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EXPANDING ARBOR FOR WIRE SPOOLING MACHINE

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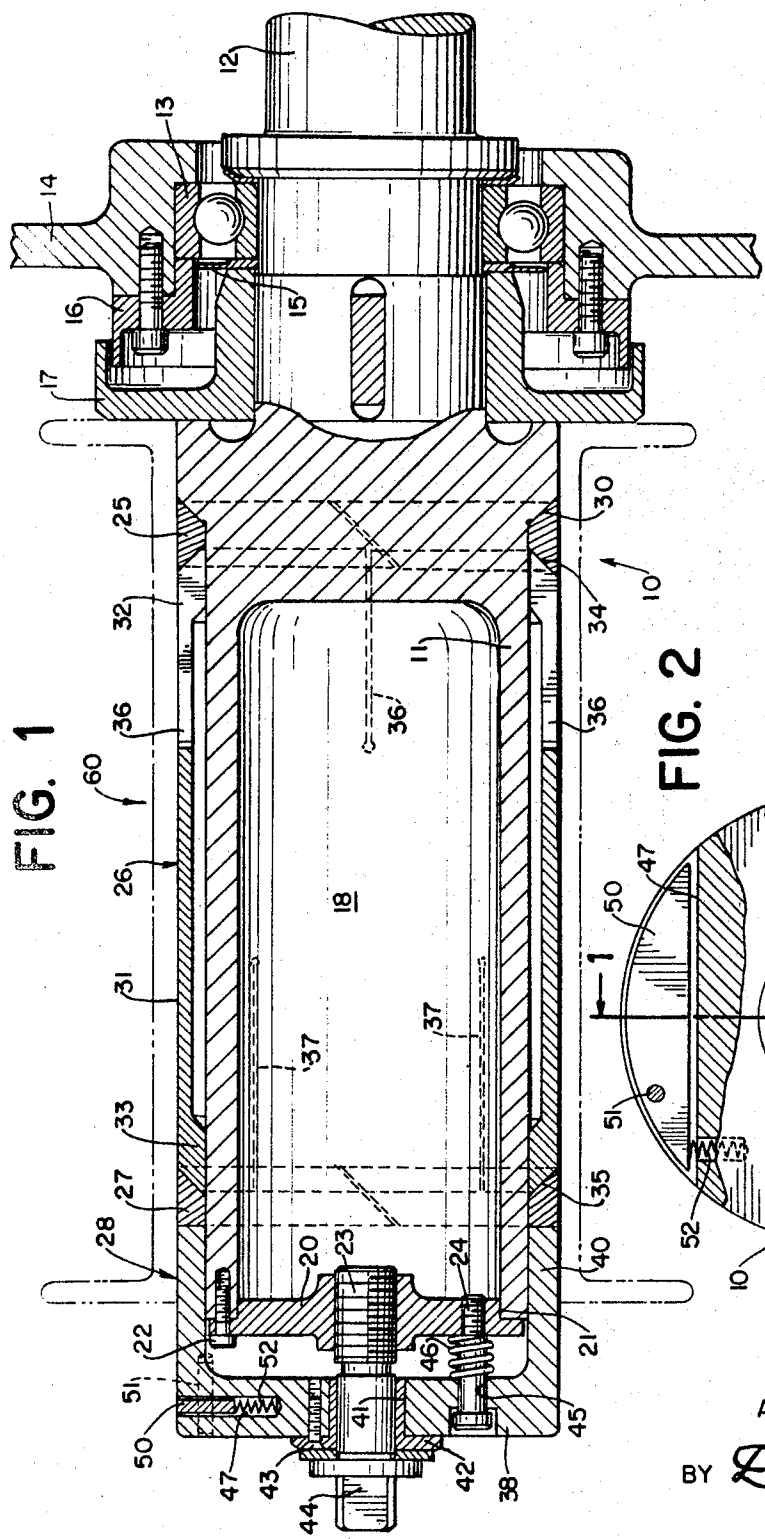


