May 30, 1961 D. E. FOOTE 2,986,357

COLLAPSIBLE JACK SPOOL

Filed Feb. 5, 1959

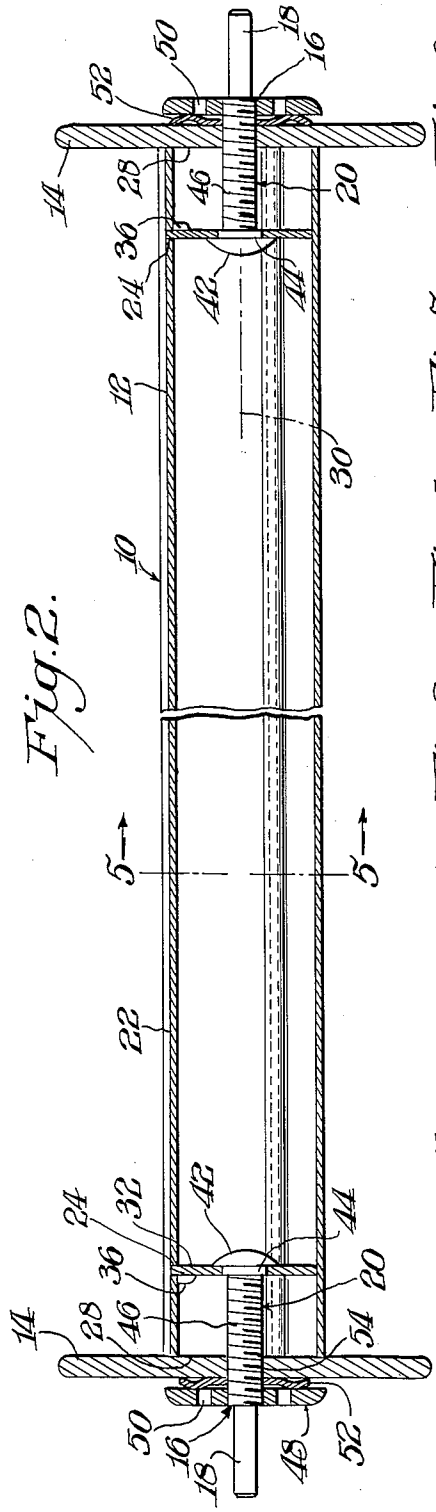


Fig. 2.

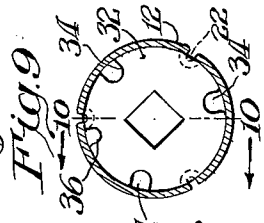


Fig. 9

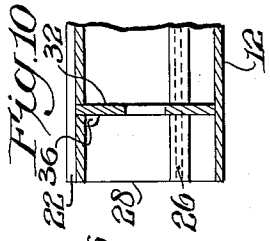


Fig. 10

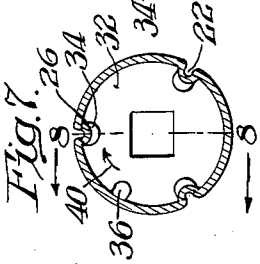


Fig. 7.

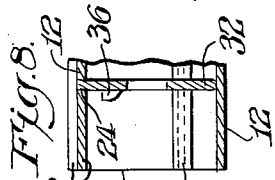


Fig. 8.



Fig. 4.

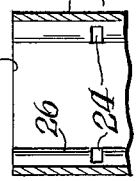


Fig. 6

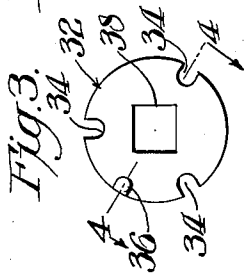


Fig. 3.

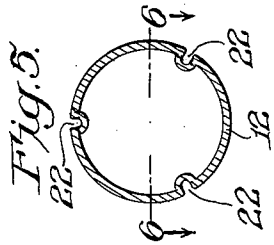


Fig. 5.

