Sept. 6, 1955 E. J. HEIZER 2,717,128

YARN PACKAGE TUBE HOLDER FOR WINDING MACHINES

Filed June 24, 1952 2 Sheets-Sheet 1

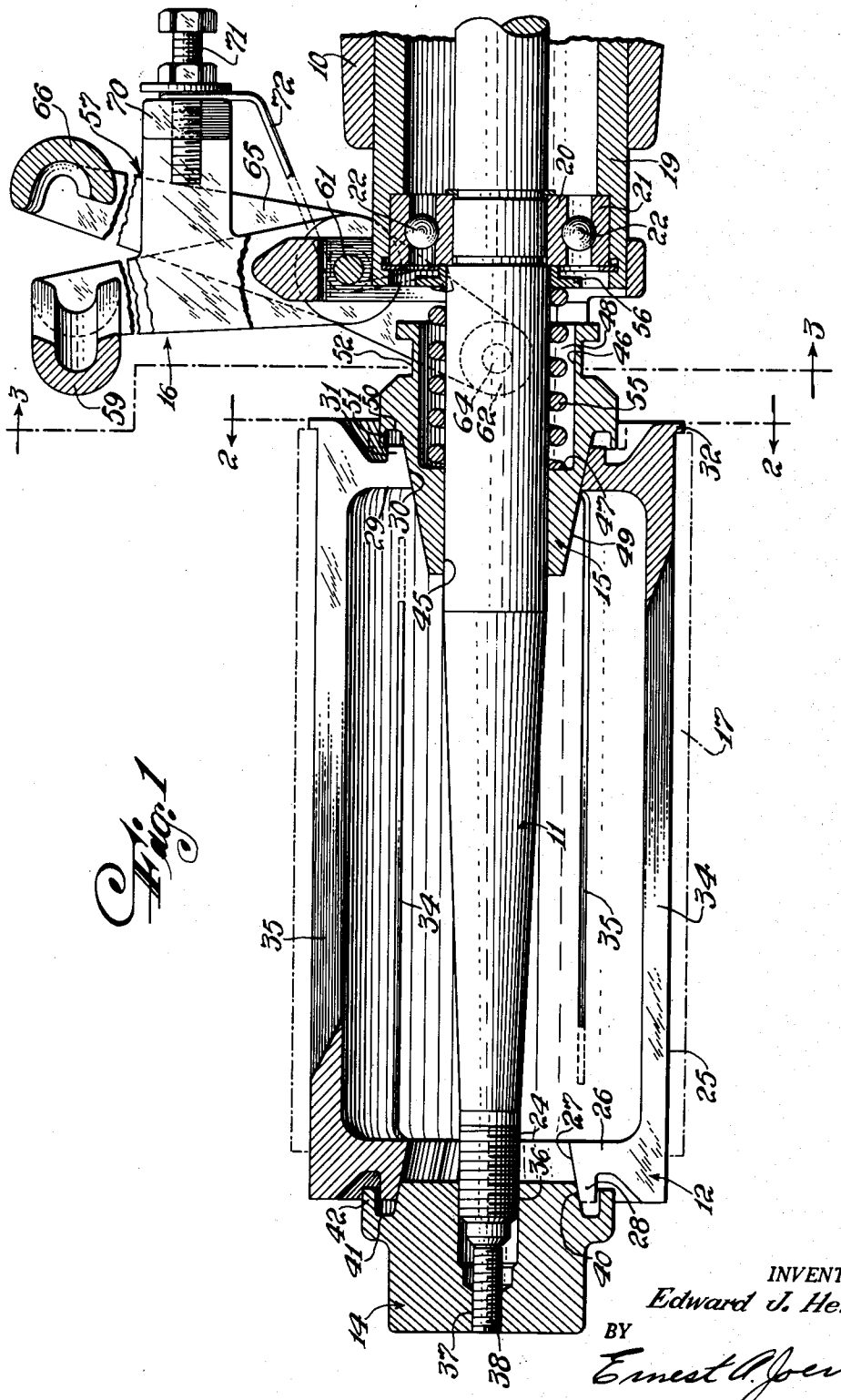


Fig. 1

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Filed June 24, 1952 2 Sheets-Sheet 2