FIG. 1

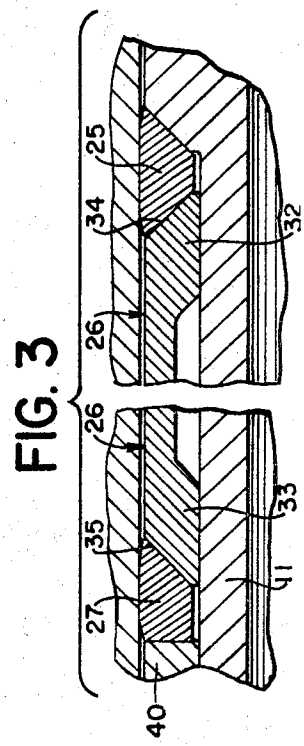


FIG. 3

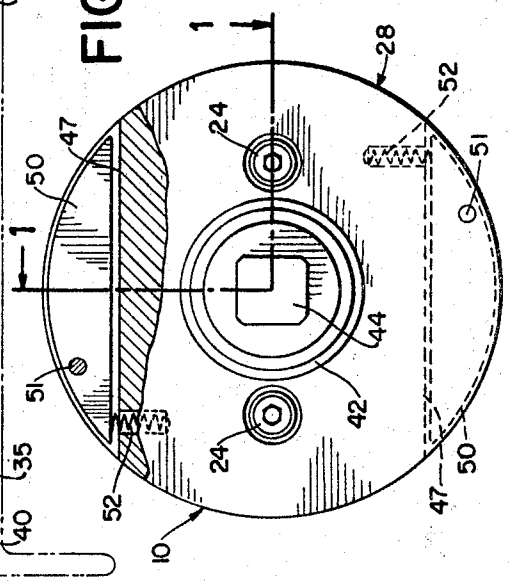


FIG. 2

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EXPANDING ARBOR FOR WIRE SPOOLING MACHINE

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ABSTRACT OF THE DISCLOSURE

An expending arbor having an arbor body with expansion rings on the arbor and a cylindrical sleeve with slotted ends between the rings. The rings and sleeve have mating beveled camming surfaces thereon, and the arbor is provided with a cap means at one end thereof to exert an axial force on the rings and sleeve, whereby the rings are cammed bodily outwardly from the arbor against the bore of a spool placed thereon and the slotted sleeve ends are moved inwardly against the arbor body.

The present invention relates to wire or other spooling mechanisms and especially to arbors for mounting spools or reels on such mechanism to be driven by the arbor for coiling of wire thereon.

In the past many arrangements of arbors have been utilized to drive spools or reels for coiling wire but these mechanisms have had numerous disadvantages such as great weight, loose parts, lack of concentricity of arbor and spool, inconvenient mounting and dismounting of the spool on the arbor due to lack of smoothness of the arbor surface, necessity for the spools to be accurately sized in order for the arbor to accept these spools, many loose parts subject to loss or misplacement, etc. The present invention provides a spool or reel arbor which minimizes and in many instances eliminates the disadvantages mentioned above and in addition reduces the cost of such arbors.

It is an object of the invention to provide a wire spooling arbor which is light in weight.

It is another object of the invention to provide an arbor of the type mentioned which has no loose parts and which therefore is always in operative condition.

It is still another object of the invention to provide a wire spooling arbor which is capable of accepting spools or reels having considerable variation in bore dimension.

It is a further object of the invention to provide such an arbor which has a smooth cylindrical surface to thereby permit convenient loading of spools or reels thereon.

It is a still further object of the invention to provide an arbor on which spools or reels may be mounted with assurance that the spools will be concentric with the arbor shaft thus eliminating vibration due to eccentricity and consequent wear on the spooling mechanism.

Other objects and features of the invention will become apparent when the following description is considered in connection with the appended drawings, in which;

FIGURE 1 is a cross section view taken on the planes of the lines indicated at 1—1 of FIGURE 2 showing a preferred form of the arbor of my invention;

FIGURE 2 is an end elevational view of the arbor of FIGURE 1 broken away to show details of a safety locking mechanism, and;

FIGURE 3 is a fragmentary longitudinal vertical cross sectional view showing the arbor sleeve and rings in operated position.

Referring now to the drawings and particularly to FIGURE 1 thereof, there is shown at 10 the arbor of this invention which in the conventional manner comprises the arbor body 11 formed integral with a drive shaft 12 which is mounted in a bearing 13 supported in a housing member 14.

In the usual manner the arbor body 11 and housing 14 are supplied with cooperating oil seals and splash guards to permit proper lubrication of the bearing while preventing oil from reaching the surface of the arbor 11, the oil seal and splash guard members being indicated at 15, 16 and 17, member 17 being keyed to arbor body 11.

Arbor body 11 is hollow for a substantial portion of its length as indicated by the reference 18 to thus reduce the weight and has fixed thereto at its left end as seen in FIGURE 1 a plate 20 which plate is provided with a circumferential shoulder 21 and thus when positioned in the end of arbor body 11 and fixed thereto by means of screws 22 serves to provide a rigid structure.

Plate 20 is drilled and tapped at its center to receive a threaded member 23 which is hereinafter described. Plate 20 is also provided with a smaller threaded hole at each side of its center to receive the threaded members 24 which will be described later.

