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WINDING SPINDLE

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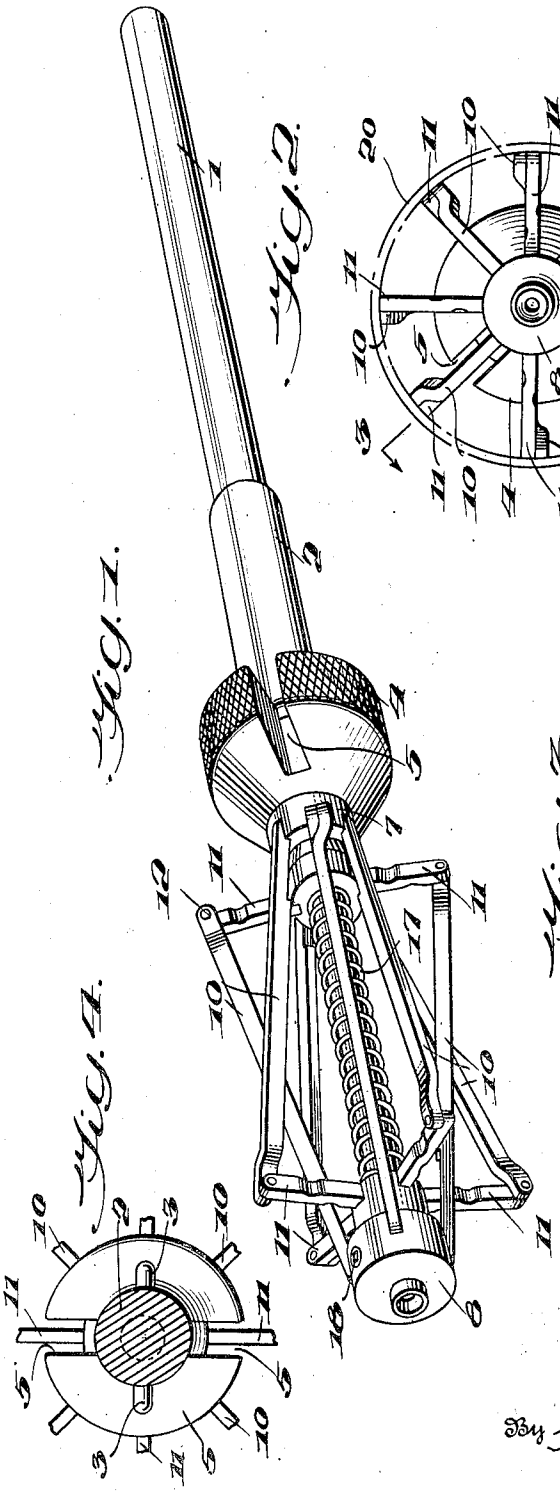


Fig. 1.

Fig. 2.

Fig. 4.

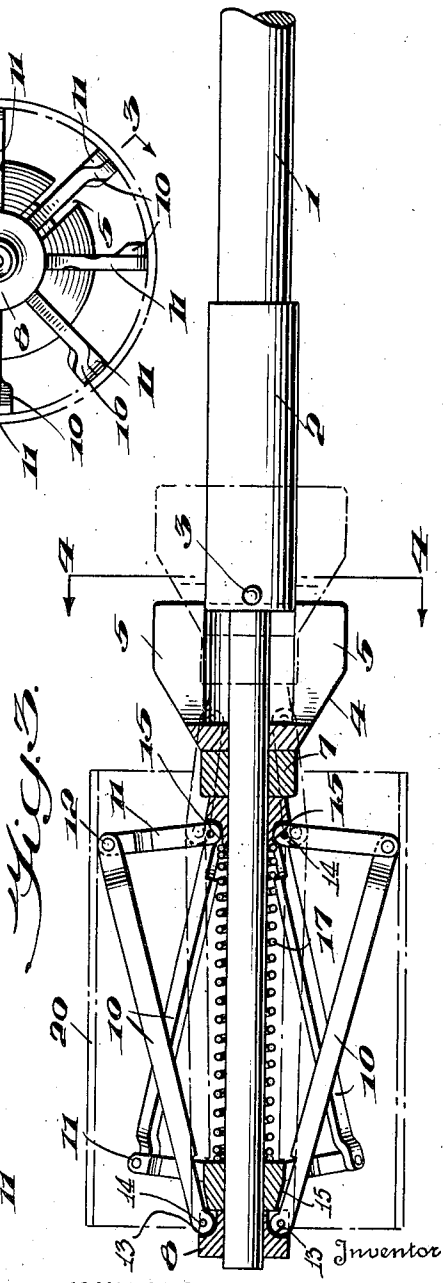


Fig. 3.

