Jan. 1, 1957 F. J. BAUMANN ET AL 2,776,098

TUBE HOLDING ASSEMBLY

Filed July 3, 1953

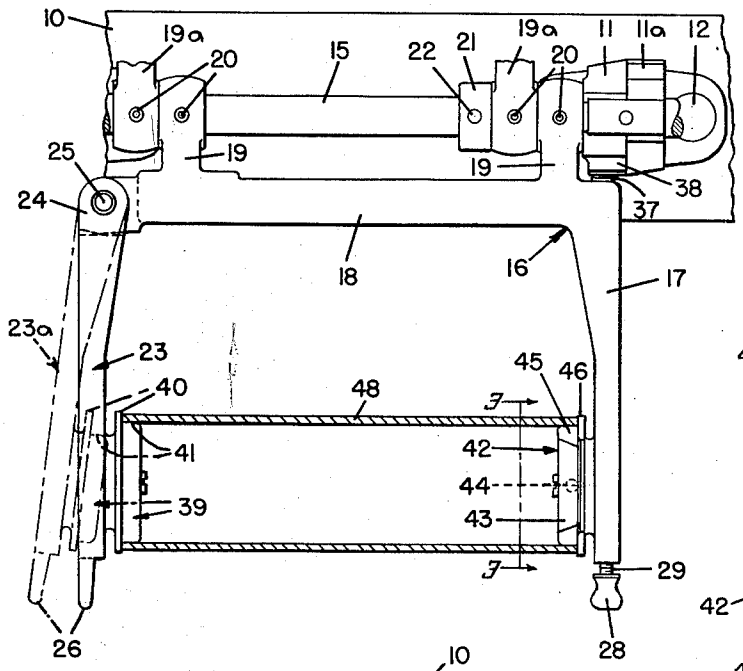


FIG. 1

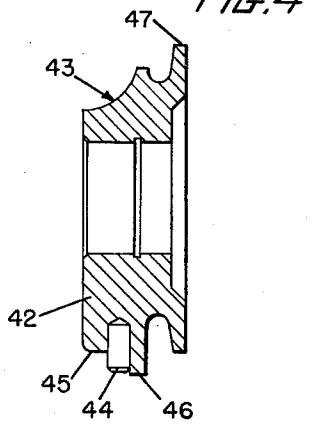


FIG. 4

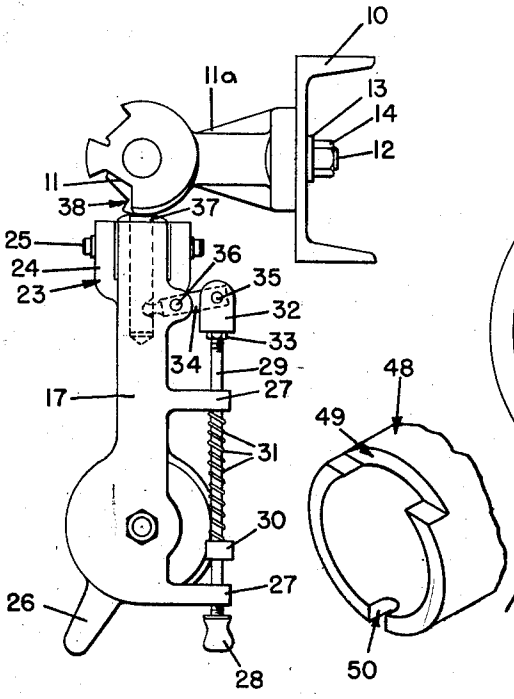


FIG. 2

FIG. 5

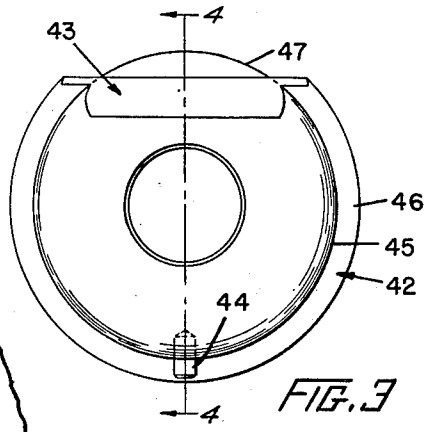


FIG. 3

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United States Patent Office 2,776,098 Patented Jan. 1, 1957

2,776,098

TUBE HOLDING ASSEMBLY

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Application July 3, 1953, Serial No. 365,922

5 Claims. (Cl. 242—130)

This invention relates to assemblies for winding twisted or untwisted thread or yarn on headless or flangeless spools, or tubes.