Mounted on the outer surface of arbor body 11 in order from right to left are a split ring 25, sleeve 26, split ring 27 and cap 28.

As is readily apparent, the split ring 25 is bevelled at both edges at an angle which is preferably 45°. At its right-hand edge the ring seats against a cooperating bevel 30 formed on arbor body 11.

Sleeve 26 is formed with a central portion 31 of greater inner diameter than the end portions 32 and 33 which end portions are bevelled at equal angles as indicated at 34 and 35, the bevelled edges 34 and 35 facing outwardly. Sleeve 26 is also provided with longitudinally extending saw cuts 36 and 37, those designated 36 extending longitudinally inward from the right-hand end of the sleeve and those designated 37 extending inwardly from the left-hand end of the sleeve. These saw cuts serve in the usual manner to permit the ends of the sleeve to be contracted; it is to be noted that the saw cuts 36 are circumferentially staggered with respect to cuts 37 and extend considerably less than half the length of the sleeve to assure that the sleeve not be unduly weakened.

Cap 28 comprises disc 38 and the cylindrical flange 40, which flange has an inner diameter slightly greater than the outer diameter of arbor body 11 and an outer diameter equal to that of sleeve 26 and unexpanded rings 25 and 27.

Disc portion 38 of cap 28 is provided with a central aperture 41 in which a bushing 42 is positioned and held in place by screws 43 in the flange thereof. Mounted for rotation in bushing 42 is the threaded member 23 which is provided with a head 44 adapted to receive a crank member to provide for rapid adjustment. It should be noted that cap 28, rings 25 and 27 and sleeve are removed infrequently and only to lubricate the parts.

Also provided in disc 28 are two holes 45 through which freely extend the shouldered screws 24 which as hereinabove described thread into the plate 20. Extending between plate 20 and cap portion 38 are springs 46 which thus press the cap toward the left when screw 23 is loosened, thus releasing pressure on the split rings 25 and 27, permitting them to collapse so that a spool can be installed or removed.

Screws 24 not only serve as retainers for springs 46 but also by means of their heads retain the cap in position on the arbor body and prevent loss thereof while permitting sufficient movement to cause a reel to be locked on the arbor 10.

End cap 28 is also provided with a pair of sector slots 47 (see FIGS. 1 and 3) in each of which is pivoted a latch 50 by means of the respective pivot pin 51. A hole

is provided adjacent one end of each slot **50** and a spring **52** placed therein bears against the lower surface of the corresponding latch **50** to urge it to position in the slot. Since the latches are pivoted off center it will be obvious that when the arbor is rotated at normal speeds the latches fly out and prevent a spool mounted on the arbor from sliding therefrom, this being a safety measure only and unnecessary when the assembly has been properly tightened.

As will be obvious from the above, a reel may be mounted on the arbor and removed therefrom in a very simple and easy manner. The cap **28** having been moved to the left by loosening screw **23**, the parts are released and rings **25** and **27**, sleeve **26**, and cap **28** form an uninterrupted and smooth cylindrical surface.

A reel or spool such as indicated in dot-dash lines at **60** is slid over the arbor until its right-hand flange seats against member **17** and the screw **23** then tightened.

As the screw **23** is tightened cap **28** moves to the right and as soon as all lateral clearances are closed the pressure first expands ring **25** and then expands ring **27**. Simultaneously the ends **32** and **33** of sleeve **26** are collapsed against the outer circumference of the arbor body **11**.

When the cap is firmly in place there are no loose parts and all parts are concentric with the center line of the arbor and arbor shaft.

It is to be noted that the ring **25** has a double bevel or chamfer. This is an important feature of my invention since it provides for expansion of ring **25** when the lateral pressure is approximately half that required to expand ring **27**. As a result ring **25** will always expand first and locate that end of the reel or spool concentrically to the shaft center line, followed by expansion of ring **27** and the positioning thereof, and of the left half of the reel concentric to the center line.

The final condition described above is illustrated in FIGUURE 3 wherein the parts are shown enlarged. It is clear from this figure that rings **25** and **27** bear against the inner circumference of the reel near its end while at the same time the inner faces of ends **32** and **33** of sleeve **26** bear against and lock to the outer circumference of arbor body **11**.

The latches **50** assure that even should there be a failure of the locking action caused for example by insufficient tightening of the assembly, the reel cannot slip off the arbor while operating at spooling speeds since the safety latches **50** are then extended into the path of the reel flanges.

Moreover, when the pressure is removed from cap **28**, i.e., when screw **23** is loosened, the parts spring back into the position of FIGURE 1 due to the resilience of rings **25** and **27** and sleeve **26** and the entire arbor including also cap **28** provide a smooth cylindrical surface adapted to guide a reel or spool during loading or removal thereof.