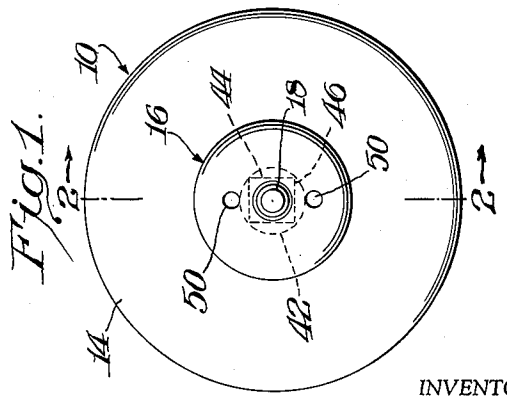


Fig. 1.

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COLLAPSIBLE JACK SPOOL

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4 Claims. (Cl. 242—118.6)

This invention relates to a collapsible jack spool for carrying a filament winding upon a barrel between a pair of flanges, and more particularly relates to such a spool which can be readily taken apart and reassembled to facilitate shipment when it is not being used for carrying a filament winding.

It is customary and convenient to ship and wind various filaments upon jack spools including hollow cylindrical barrels with flanges secured to their ends. Since these spools are appreciably costly it is customary to ship the empty spools back to the supplier for rewinding. However, the flanges which project a considerable distance radially outwardly from the barrels prevent assembling and packing these spools in a compact manner. It is, accordingly, desirable to disassemble the flanges or heads from the spools to minimize the cost of reshipment and the size of the shipping containers. However, the labor cost of disassembly must not be so great as to cancel the savings resulting from the reuse of the spool; and, furthermore, the structure of the spool itself must not be prohibitively complicated.

It is, therefore, an object of this invention to provide a simple and economical structure for a collapsible jack spool which facilitates its taking apart and reassembly for minimizing the size of shipping containers and the cost of spool shipment in the unwound condition.

In accordance with this invention the roots of longitudinal slash grooves, which are conventionally indented into the surface of the hollow tube forming the barrel of a jack spool, are internally grooved in a plane disposed perpendicular to the axis of the tube a short distance from each of its ends. Circular locking plates, which have a diameter smaller than the inside diameter of the tube and larger than that of a circle tangent to the root of the longitudinal indentations, are cut out around their periphery to form notches which are aligned with and receive these longitudinal indentations when these plates are inserted within the hollow tube. After these plates are aligned with the grooves, they are rotated to misalign their notches with the longitudinal indentations thereby temporarily locking the plates within the ends of the tube. Readily disengageable fastening means are anchored to these plates and react upon the flanges to draw them securely into contact with the ends of the tubes and permitting convenient disassembly for shipment when empty.

A projection may be provided adjacent the periphery of the locking plates between notches for indexing unidirectional rotation of the plate in a positively locked condition. Furthermore, the readily disengageable fastening means may be centrally aligned with the plate and flange and include a cylindrical extension or shaft which extends past the flanges to provide a convenient means for rotatably mounting the spool.

Novel features and advantages of the present invention will become apparent to one skilled in the art from a reading of the following description in conjunction with

the accompanying drawings wherein similar reference characters refer to similar parts and in which:

Fig. 1 is an end view of an assembled embodiment of this invention.

Fig. 2 is a cross-sectional view taken through the Fig. 1 along the line 2—2.

Fig. 3 is a view in elevation of a locking plate which is a portion of the embodiment shown in Figs. 1 and 2.

Fig. 4 is a cross-sectional view taken through Fig. 3 along the line 4—4.

Fig. 5 is a cross-sectional view taken through Fig. 2 along the line 5—5.

Fig. 6 is a cross-sectional view taken through Fig. 5 along the line 6—6.