The winding of thread or yarn upon flangeless spools, or cylindrical tubes, into flangeless or headless packages, sometimes characterized as "cheeses" has certain advantages inherent over bobbin or spool supported packages. An advantage is significant economy in the cost of the tube on which the thread is wound over that required when the thread or yarn is wound on a flanged spool or bobbin for further processing or for handling. Tubes can be simply made of paper, cardboard, or other relatively inexpensive materials, whereas flanged spools are ordinarily made of a greater amount of material such as metal, wood, plastic, and the like, and usually more care is required in their manufacture. Further, spools, especially shippable packages, are subject to considerable damage during handling, which necessitates frequent and oftentimes costly maintenance.

The use of headless packages offers other advantages such as the greater ease with which they may be unwound during creeling, or other operations, due to the lower and more uniform unwinding tension developed in unwinding over the end of a headless package instead of a spool. Creels with headless package supplies have been known to be operated with substantially less number of stops resulting from thread breaks than creels filled with spool packages due to the lower unwinding tensions developed.

The thread winding, flangelesss pool supporting assembly of the present invention provides for an improved flangeless tube supporting and positioning device in an arborless tube holding assembly which cooperates with a particular type of tube to facilitate production of a readily accessible transfer tail on the tube end. Further, the tube is held in rigid support during winding so as to prevent damage to or destruction of the transfer tail until the headless package is doffed. The tube holding assembly of the present invention generally is adapted for machines having a friction roller to rotatably drive a tube mounted in the assembly. A suitable reciprocating guide is located on the machine to distribute the thread or yarn over the tube during winding. Such machines are well-known and commonly employed in the art.

In accordance with the present invention, a circular tube supporting and positioning hub element of the arborless tube holding assembly has a portion of its periphery cut away to leave, preferably, a substantially flat, secantal peripheral surface. There is further provided a flange, or tube abutting shoulder, about the circular periphery of the hub. A protuberance, preferably nipple-shaped, advantageously projects from the circular peripheral portion of the hub generally opposite the cutaway portion.

A flangeless spool, or tube, having a chord-like indenture and a slot on one end conforming respectively to the cutaway portion, and to the nipple, is adapted to be engaged at one end on its inner surface by the circular periphery of the hub which is inserted in the tube end

up to the flange. The tube supporting and positioning element is disposed to rest with the cutaway portion uppermost, due to gravity, so that a tube may easily be placed in the assembly. With the tube supported in this position, a transfer tail may be wound across the tube indenture over the cutaway portion of the hub.

Other advantages and features of the invention are apparent in the following description and the drawing, which is merely illustrative, wherein:

Figure 1 is a plan view of the winding assembly including a tube;

Figure 2 is a right side view of the assembly;

Figure 3 is a front view of the tube supporting and positioning hub element of this invention taken along 3—3 in Figure 1;

Figure 4 is a sectional view of the tube supporting hub element taken along 4—4 in Figure 3; and

Figure 5 is a perspective view of the end of the headless package tube conforming to the tube supporting and positioning hub element.

Referring first to Figures 1 and 2 of the drawing, a horizontal support rail **10** is part of a winding machine upon which the tube holding assembly is mounted. A bracket shaft supporting stand **11** is secured to the rail **10** by means of a bolt, washer and nut (not shown) through its base but identical to the bolt **12**, washer **13**, and nut **14** securing the adjacent bracket stand **11***a* which assists in supporting a shaft for an adjacent tube holding assembly (not shown). The bracket stands **11** and **11***a* are identical, being mounted on the rail in back-to-back relationship. A bracket shaft **15** is supported between spaced bracket stands mounted on the rail **10**, and each tube holding assembly is mounted on such a pair of bracket stands. The mate to bracket stand **11** supporting the other end of the shaft **15** also is not shown but it is positioned in the same manner as bracket stand **11***a* on the rail **10**.

