United States Patent

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[54] **BOBBIN CHUCK**
6 Claims, 3 Drawing Figs.

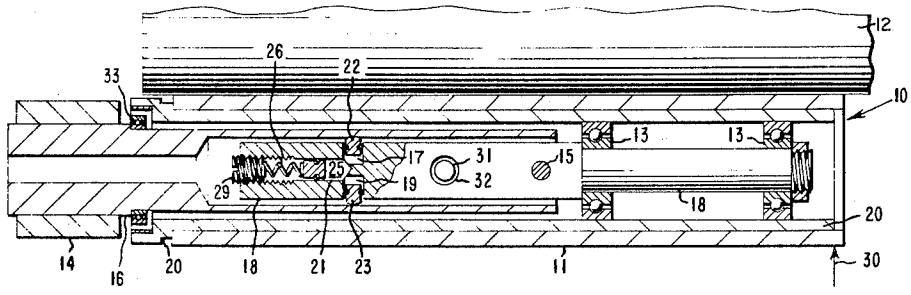
[52] **U.S. Cl.** **242/18,** 242/46.2, 242/65
[51] **Int. Cl.** **B65h 54/02,** B65h 75/18
[50] **Field of Search** ..... 242/18 R, 18 DD, 46.2, 46.3, 46.4, 46.5, 68, 68.1, 68.2, 68.3, 65, 66; 57/135

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ABSTRACT: A self-aligning bobbin chuck for use with a yarn winding apparatus of the type that includes a drive roll and means for moving a bobbin carried by the chuck into surface driven engagement with the drive roll. The chuck includes concentrically arranged and radially spaced, first and second shafts and a sleeve telescoped over the shafts. The second shaft has a portion that extends beyond one end of the first shaft and is pivotally mounted at a point between its ends to the first shaft for swinging movement in a plane inclusive of the longitudinal axes of both the chuck and the drive roll. The sleeve is rotatably mounted to one end of the second shaft while a damping means is coupled between the other end of the second shaft and the first shaft to dampen out rapidly applied shock loads.