Inventor

JOHN N. GREENAWAY, JR.

By Glascock Downing & Seebold

Attorneys.

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WINDING SPINDLE

John N. Greenaway, Jr., Hanover, Pa.

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1 Claim. (Cl. 242—112)

This invention is an improvement on the device shown and claimed in my Patent No. 2,177,318, dated October 24, 1939, and relates to winding spindles, in which a cop or spool may be releasably mounted on the spindle or the cord may be wound directly on the spindle and released therefrom.

The invention is intended especially for cordage made of vegetable fiber but is entirely suitable for winding flexible wire of any composition.

The objects of this invention are to produce a spindle from which the wound material or the spool if one is used, is readily detached and which, while retaining the advantages of the device claimed in the aforesaid patent is of simpler manufacture and easier manipulation. Moreover, the ball or cylinder of cord produced is when a spool is used of firmer make better suited for packing and holds the spool positively in place while avoiding entanglement. It is to be understood that the words "ball" and "cylinder" are used here in a broad sense and do not imply a mathematically rigid shape. I attain these objects by the spindle illustrated in the accompanying drawing, in which:

Figure 1 is a perspective view of the spindle when the arms of the reel are extended.

Figure 2 is an end elevation looking to the right in Fig. 1.

Figure 3 is a cross-sectional view on line 3—3 of Fig. 2, the rod 1 being shown in elevation in full lines with the arm of the reel spread, and in broken lines with the arms collapsed.

Figure 4 is a section on line 4—4 of Fig. 3.

Similar numbers refer to similar parts throughout the several views.

Numeral 1 designates a rod, preferably of steel, the ends of which are formed to fit into the winding machine to be rotated thereby. An enlargement 2, either integral with or rigidly secured on the rod 1, serves as a stop for an operating annulus 4 which is shown as frusto-conical, when the arms of the reel are collapsed as shown in Fig. 3, in broken lines. A pin 3 passing through the rod 1 and the enlargement 2 acts as a stop to the longitudinal motion of the annulus 4 when the reel is in the transversely distended position, shown in Figs. 1 and 3 in full lines. Rod 1 is reduced in diameter to receive the operating annulus 4 and the collars 7 and 8.

Operating annulus 4 embraces closely rod 1 at the left as shown in Fig. 3, but sufficiently loosely to permit longitudinal motion on rod 1. The central aperture of annulus 4 is enlarged or stepped a short distance from the left end to embrace the enlargement 2. Annulus 4 is shown as frusto-conical with a cylindrical portion at the right and the periphery of said cylindrical portion is knurled or roughened to facilitate manual manipulation.

A slot 5 extends diametrically across annulus 4 and longitudinally to that portion of the annulus where the central aperture is contracted to the diameter of the rod 1. The pin 3 may therefore be held against the base of the annulus thereby acting as a stop or on the rotation of the annulus fit into the slot allowing the arms hereinafter described to collapse.

The reel proper, referred to herein as the reel, comprises two stepped collars 7 and 8 apertured to fit on the rod 1. To each of the steps of each of said collars are pivoted arms at regular circumferential intervals. The arms 10 pivoted to the part of greater diameter of each of said collars are longer than the arms 11, pivoted to the part of lesser diameter. These arms are not only pivoted to the collars, but the longer arms of each collar are at their extremities 12 pivoted to the end of the corresponding shorter arms of the other collar. The stepped collars are thus connected but may be moved toward and away from each other to an extent limited by the length of the arms. It is to be noted that circumferentially the longer and shorter arms of each collar alternate.

The arms may be pivoted to the collars in any desired manner, but as shown, grooves 13 are formed in the circumferences of the collars, a slot 15 extending to the grooves is cut for each arm and the arm is pivoted on a wire 14 in the groove 13. If desired, the wire may be further fixed by soldering.

A coiled spring 17 bears against the inner surface of the collars and holds them apart as shown in broken lines, except when they are forced toward each other as shown in Figs. 1 and 3 in full lines.

The spool when used is an annulus of slight thickness as shown at 20, Figs. 2, 3, 6 and 7. Spool 20 is of such internal diameter as to surround freely the arms in their collapsed condition but to be firmly held by the arms when they are expanded.