The tube holder bracket is an L-shaped member, generally indicated by reference numeral **16**, having an integral extending leg **17** from the trunk portion **18**. A pair of integral bearing extensions **19** extend from the trunk **18** of the bracket. The shaft **15** is journaled in bearings centrally located at the extremities of the integral bearing extensions **19** so that the bracket is pivotally mounted on the shaft. Oil holes **20** are provided for a lubricant which may be applied to the bearing surface. Integral bearing extensions **19***a* are shown from another tube holder bracket mounted on the opposite side of the winding machine. The collar **21** is held securely on the shaft **15** by the set screw **22** so as to laterally position the tube holding assemblies by maintaining the bearing extensions **19** and **19***a* firmly in place against the bracket stand **11**.

At one extremity of the trunk of the bracket **16** there is mounted a pivot arm, indicated generally by **23**, having an enlarged bifurcated end portion which forms the ears **24**. The pivot arm **23** is secured to the trunk of the bracket by means of the hinge pin **25** which is journaled through bifurcated ears **24** and the extremity of the trunk **18**. The extremity **26** of the pivot arm **23** is formed to a handle portion which is useful in elevating the tube holding assembly from the winding machine about the shaft **15**. The pivot arm **23** is normally maintained in position by a suitable spring (not shown) so as to extend at a right angle from the trunk **18** in the same direction as the extending leg **17** of the bracket **16**. The pivot arm may be moved about its hinge pin **25** to assume the position shown generally at **23***a*. In this position a tube may be placed in or removed from the assembly, after which the pivot arm **23** is returned to its normal position by action of the spring.

On the underside of the extending leg **17** (Figure 2)

of the bracket 16 there is an elevation stop mechanism by which the assembly may be locked in an elevated position above the winding machine. The mechanism consists essentially of the push rod 29 which is linked to the stop bar 37 so as to release it from engagement in the stop notch 38 of bracket stand 11 whenever the push bar is actuated. This is accomplished by depressing the push rod 29 by means of knob 28 which moves the stop bar lever 34 and this in turn pulls back the stop bar 37 to which the lever is linked. The lever 34 attached to the arm 17 moves about the pin 36 and it is secured to the push rod 29 by the joint pin 35 on the push rod joint 32. The nut 33 on the threaded end portion of the push rod 29 holds the rod securely to the joint 32. A compression spring 31 is coiled about the push rod 29 between an integral extension 27 of the extending leg 17, through which the push rod is journaled, and the collar 30 on the push rod. The spring 31 functions to maintain the elevation stop mechanism out of a depressed position.

Mounted freely rotatable, with a common axis, on the pivot arm 23 and the opposing extending leg 17 of the bracket 16 are tube supporting and positioning elements which are inserted in both ends of a tube 48. A circular hub element 39, which has a flange 40 and a rounded inserting end, is mounted on the pivot arm 23. The hub element 39 engages one end of the tube 48 through its tube engaging surface 41. Element 39 is inserted in the tube end with the flange 40 abutting the tube.

Mounted on the extension leg 17 is the tube supporting and positioning hub element 42, shown in detail in Figures 3 and 4. The hub element 42 is a circular member, having a portion of its periphery cut away. Preferably, the cut away section leaves a substantially flat, secantal peripheral surface 43 which extends for approximately one quadrant of the otherwise cylindrical periphery. The secantal peripheral surface may be flat with respect to the axis, or, as illustrated, substantially flat with the cut-away having an arcuate or otherwise shaped cross-section. The inserting end of the hub 42 is rounded along its circular peripheral portion and a protuberance, or nipple 44 projects from the circular periphery. The nipple 44 may be made integral with the element or may, as shown, consist of a pin which fits into a hole bored in the circular periphery. A flange 46 extends about the circular periphery of the hub 42. If desired, the nipple 44 may project from the face of flange portion of the hub and the flange, in addition, may completely encircle the hub without being cut away adjacent to the secantal peripheral surface 43.

