch **14** being adapted to be pressed against the ring **18** by means of a screw **17**. Two ball bearings **20** (FIG. 2) are mounted on the bearing bushing **6** and carry a flanged sleeve-type member **21** having projecting parts **22** and **23** which support through the intermediary of rods **24** and **25** a rotatable guide member **26** having an arcuate portion **27** which is arranged eccentrically with respect to the mandrel **5** and provided with two arms **28** and **29**. The arm **28** is secured to the rod **24** substantially above the middle portion of the reel **9** and the arm **29** is arranged adjacent the mandrel **5**. The rotatable guide member **26** is provided with rollers **30**. These rollers **30** are rotatable on axles **31** which are mounted so as to extend substantially parallel to the longitudinal axis of the mandrel **5**.

The rods **24** and **25** to which the rotatable guide member **26** is secured are expediently arranged at the same distance from the longitudinal axis of the mandrel **5**. The arms **28** and **29** are disposed opposite each other in spaced relationship both in the longitudinal direction of the mandrel **5** and in the transverse direction thereof. The rotatable guide member **26** consists of flat iron and has an extension **32** which is secured to the rod **25**. Two rollers **33** are arranged on the extension **32** and movable towards and away from the mandrel **5**. For this purpose the extension **32** may be formed with two slots **38** extending toward mandrel **5** and the shafts **39** of the two rollers **33** extend respectively through slots **38**. Each shaft **39** is provided on one side of the extension **32** with a flange portion **40** while at the other side a nut **41** is screwed onto a threaded end of the shaft so as to press the flange portion **40** against the one side of the extension **32**, to hold thereby the roller **33** in an adjusted position along the slot **38**. The wire **10** is guided by the rollers **30** and **33** and can be permanently deformed by displacing the rollers **33**. This deformation is intended to provide a tight grip of the wire **10** on an intermediate layer (not shown) and to prevent the wire **10** from uncoiling after having been cut off.

A rubber hose **15** is applied to the mandrel **5** in a known manner and the free end of the wire **10** led around the rollers **30** and **33** is tightly clamped thereon.

The flanged sleeve-type member **21** is provided with a toothed rim **34** which is adapted to be driven by a pinion **35**. During operation the rotatable guide member **26** with the wire **10** will be rotated through the intermediary of the flanged sleeve-type member **21** in the direction of the arrow **36**, as can be seen from FIG. 1.

At the same time the mandrel **5** with the rubber hose **15** and the wire **10** will be pulled out of the bearing bushing **6** in a known manner by a pulling device (not shown), in the direction of the arrow **4**. The pull will cause the wire **10** to rotate the reel **9** in the direction of the arrow **37**. When the wire **10** is pulled off the reel **9** it is led through the intermediary of the rotatable guide member **26** around the rollers **30** and subsequently deformed according to the location of the rollers **33** whereupon it will be helically wound onto the rubber hose **15**. The position of the point at which the wire **10** is applied onto the rubber hose **15** as well as the spacing of the individual windings of the coiled wire **10** is dependent on the speed at which the wire **10** is reeled off the reel **9** and on the rate of revolution of the rotating wire **10**. The pretension of the wire **10** is adjustable by means of the brake **13**.

Instead of the single wire **10**, several wires may be wound in multiple threads onto the rubber hose **15** by arranging several winding devices in series. The general arrangement may be such that the winding device shown in the drawing is positioned between the braiding or winding head of the braiding or winding machine. The wire is then wound in a continuous process either in single or multiple threads onto the interpositioned known netting whereupon a further netting is applied onto the wire.

As already mentioned, the figures of the drawing show only one preferred embodiment of the invention which, however, is not limited to this single embodiment as there are many other embodiments and applications feasible without departing from the nature of the invention. For example, the reel **9** may also be supported on a known winding plate and in a manufacturing process not using a mandrel, the exchangeable bushing **16** may be replaced in a known manner by a supporting tube. Instead of wires also bands may be used which are wound so as to overlap in an interlocking manner. The interlocking may be effected by bending the edges or in dovetail or snap-fastener fashion.

I claim:

1. In a machine for producing armored hose, in combination, support means; first guide means mounted on said support means for guiding a hose in the direction of its axis; second guide means extending transverse to and partly around said axis and being mounted on said support means turnably about said axis for guiding an elongated resiliently flexible metal element in a direction substantially normal to said axis onto said hose and for winding said element about said hose so that during movement of said hose in the axial direction said element is wound in a spiral onto said hose, said second guide means having an end portion adjacent said axis; and deforming means mounted on said end portion for imparting a permanent deformation to said elongated resiliently flexible element before it is applied to said hose.

2. In a machine for producing armored hose, in combination, support means; first guide means mounted on said support means for guiding a hose in the direction of its axis; second guide means extending transverse to and partly around said axis and being mounted on said support means turnably about said axis for guiding a wire in a direction substantially normal to said axis onto said hose and for winding said wire about said hose so that during movement of said hose in the axial direction said wire is wound in a spiral onto said hose, said second guide means having an end portion adjacent said axis; and deforming means mounted on said end portion for imparting a permanent deformation to said wire before it is applied to said hose.