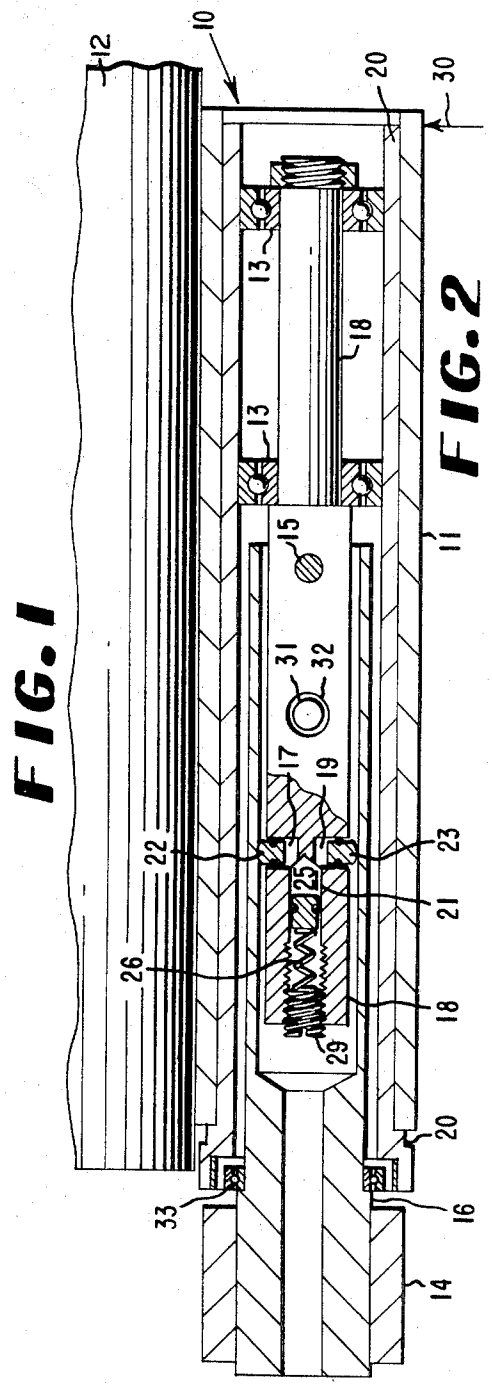


FIG. 1

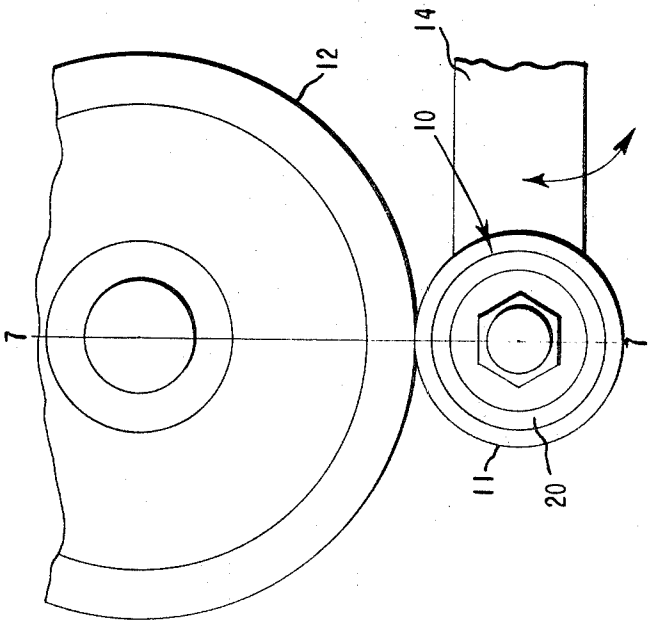


FIG. 2

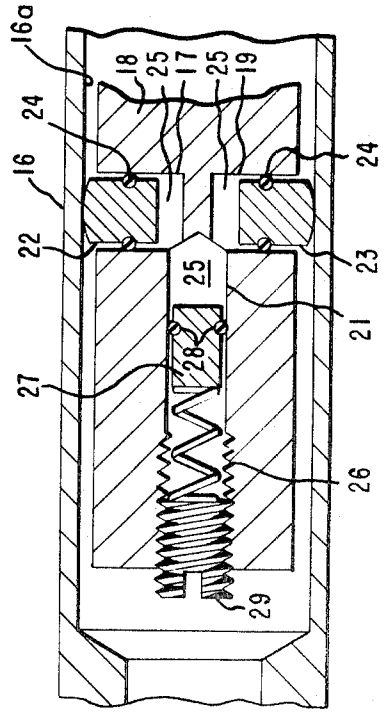


FIG. 3

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BOBBIN CHUCK

BACKGROUND OF THE INVENTION

This relates to the winding of filamentary materials and more particularly to the chucks used for holding tubular bobbins or yarn package supports.

In chucks used in surface driven windups, attempts have been made to render the chuck self-aligning or, alternatively, to permit some degree of compensatory radial adjustment between bobbin and chuck in an effort to secure parallelism between the bobbin surface (or, as the yarn builds, the yarn surface) relative to a drive roll surface. In the former, elastomeric members have been used where the chuck shaft is mounted in the swing arm and in the latter, various kinds of garter springs, "wedge" rings, and elastomeric bands have been used between chuck and bobbin inner periphery. While such devices have been somewhat successful, they require that a continuing force be applied to effect and maintain a correction in bobbin alignment relative to the drive roll, thus, the force at one end of a bobbin is invariably greater than at the other, and additional rapidly applied shock loads tend to cause the chuck to vibrate which in turn may result in poor package formation.

SUMMARY OF THE INVENTION

The present invention contemplates a damped self-aligning bobbin chuck for use with a yarn winding apparatus that includes a drive roll and a swing arm support for moving a bobbin carried by the chuck into surface driven engagement with the roll. The chuck includes a first shaft connected at one of its ends to the support so that this shaft and the drive roll have substantially parallel longitudinal axes. A second shaft which is substantially coaxial with the first is pivotally mounted at a point between its ends to the first shaft for swinging movement in a plane inclusive of the axes. A bobbin support sleeve is rotatably mounted to the second shaft in a manner so that it telescopes over both shafts and a damping means is coupled between the shafts.

In a preferred embodiment the first shaft is hollow and the second shaft is concentric with, radially spaced from and extends out from the hollow portion of the first shaft. The second shaft is pivotally mounted at a point between its ends to the first shaft for swinging movement in a plane inclusive of longitudinal axes of the chuck and the drive roll. The sleeve or bobbin holder is rotatably mounted to the end of the second shaft that extends outwardly from the first and is telescoped over and radially spaced from the first shaft. At the end opposite from the rotatable sleeve mounting, the second shaft has a damping means coupled between it and the inner wall of the hollow first shaft. In the preferred embodiment a silicone material is confined in a cavity at the end of the second shaft by means of pistons at least two of which are aligned diametrally opposite to each other and act on the inner wall of the first shaft and the second shaft in substantially the above-mentioned plane.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side-elevational view in cross section of a preferred embodiment of a bobbin chuck and a mounting therefor.

FIG. 2 is an end elevational view of the apparatus of FIG. 1 showing its relation to a surface drive-roll.

FIG. 3 is an enlarged view in cross section of a portion of the apparatus of FIG. 1 that includes the damping means.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, a chuck **10** carrying a bobbin **11** is fixed to a swing arm **14** (shown fragmentarily) and is adapted to move toward and away from a drive-roll **12** in conventional fashion. The chuck **10** includes concentrically arranged and radially spaced first and second shafts **16, 18** respectively and a sleeve **20** telescoped over the shafts. Shaft **18** extends into and is pivotally secured to shaft **16** by means of a close-fitting hinge pin **15**, the axis of which is situated substantially perpendicular to a plane **7–7** (FIG. 2) which includes the axis of the shaft **18** and the axis of the shaft of the drive-roll **12**. The second shaft **18** carries a spaced pair of ball bearings **13** for the rotatable mounting of sleeve **20**.