The hub 42 is inserted in the end of the tube 48 (illustrated in Figure 5) and engages the inner surface of the tube about its circular peripheral portion upon the tube engaging surface 45. Advantageously the tube engaging surfaces 41, 45 are relatively narrow, rounded off rim portions of the tube supporting and positioning elements which are parallel to the axis of rotation of the elements.

A tube 48 is positioned in the assembly with the tube supporting elements 39, 42 inserted in the tube ends to abut the flanges. As shown in Figure 5, one end of the tube which is supported by the hub 42, has a chord-like indenture 49 and a slot 50 angularly displaced from the indenture. The indenture 49 is cut out to conform to the cut-away peripheral portion of the hub 42 with the depth of the indenture and of the slot at least equivalent to the width of the tube engaging surface 45 of the hub 42. The indenture 49 fits over the cut-away portion of the hub 42 so as to expose the secantal peripheral surface 43 while the slot fits about, and accepts, the nipple 44. Both the nipple 44 and the slot 50 are positioned at the same angular displacement, about 180°, from the centers of the cut-away secantal peripheral portion 43 and the chord-like indenture 49 respectively. If desired, a very tight fitting tube may be employed and the nipple 44 and slot 50 omitted. It is highly advantageous, however, to employ the nipple on hub 42 to more positively position the tube in slip-proof support and to additionally counterweight the hub.

The tube supporting elements 39, 42 preferably have a flanged base such as base 47 illustrated on the hub element 42, which fits into recessed mounting wells (not shown) on the support and is spaced from the flange or shoulder portion of the element. This construction is useful to minimize the possibility of catching or nipping in a bearing any thread which may fall over the end of the package during winding. It is desirable to mount the tube supporting elements on ball bearing assemblies.

In operation, the pivot arm 23 is moved sufficiently to the left to allow the tube 48 to be placed in the assembly. The indentured and slotted end of the tube is readily fitted over the tube supporting and positioning element 42 up to the flange 46 with indenture 49 over the cut-away peripheral portion of the hub 42 and the slot 50 about the nipple 44. Since the hub 42 is naturally gravity positioned to always rest with the secantal peripheral surface 43 uppermost, the tube is easily placed on the element in the desired position. The arm is then released and the tube supporting element 39 is inserted in the plain end of the tube to the flange 40. The rounded inserting ends of the tube supporting elements ease the operation of inserting and removing the tube from the tube holder assembly, although the elements will function with unrounded inserting ends. The entire assembly is then lowered upon a friction roller by release of the elevation stop mechanism whereon the tube 48 commences rotation. Thread or yarn is attached to the tube and distributed over its length by a reciprocating guide. After a few turns the thread is removed from the guide by an operator and held at the extreme right side of the mounted tube beyond the intended edge of the yarn package so as to build the transfer tail around the tube across the indenture 49 and over the secantal peripheral surface 43 of the hub 42. Within a few revolutions the transfer tail is completed and the thread is returned to the guide to build the yarn package on the tube. The nipple 44 retains the tube rigidly in position so that it cannot slip or twist and thereby damage or destroy the transfer tail. When a package of desired size is reached, the pivot arm 23 is opened to remove the yarn package on the tube from the holder and a fresh tube may be inserted upon which the operation is repeated.

Obviously, if desired, both of the tube supporting and positioning elements may be hubs with cut-away peripheral portions and with the tube indentured and slotted at each end to conform to the hubs. Or, when a plain tube supporting element is used in the assembly as shown, it may be mounted on the bracket and the hub element with the cut-away peripheral portion alternatively mounted on the pivotable arm.