3. In a machine for producing armored hose, in combination, support means; first guide means mounted on said support means for guiding a hose in the direction of its axis; a wire reel mounted on said support means turnably about said axis; second guide means mounted on said support means turnably about said axis for winding a wire from said wire reel about said hose so that during movement of said hose in the axial direction said wire is wound in a spiral onto said hose, said second guide means including an arcuate member having one end located between opposite ends of said reel radially spaced from the periphery thereof and another end axially spaced from said reel in direction of movement of said hose and adjacent said axis; and deforming means mounted on said other end of said arcuate member for imparting a permanent deformation to said wire before it is applied to said hose.



4. In a machine for producing armored hose, in combination, support means; first guide means mounted on said support means for guiding a hose in the direction of its axis; second guide means extending transverse to and partly around said axis and being mounted on said support means turnably about said axis for guiding a wire in a direction substantially normally to said axis onto said hose and for winding said wire about said hose so that during movement of said hose in the axial direction said wire is wound in a spiral onto said hose, said second guide means having an end portion adjacent said axis; drive means connected to said second guide means for turning the same about said axis; and deforming means mounted on said end portion for imparting a permanent deformation to said wire before it is applied to said hose.

5. In a machine for producing armored hose, in combination, support means; first guide means mounted on said support means for guiding a hose in the direction of its axis; a wire reel mounted on said support means turnably about said axis; second guide means mounted on said support means turnably about said axis for winding a wire from said wire reel about said hose so that during movement of said hose in the axial direction said wire is wound in a spiral onto said hose, said second guide means including an annular member mounted on said support means turnably about said axis, and an arcuate member carried by said annular member and having one end located between opposite ends of said reel radially spaced from the periphery thereof and another end axially spaced from said reel in direction of movement of said hose and adjacent said axis; drive means connected to said second guide means for turning the same about said axis; and deforming means mounted on said other end of said arcuate member for imparting a permanent deformation to said wire before it is applied to said hose.

6. In a machine as set forth in claim 5, in which said arcuate member is eccentrically mounted on said annular member and said arcuate member having an extension projecting from said other end of said arcuate member and connected at a free end thereof to said annular member.

7. In a machine for producing armored hose, in combination, support means; first guide means mounted on said support means for guiding a hose in the direction of its axis; a wire reel mounted on said support means turnably about said axis; second guide means mounted on said support means turnably about said axis for winding a wire from said wire reel about said hose so that during movement of said hose in the axial direction said wire is wound in a spiral onto said hose, said second guide means including an annular member mounted on said support means turnably about said axis, an arcuate member carried by said annular member and having one end located between opposite ends of said reel radially spaced from the periphery thereof and another end axially spaced from said reel in direction of movement of said hose and adjacent said axis, and a plurality of guide rollers mounted spaced from each other along said arcuate member respectively turnable about axes substantially parallel to said axis along which said hose is guided by said first guide means; drive means connected to said

second guide means for turning the same about said axis; and deforming means mounted on said other end of said arcuate member for imparting a permanent deformation to said wire before it is applied to said hose.

8. In a machine for producing armored hose, in combination, support means; first guide means mounted on said support means for guiding a hose in the direction of its axis; a wire reel mounted on said support means turnably about said axis; second guide means mounted on said support means turnably about said axis for winding a wire from said wire reel about said hose so that during movement of said hose in the axial direction said wire is wound in a spiral onto said hose, said second guide means including an annular member mounted on said support means turnably about said axis, an arcuate member carried by said annular member and having one end located between opposite ends of said reel radially spaced from the periphery thereof and another end axially spaced from said reel in direction of movement of said hose and adjacent said axis, and a plurality of guide rollers mounted spaced from each other along said arcuate member respectively turnable about axes substantially parallel to said axis along which said hose is guided by said first guide means, one of said guide rollers being mounted in the region of said other end of said arcuate member; drive means connected to said second guide means for turning the same about said axis; and deforming means mounted on said other end of said arcuate member for imparting a permanent deformation to said wire before it is applied to said hose, said deforming means including a pair of deforming rollers mounted in the region of said other end of said arcuate member movable towards and away from said axis and co-operating with said one guide roller for permanently deforming the wire before it is applied to the hose.



9. In a machine as set forth in claim 5 in which said drive means include a gear ring fixed to said annular member and a pinion meshing with said gear ring.

10. In a machine as set forth in claim 3 in which said support means include an elongated tubular member, in which said first guide means include an elongated rod extending with clearance through said tubular member substantially coaxial therewith, and in which said second guide means and said wire reel are mounted on said tubular member turnably about the axis thereof.

11. In a machine as set forth in claim 10 in which said first guide means include a bushing mounted at one end of said tubular member.

12. In a machine as set forth in claim 3 and including brake means mounted on said support means and co-operating with said reel for controlling rotation thereof.

**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 1,136,291 | Subers | Apr. 20, 1915 |
| 1,204,342 | Cobb | Nov. 7, 1916 |
| 1,367,709 | Noble | Feb. 8, 1921 |
| 1,899,559 | Damon | Feb. 28, 1933 |
| 1,972,290 | Conner | Sept. 4, 1934 |
| 2,118,136 | Bardsley | May 24, 1938 |
| 2,723,705 | Collins | Nov. 15, 1955 |
| 3,020,701 | McCormick | Feb. 13, 1962 |
| 3,037,343 | Haas et al. | June 5, 1962 |