Fig. 2

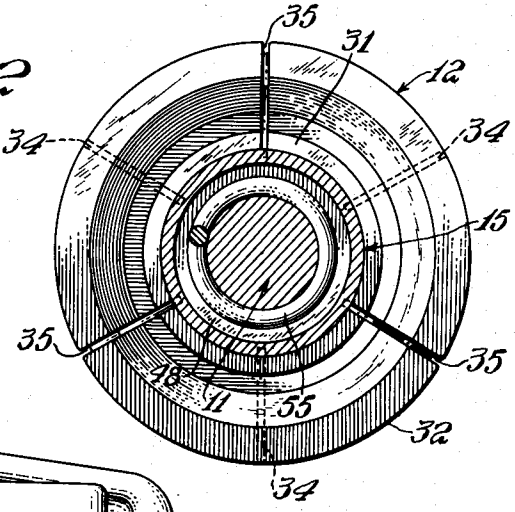
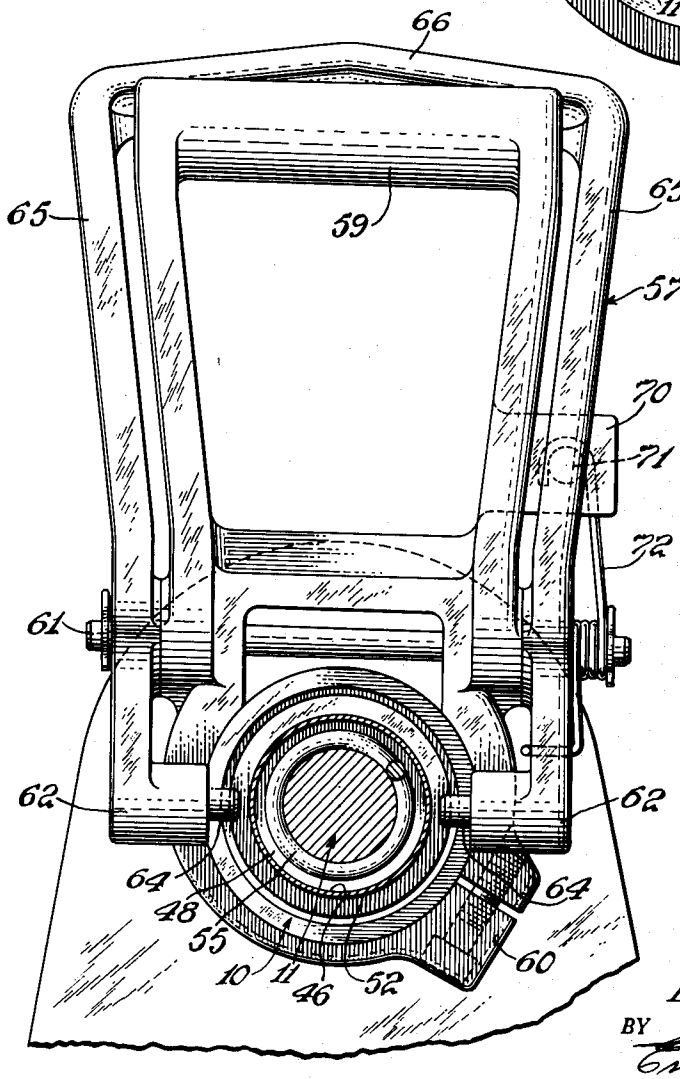


Fig. 3



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United States Patent Office 2,717,128
Patented Sept. 6, 1955

2,717,128

YARN PACKAGE TUBE HOLDER FOR WINDING MACHINES

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Application June 24, 1952, Serial No. 295,253

5 Claims. (Cl. 242—72)

The present invention relates to yarn package winding machines, and, more particularly, to an improved yarn package tube holder and operating mechanism therefor associated with the spindles of such machines.

Accordingly, an object of the present invention is to provide such a yarn package tube holder which is adapted for high speed winding operations.

Another object is to provide such a holder which arranges the package tube in accurate coaxial alignment with the spindle shaft.

Another object is to provide such a holder which securely holds the package tube thereon but is readily operated to release the tube.

Another object is to provide operating mechanism for such a holder which facilitates securement and release of the tube.

A further object is to provide apparatus of the foregoing character which is simple and economical in construction and is readily manufactured and assembled.

A still further object is to provide such apparatus which is both practical and reliable in operation.

Other and further objects of the invention will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

In accordance with the present invention, the foregoing objects are accomplished by providing apparatus of the character indicated herein which essentially comprises a spindle shaft, a yarn package tube holder on the spindle having an opening at each end thereof and having resilient sections adapted to be expanded, and means cooperating with the openings for coaxially arranging the holder on the spindle shaft for rotation therewith and serving to expand the holder sections to cause these sections to grip the package tube.