As best shown in FIG. **3**, a generally T-shaped damping fluid passage **25** is located at the end of shaft **18** and includes a pair of aligned, diametrally opposed bores **17, 19** which do not form a common bore but each of which intersect and are partially open to a third bore **21** which is concentric with the central axis of the shaft **18**. The opposed bores **17, 19** are situated in the plane **7–7** and each is occupied by a piston **22, 23**, fluid sealing between the bores and respective pistons being effected by means of conventional "O" rings **24**. In general, the pistons **22, 23** are each urged radially outward into abutment with the inner wall **16***a* of the hollow shaft **16** by means of a fluid in the passage **25** and by spring loaded piston **27** urged by spring **26**. Piston **27** also has an O-ring seal **28**. A screw **29**, accessible through the hollow tubular shaft **16**, permits axial adjustment of the spring **26** to increase or decrease pressure on the piston **27** and hence on the entrapped fluid in the passage **25**.

A pin **31** is tightly fitted in the tubular shaft **16** but passes through a clearance hole **32** in the shaft **18** and is situated parallel to the pin **15**. The pin **31** thus serves to hold the assembly together if pin **15** should fail and may serve to limit angular travel of the shaft **18** and its appurtenances if so desired. A bearing **33** situated on the first shaft **16** near support **14** has its outer peripheral surface clear of the interior of sleeve **20**. This particular arrangement may be used to limit angular travel of the shaft **18** about pin **15** as well as provide a relatively friction free contact between the sleeve and first shaft when the limit of angular travel is reached.

From the foregoing it will be seen that pivotal movement of shaft **18** about the pin **15** in the plane **7–7** and relative to the hollow tubular shaft **16** is restrained by means of the opposed pistons **22, 23**. If for example a force is exerted upward on the free end of the sleeve **20** through bobbin **11** as denoted by arrow **30**, the piston **23** will be urged downward exerting pressure on the fluid confined in the passage **25** which, in turn, urges the piston **22** upward in effect, maintaining a taut system, e.g., on without any clearance between the various pistons and their abutting members and without any voids in the fluid in passage **25**. Since the bores **17, 19** have small openings into the common bore **21**, a damping effect is introduced; however, the damping effect is derived mainly from the choice of fluid used in the passage **25**, the most preferred being a non Newtonian silicone polymer of the type described in "Organosilicon Compounds" by C. Eaborn, Butterworth Scientific Publications, 1960, which will flow under steady urging but is substantially immovable under a suddenly applied shock load. Thus, in a windup in which an angular misalignment or package taper is present, the concomitant transverse loads on a chuck will result in gradual movement about the pivot **15** until transverse forces are uniform, end to end; however, any rapidly applied shock loads such as those arising from eccentricity from substantially any source (e.g., bearings, housing, bobbin, drive-roll or yarn) will be damped out and have substantially no effect on winding. The preferred silicone polymer is Dow Corning® C–2–0982 Coral Bouncing Putty.

In another damping arrangement the bores **17, 19**, fed by suitable damping fluid passages may be located in the inboard end of the pivoting shaft so that their axes are parallel to each other, and lie in a plane perpendicular to and are equispaced from the axis of the hinge pin connecting the two shafts. The hinge pin is located in close proximity to the bore openings. The opposing pistons installed in these bores bear on the outboard end of the shaft connected to the swing arm, which end surface lies in a plane perpendicular to the shaft axis.

What we claim is:

1. A bobbin chuck for use with a yarn winding apparatus that includes a drive-roll and support means for moving a bobbin carried by said chuck into surface driven engagement with said roll, said chuck comprising: a first shaft connected at one of its ends to said support means said shaft and said drive-roll having substantially parallel longitudinal axes; a second shaft substantially coaxial with and pivotally mounted at a point between its ends to said first shaft for swinging movement in a plane inclusive of the axes of the second shaft and said drive roll; a sleeve rotatably mounted to said second shaft, said sleeve telescoped over said shafts; and means coupled between said shafts for damping movement therebetween.

2. A bobbin chuck for use with a yarn winding apparatus that includes a drive-roll and support means for moving a bobbin carried by said chuck into surface driven engagement with said roll, said chuck comprising: a first shaft connected at one of its ends to said support means, said shaft being hollow and having a concentric inner and outer walls, said drive-roll and said shaft having substantially parallel longitudinal axes; a second shaft having one end extending into and its opposite end extending out from said first shaft, said second shaft being concentric with, radially spaced from, and pivotally mounted

at a point between its ends to said first shaft for swinging movement in a plane inclusive of said axes; a sleeve rotatably mounted to said opposite end and telescoped over and radially spaced from said opposite end and telescoped over and radially spaced from said first shaft; and means coupled between said one end and the inner wall of said first shaft for damping movement therebetween.

3. The bobbin chuck as defined in claim 2, wherein said damping means includes diametrally opposed members extending radially outwardly from said second shaft against said inner wall and resilient means within said second shaft and contacting said members for urging them outwardly against said inner wall.

4. The bobbin chuck as defined in claim 3 said opposed members extending radially outwardly substantially in said plane.

5. The bobbin chuck as defined in claim 4, said second shaft having a cavity therein, said resilient means being a silicone material confined in said cavity by said members.

6. The bobbin chuck as defined in claim 5, said material being a silicone polymer.