Figs. 7 and 9 are cross-sectional end views of a tube portion of the embodiment shown in Figs. 1 and 2 with the locking plate portion inserted therein in successive phases of assembly; and

Figs. 8 and 10 are respectively cross-sectional views taken through Figs. 7 and 9 along the lines 8—8 and 10—10.

In Figs. 1 and 2 is shown an assembled jack spool 10 which is an embodiment of this invention. Jack spool 10 includes a barrel 12 formed as a hollow tube, for example, of aluminum tubing of suitable thickness. A pair of heads or flanges 14 are secured to the ends of tube 12 by readily disengageable fastening means 16, later described in detail. Heads or flanges 14 are, for example, formed of vulcanized fibre or aluminum. A pair of shafts or pins 18 extend axially from spool 10 to provide means for rotatably mounting it. These cylindrical extensions 18 are, for example, advantageously incorporated in bolts 20 which form a part of readily disengageable fastening means 16, as is later described in detail.

As shown in Figs. 2, 5 and 6 which illustrate a representative end portion of tube 12, the surface of tube 12 is longitudinally indented at a number of positions about its periphery, for example three in all at 120° intervals, to form longitudinal slash grooves 22. These slash grooves 22 are customarily formed within conventional jack spools to provide a convenient passageway for insertion of a knife for cutting the wound fibers off the spool where the would filaments become entangled. As also shown in Figs. 2 and 6, internal grooves 24 are cut through the roots 26 of slash grooves 22 in planes which are disposed a short distance from ends 28 of the tubes and perpendicular to the tube axis 30.

In Figs. 3 and 4 is shown a circular plate 32 whose diameter is smaller than the inside diameter of the hollow tube and larger than that of a circle tangent to the inside surfaces of the roots of the slash grooves. The periphery of plate 32 is cut out to form a series of notches 34 which are aligned to engage the roots 26 of slash grooves 22 when plate 32 is inserted within the end of hollow tube 12. Plate 32 also includes a projection 36 which may be advantageously used as an indexing means in a manner later described. Projection 36 is disposed between a pair of notches 34, for example, midway between them; and is, for example, formed by indenting a small portion of the periphery plate 32. Plate 32 also includes an anchor means 38, for example, formed by a non-circular cut-out such as a square hole for cooperating with the readily disengageable fastening means which is later described in detail.

Figs. 7–10 show the relative positions of plate 32 and the end of hollow tube 12 in various phases of assembly. In Figs. 7 and 8 plate 32 has been inserted a short distance into the end 28 of tube 12 into alignment with the plane of grooves 24 cut through the roots of slash grooves 22 as shown in Fig. 7. Notches 34 are aligned with roots 26 of slash grooves 22 thereby permitting plate 32 to readily slide through end 28 of tube 12 into alignment

with groove 24. In the position shown in Figs. 7 and 8, projection 36 lies between roots 26 avoiding interference therewith.

Figs. 9 and 10 show the relative positions of plate 32 and the end of hollow tube 12 after plate 32 is rotated, for example, in the direction of arrow 40 until projection 36 strikes root 26 of the first slash groove 22 in its path. This indexes plate 32 in a condition where notches 34 are maintained misaligned, to the maximum degree from grooves 24 in roots 26 to anchor locking plate 32 a short distance from the end of tube 12 behind slash grooves 26.

Referring to Figs. 1 and 2 which represent the assembled jack spool 10, it is apparent that plates 32 are temporarily locked a short distance from the ends of tube 12 by orientation in the phase shown in Figs. 9 and 10. Adequate locking is provided even when plates 34 are not rotated enough to bring projection 36 into contact with a root 26 of a slash groove 22, but it is apparent that positive indexing without question is achieved by the arrangement and orientation shown in Figs. 9 and 10. After this orientation is achieved, a portion 42 of readily disengageable fastening means 16 which is, for example, the head 42 of bolt 20 is maintained anchored in position for locking flange 14 to end 28 of the tube. Bolt 20 is anchored to plate 32, for example, by insertion of its square shoulder 44 up to head 42 within corresponding hole 38 in plate 32 before insertion of plate 32 within tube 12. Bolt 20 accordingly provides a convenient means for inserting and rotating plate 32.