As is apparent, the present invention provides for a lightweight tube holding assembly which is easily operated. Tubes are readily and positively positioned in the assembly in proper arrangement for building a transfer tail as desired on the tube end. The transfer tail so produced is easily accessible on the tube and remains stably in place during handling of the package. As mentioned, the positive, slip-proof support of the tube 34 minimizes the possibility of damaging or destroying the transfer tail during winding.

Since changes and modifications can be made without departing from the spirit or scope of the invention, the foregoing is to be interpreted as illustrative only and in no sense limiting.

What is claimed is:

1. In a tube holding assembly adapted to rotatably support a tube by both ends, the combination of a tube and supporting and positioning elements inserted in the ends of said tube, at least one of said elements comprising a circular hub having a portion of its periphery cut away; the circular periphery of said hub engaging the

inner surface of said tube; a flange on said hub adapted to abut said tube; a nipple on said hub; said tube having a chord-like indenture and a slot at its end, said indenture conforming to the cut-away peripheral portion of said hub and said slot to said nipple on said hub.

2. In a tube holding assembly adapted to rotatably support a tube by both ends, the combination of a tube and supporting and positioning elements inserted in the ends of said tube, at least one of said elements comprising a circular hub having a portion of its periphery cut away; the circular periphery of said hub being rounded along its inserting end; said circular periphery engaging the inner surface of said tube; a flange on said hub adapted to abut said tube; a nipple on said hub displaced at an angle of about 180° from the center of said cut-away peripheral portion of said hub; said tube having a chord-like indenture and a slot at one end, said indenture conforming to the cut-away peripheral portion of said hub and said slot to said nipple on said hub.

3. A tube holding assembly for winding headless packages including a bracket; an arm pivotally mounted on said bracket; a tube rotatably supported at both ends between said bracket and said arm by tube supporting and positioning elements inserted in the ends of said tube which are mounted freely rotatable on said bracket and said arm; at least one of said elements comprising a circular hub having a portion of its periphery cut away and being preferably mounted on said bracket; the circular periphery of said hub engaging the inner surface of said tube; a flange on said hub adapted to abut said tube; a nipple on said hub; said tube having a chord-like indenture and a slot at its end supported by said hub, said indenture conforming to the cut-away peripheral portion of said hub; and said slot to said nipple on said inserted hub.

4. A tube holding assembly for winding headless packages mounted on a winding machine including a bracket hingedly secured to said winding machine, said bracket having an extending leg; an arm pivotally mounted on said bracket and yieldably movable relative thereto; a tube rotatably supported at both ends between said bracket and said arm by tube supporting and positioning elements inserted in the ends of said tube which are mounted freely rotatable on said leg and said arm; at least one of said elements comprising a circular hub having a portion of its periphery cut away and being

preferably mounted on said leg; the circular periphery of said hub being rounded along its inserting edge; said circular periphery engaging the inner surface of one end of said tube; a flange on said hub adapted to abut said tube; a nipple on said hub displaced at an angle of about 180° from the center of said cut-away peripheral portion of said hub; said tube having a chord-like indenture and a slot at its end supported by said hub; said indenture conforming to the cut-away peripheral portion of said hub, said slot accepting said projecting nipple of said inserted hub; and means on said winding machine to rotatably drive said tube positioned between said tube supporting elements.

5. A tube holding assembly for winding headless packages including a bracket; an arm pivotally mounted on said bracket; a tube rotatably supported at both ends between said bracket and said arm by tube supporting and positioning elements inserted in the ends of said tube which are mounted freely rotatable on said bracket and said arm; at least one of said elements comprising a cricular hub having a portion of its periphery cut away and being preferably mounted on said bracket; the circular periphery of said hub engaging the inner surface of said tube; the inserting end of said hub being rounded along its circular periphery; a flange on said hub adapted to abut said tube; a nipple on said hub displaced at an angle of about 180° from the center of the cut-away peripheral portion of said hub; said tube having a chord-like indenture and a slot at its end supported by said hub, said indenture conforming to the cut-away peripheral portion of said hub; and said slot to said nipple on said inserted hub.

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