To assemble the unit the operating annulus 4 is slipped over the rod 1 and is stopped by the pin 3. On turning the annulus 4, the pin 3 will, when it encounters slot 5, slip into it and annulus 4 will rest against stop 2. The reel proper is next placed upon the rod, the coil spring 17 surround-

ing the rod 1. The outer collar 8 is then rigidly secured to rod 1 by, for example, the screw 18 or any other convenient means. The inner collar 7, however, is movable longitudinally on the rod 1 through both collars and arms must rotate therewith.

If the reel is in the expanded position shown in Fig. 1 and in full lines in Fig. 3, the base of the annulus rests against the pin 3 which acts as a stop against the action of the spring 17. If the annulus be rotated until the slot 5 is in line with the pin 3, spring 17 will push the collar 7 to the right the pin 3 entering the slot 5 and this movement will be stopped when the portion of annulus 4 in which the aperture is contracted to the diameter of rod 1 contacts the collar 7. The structure is so proportioned that this brings the arms into complete collapsed position. To expand the reel the annulus is pushed manually to the left until pin 3 is out of the slot 5. The reel is held in this expanded position by a slight rotation of the annulus.

A vital point in the above described construction is that the peculiar construction of the arms produces, when the reel is expanded, a device having a double maximum diameter. These maximum diameters are formed by the juncture of the long and short arms. In other words, the protuberant points formed by the junctures of the long and short arm lie in two planes parallel to and on opposite sides of the median transverse plane of the reel.

Owing to the construction described, it is obvious that the transverse plane of one set of junctures will be on one side of the median transverse plane of the reel and the other set will be on the other side of the median transverse plane. The importance of this will be clear from a description of the operation of the device and of the product.

In operation, the rod is inserted in the balling or winding machine. The operating annulus is manually forced forward, i. e. towards the slidable collar 7. Collar 7 moves toward collar 8 and the arms are expanded as shown in Fig. 2. The annulus is then turned so that pin 3 bears against the base of the annulus which is thus held in position.

The operator loops the material to be wound several times around the arms of the spindle. The winding machine is then started and winds the material on the reel. This material, cord, twine or similar material, is guided in any customary manner from one end of the reel to the other. When the ball is completed the machine is stopped, the cord or whatever the material wound may be is cut, leaving when no spool is used, a substantial length of unwound cord attached to the ball.

The operator then winds this length of cord around the ball at its median line forming a band, and tucks the end of the cord in the band to hold it. This band, as is clear from the above, surrounds the ball between the planes of the reel's maximum diameters. The two zones of cord on either side of the median are supported from within by the protuberant points of juncture of the long and short arms but the median zone is not thus supported. By winding the unwound portion of the cord repeatedly tightly around this median part the latter is indented somewhat. This gives the cord a springing action from the core against the band and produces a firmer ball than is obtained with the spindles now in use. The band being wound on the operating annulus is turned until the slot therein registers with the pin 3. The coiled spring forces the annulus to the right, the slot slipping over the pin 3 and the annulus is stopped by the enlargement 2, the arms of the reel are thereby collapsed, the reel is then easily removed and is ready for packing and shipping.

Having thus described the invention what I claim is:

A winding spindle comprising a rod adapted to be inserted in a winding machine, a reel mounted on said spindle to rotate therewith, said reel comprising collars relatively movable on said spindle, a series of longer arms and a series of shorter arms, the longer and shorter arms alternating, pivoted to each of said collars, and the longer arms of one collar also pivoted to the corresponding shorter arms of the other collar, a coiled spring surrounding said spindle and bearing against the inner faces of said collars to force them away from each other and means for moving said collars toward each other against the tension of said spring, said reel being expanded when said collars approach each other and collapsed when said collars move further apart, an enlargement on said rod and a pin passing diametrically through said enlargement, the means for moving said collars comprising an annulus having a stepped central aperture, the larger portion of a diameter to loosely embrace the enlargement on the rod and the smaller portion of a diameter to loosely embrace the rod, a diametrical slot in said annulus extending longitudinally of said annulus to the end of the larger portion of said aperture remote from the smaller portion whereby when said annulus is turned to put said pin and said slot in register, said spring pushes said movable collars apart, the pin entering the slot, and collapses said arms and when said annulus is pushed along said rod to release said pin from said slot, said arms are expanded and on rotating said annulus said pin holds said arms in extended position.

JOHN N. GREENAWAY, JR.