Bolt 20 includes a flange-securing portion 46 which is, for example, threaded to engage a lock nut 48 which fastens flange 14 to end 28 of tube 12. Locknut 48 is, for example, made of steel and includes spanner holes 50 for receiving the lugs of a spanner wrench for fastening locknut 48. Lockwasher 52 is, for example, inserted between locknut 48 and flange 14 to prevent locknut 48 from shaking loose. Threaded portion 46 of bolt 42 extends through a hole 54 located, for example, in the center of flange 14; and bolt 42 extends, for example, externally through locknut 48 in the form of cylindrical shaft or pin 18 to provide a means for rotatably mounting spool 10. Holes 38 and 54, respectively in plate 32 and flange 14, are centrally located to orient bolt 42 and shaft 18 along the axis of rotation 30 of spool 10.

Spools 10 are wound with filaments and shipped to the user in the form shown in Figs. 1 and 2. After the filaments (not shown) are unwound or stripped from spool 10, it is a simple matter to remove flanges or heads 14 from the ends of tube 12 by removal of locknuts 48 and lockwashers 52. After heads 14 are removed, rotation of plates 32 to align notches 34 with roots 26 of slash grooves 22, as shown in Fig. 7, permits simple withdrawal of plates 32 and bolts 42 through ends 28 of tube 12. Tubes 12, flanges or heads 14, plates 32, and the rest of the hardware including bolts 20, locknuts 48 and lockwashers 52 are then separately packed in a highly compact arrangement, and then shipped back to the filament supplier for reassembly and rewinding. Reassembly is easily performed in the manner previously described in detail in conjunction with the description of Figs. 7–10; and spool 10 is accordingly easily placed into condition for reuse with very little trouble or expense.

What is claimed is:

1. A collapsilble jack spool for carrying wound filaments comprising a hollow tube, the wall of said tube being longitudinally indented to form slash grooves having roots which protrude within said tube, a pair of substantially circular locking plates having a diameter smaller than the unindented inside diameter of said hollow tube and larger than that of a circle tangent to inside surfaces of said roots of said longitudinal indentations, internal grooves cut through said roots of said slash grooves in planes disposed a short distance from both of the ends of said tube and perpendicular to the axis of said tube, the periphery of said plates being cut out to form notches which are aligned with said longitudinal indentations when said plates are inserted within said hollow tube, one of said plates being inserted within each end of said hollow tube in line with each of said internal grooves and being rotated to misalign said notches with said longitudinal indentations for temporarily locking said plates within both ends of said tube, a pair of flanges arranged at both ends of said tube, and readily disengageable fastening means connected to said plates and reacting upon said flanges to draw them securely into contact with the ends of said tube for binding said flanges to said spool and permitting convenient disassembly for shipment without said wound filaments.

2. A collapsible jack spool as set forth in claim 1 wherein a projection extends out of the plane of said plates between said notches to provide a stop which contacts one of said longitudinal indentations when said plate is rotated within said internal grooves in the roots of said slash grooves to prevent said notches from rotating into alignment with a set of longitudinal indentations when they are rotated in one direction.

3. A collapsible jack spool as set forth in claim 2 wherein said projection is formed by an indentation in the peripheral portion of said plates substantially midway between a pair of said notches.

4. A collapsible jack spool as set forth in claim 1 wherein said readily disengageable means includes a noncircular hole in each of said plates, a pair of bolts each having a head which locks in a respective one of said holes, said bolts each including a cylindrical extension, said flanges and said plates being centrally cut out to permit said bolts to pass through them in line with the longitudinal axis of rotation of said tube, and said cylindrical extensions projecting a sufficient distance past said flanges to provide means for rotatably mounting said spool.

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