A preferred embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings, forming a part of the specification, wherein:

Fig. 1 is a sectional view of the spindle portion of a yarn winding machine, illustrating the yarn package tube holder and its operating mechanism in accordance with the present invention.

Fig. 2 is an end view of the tube holder as seen looking in the direction of the arrows 2—2 on Fig. 1.

Fig. 3 is a sectional view taken along the line 3—3 on Fig. 1.

Referring to the drawings in detail, there is shown the spindle portion of a yarn package winding machine, this portion essentially comprising the spindle section of the frame of the machine (of which only a tubular housing **10** is partially shown), a spindle shaft **11**, a yarn package tube holder **12**, a member **14** at the free end of the shaft and a member **15** on the shaft for supporting the tube holder at the ends thereof, and mechanism **16** for effecting movement of the member **15** to cause

the tube holder to engage and release a yarn package tube **17** depicted in broken lines.

The spindle shaft **11** is rotatably mounted in the housing **10** by conventional bearing structure of which there is shown a portion of a sleeve **19** carrying a bearing at its outer end comprising an inner race **20** secured about the shaft, an outer race **21** secured within the sleeve and ball bearings **22** between the races. The shaft extends outwardly of its support a sufficient distance to mount the tube holder **12** and tube holder supporting members **14** and **15** thereon, and has a threaded section **24** of reduced diameter at the free end thereof.

The tube holder **12** is a generally tubular or hollow member or shell having a cylindrical outer wall **25**, and end wall **26** at its outer end formed with an opening defined by a conical surface **27**, an annular section **28** surrounding the outer end of the opening, an end wall **29** at its inner end formed with an opening defined by a conical surface **30**, and an annular section **31** surrounding the outer end of the last mentioned opening. Suitable shoulder means **32** are provided on the wall **25** at the inner end thereof serving as an abutment for the inner end of the tube **17** to properly position the tube on the holder.

The holder has longitudinal slits therein of a length somewhat less than the overall length of the holder and at least half the length of the holder which slits extend from at least one end of the holder, at least two of such slits being provided and preferably three or four. In the preferred embodiment illustrated herein, three slits **34** extend from the outer end and three slits **35** extend from the inner end, the slits **34** and **35** being circumferentially spaced and alternately arranged (Figs. 1 and 2). The holder is formed of a material to so provide bendable or resilient wall sections adapted to be moved radially outwardly or expanded by the members **14** and **15**, and to contract, as will be described hereinafter, to respectively secure the tube on the holder and to release the same for removing.

While the holder is shown as being generally cylindrical, it will be appreciated that the same could be conical with the outer wall thereof converging from the inner end to the outer end to receive conical package tubes.

The member **14** is a nut-like element which has a threaded bore **36** at its inner end for receiving the shaft section **24** to removably attach the member on the shaft. This member also has a threaded bore **37** of smaller diameter than the bore **36** at its outer end for receiving a screw **38** which has its inner end in engagement with the free end of the shaft to lock the member **14** for rotation with the shaft. The inner end of the member **14** has a conical surface **40** for cooperation with the holder surface **27** to effect expansion of the resilient holder sections, and has an annular shoulder **41** adapted to engage the outer face of the annular section **28** of the holder to limit movement of the member **14** into the outer end opening of the holder. An annular flange **42** is provided on the shoulder which extends in overlapping relation about the annular section **28** to limit expansion of the outer resilient holder sections due to centrifugal force in event the spindle is operated without a package tube being positioned on the holder.

The member **15** is a collar-like element having a bore **45** at its outer end for slidably mounting the member on the shaft, and having an enlarged bore **46** at its other end providing a shoulder **47** and an annular spring receiving recess **48** about the shaft. The outer end of the member **15** has a conical surface **49** for cooperation with the holder surface **30** to effect expansion of the resilient holder sections, and has an annular shoulder **50** adjacent the surface **49** adapted to engage the inner face of the annular

section 31 of the holder to limit movement of the member 15 into the inner end opening of the holder. An annular flange 51 is provided on the shoulder which extends in overlapping relation about the annular section 31 to limit expansion of the inner resilient holder sections for the purpose aforementioned. The inner end of the member 15 is formed with an annular recess 52 at the exterior thereof, the function of which will be made apparent in the ensuing description.