While I have described a preferred embodiment of my invention and the details thereof, it will be understood that other embodiments are possible and that the detailed construction may be considerably varied. I wish therefore to be limited not by the foregoing description, but on the contrary, solely by the claims granted to me.

What is claimed is:

1. In an expanding arbor for wire spooling machines and the like, in combination, a cylindrical arbor body supported for rotation adjacent one end thereof, a shouldered on said body at said supported end, an expansion ring on said arbor body adjacent said shoulder, said ring having at least one camming surface thereon, a cylindrical sleeve mounted on said arbor body and extending axially over a major portion thereof, said sleeve having a circumferentially extending beveled camming surface at each end thereof and an inner diameter substantially greater than the diameter of the arbor body over a major portion of its length, the end portions of said sleeve having a diameter providing a sliding fit on said arbor body, said sleeve also having slots extending axially from each end thereof to provide for contraction of said sleeve ends and gripping of said arbor body, said camming surface near said supported arbor end mating with said camming surface of said expansion ring; a second expansion ring mounted on said arbor body at the opposite end of said sleeve, said second expansion ring having a camming surface mating with the adjacent camming surface of said sleeve; a cap mounted on the unsupported end of said arbor body, said cap having a circumferential flange bearing against said second expansion ring, said expansion rings, sleeve and cap having substantially equal external diameters when relaxed forming a smooth cylindrical surface adapted to receive the bore of a spool, and means for moving said cap axially to exert pressure against said rings and sleeve and thereby cam said rings bodily outwardly against the bore of a spool on said arbor and simultaneously cam the ends of said sleeve inwardly against the surface of said arbor body whereby said spool is firmly held to said arbor body with its axis concentric with that of said body.

2. An expadning arbor as claimed in claim **1**, wherein said shoulder on said arbor body is beveled and said first expansion ring has a beveled surface mating with said shoulder, and wherein said second expansion ring has a radially extending edge adjacent the end of said cap flange, whereby when said cap is moved axially to press against said ring and sleeve said first expansion ring expands at a rate greater than that of said second ring, thereby assuring concentricity of the spool relative to the arbor body.

3. An expansion arbor as claimed in claim **2**, wherein said beveled camming surfaces of said rings and said sleeve are at equal angles, and wherein said first expansion ring expands at a rate twice that of said second expansion ring.

4. An expansion arbor as claimed in claim **3**, wherein said angles are 45°.

5. In an expanding arbor for wire spooling machines and the like, in combination, a cylindrical arbor body supported for rotation adjacent one end thereof, a shoulder on said body at said supported end, an expansion ring on said arbor body adjacent said shoulder, said ring having at least one camming surface thereon, a cylindrical sleeve mounted on said arbor body and extending axially over a major portion thereof, said sleeve having a circumferentially extending beveled camming surface at each end thereof, said camming surface near said supported arbor end mating with said camming surface of said expansion ring; a second expansion ring mounted on said arbor body at the opposite end of said sleeve, said second expansion ring having a camming surface mating with the adjacent camming surface of said sleeve; a cap mounted on the unsupported end of said arbor body, said cap having a circumferential flange bearing against said second expansion ring, said expansion rings, sleeve and cap having substantially equal external diameters when relaxed forming a smooth cylindrical surface adapted to receive the bore of a spool, and means for moving said cap axially to exert pressure against said rings and sleeve and thereby cam said rings bodily outwardly against the bore of a spool on said arbor and simultaneously cam the ends of said sleeve inwardly against the surface of said arbor body whereby said spool is firmly held to said arbor body with its axis concentric with that of said body, said means for moving said cap axially comprising a plate fixed to the free end of the arbor body, a threaded aperature in said plate, a screw rotatably mounted in said cap and threaded into said aperautre, and spring means urging said cap axially away from said arbor body to cause said rings to contact and release a spool from said arbor.

6. An expansion arbor as claimed in claim 5 wherein said spring means comprises screws extending through bores in said cap and into threaded apertures in said plate, and coil springs on said screws bearing against said plate and said cap, said screws having heads limiting the axial movement of said cap away from said plate.

7. An expansible arbor as claimed in claim 6, wherein said cap is slotted along circle chords at opposite ends of a diameter thereof and a latch member is pivotally mounted in each said slot, said pivot points being adjacent one end of each latch member whereby said latches rotate about their pivots under centrifugal force and extend beyond the circumference of said cap to retain a spool on said arbor.

8. An expansible arbor as claimed in claim 7 wherein said latch members are spring-pressed to lie within the circumference of said cap member when said arbor is rotated at speeds below a predetermined speed.

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