The mechanism 16 for effecting movement of the member 15 essentially comprises a relatively strong cylindrical helical spring 55 positioned in the recess 48 and encircling the shaft 11 with the outer end engaging the shoulder 47 and with the inner end engaging a ring 56 urged against the inner bearing race 20, and a lever 57 pivotally mounted with respect to the spindle support or housing 10 for moving the member 15 in opposition to the spring 55.

As shown more particularly in Figs. 1 and 3, the mechanism in its preferred form includes a stationary handle 59 secured to the housing 10 by a clamping ring 60 or the like so that the handle in effect is part of the housing structure. The lever 57 is pivotally mounted on a horizontal shaft 61 supported by the handle, and has a pair of spaced apart lower arms 62 each carrying a pin or stud 64 facing the other and extending into the recess 52 in diametrically opposite relation to provide a connection permitting rotation of the member 15 with respect to the lever and movement of the member 15 by means of the lever. The lever further has a pair of upper arms 65 connected by a handle 66 closely adjacent to the handle 59 to facilitate grasping the handles in the palm of the hand and squeezing the same to rock the lever 57 in a counterclockwise direction as viewed in Fig. 1 and thereby withdraw the member 15 from its holder opening to allow the resilient holder sections to contract and release the package tube.

In order to prevent the pins 64 from contacting the rotating sides of the recess 52 and causing wear therebetween, the recess is of a width greater than the diameter of the pins and stop means are provided for normally maintaining the lever in a position whereby the pins are in the middle of the recess. Such stop means, as shown in the illustrative embodiment, may comprise a bracket 70 formed integral with the handle 59 at one side thereof or otherwise made part of the housing 10, and an adjustable screw or bolt 71 threaded through the bracket and positioned so that the free end thereof is engaged by one of the upper arms 65 of the lever and serves as a stop therefor. A spring 72 coiled about the shaft 61 has one end fixed to the bracket and has its other end engaging one of the lower arms 62 of the lever to urge the lever in a clockwise direction as viewed in Fig. 1 with the upper arm contacting the stop means.

In operation, with the elements arranged as shown in Fig. 1, the lever 57 is rocked by squeezing the handles 59 and 66 together thereby causing the pins 64 to engage the righthand side of the recess 52 to retract the member 15 sufficiently to allow the resilient holder sections at the inner side to contract. As this takes place, the surface 30 of the holder remains in frictional engagement with the surface 49 of the member 15, whereupon slight further retracting movement of the member 15 causes the holder to move from left to right a sufficient distance to back the holder surface 27 off the nut member surface 40 to allow the resilient holder sections at the outer end thereof to contract.

The tube 17 is then slipped over the holder while holding the handles together and is positioned so that its inner end abuts the shoulder means 32. The handles are thereafter released, whereby the spring 55 moves the member 15 outwardly to cause the conical surfaces 40 and 49 to act on the surfaces 27 and 30, respectively, and expand the resilient holder sections to firmly and securely grip the inner wall of the tube. The force exerted by the spring 55 on the member 15 and in turn by the holder on the member 14 and the rotatable inner bearing race through the ring 56 establishes a frictional driving connection between the surfaces 27 and 40 and 30 and 49 of the holder and members 14 and 15, respectively. Thus, when the spindle shaft is rotated, the tube is rotated by reason of this connection to facilitate winding yarn thereon.

After a yarn package has been provided by winding yarn on the tube, the package is removed by squeezing the handles together in the manner just described, whereby the holder releases the tube to enable the package to be removed.

From the foregoing description, it will be seen that the present invention provides an improved yarn package holder and operating mechanism therefor which is simple and economical in construction and practical and reliable in operation. While the holder is light in weight and adapted for high speed winding machines, it is sufficiently rugged in construction to withstand such rough usage to which it may normally be subjected.

As various changes may be made in the form, construction and arrangement of the parts herein, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matter herein is to be interpreted as illustrative and not in any limiting sense.

I claim:

1. In a yarn package winding machine, the combination of a spindle shaft having a free end, a support for the other end of said shaft, a stationary handle on said support adjacent said shaft, means for operating a yarn package tube holder including a member slidably mounted on said shaft, a spring for urging said member in a direction to operate the holder to secure a tube thereon, and manually operable means including a lever pivotally mounted on said support and connected at one end to said member for moving said member in a direction in opposition to said spring to operate the holder to release the tube thereon, said lever having a handle at the other end thereof closely adjacent said first handle to facilitate grasping said handles in the palm of the hand and squeezing the same together to operate said lever.

2. A yarn package winding machine according to claim 1, wherein stop means on said support are positioned to be engaged by the other end of said lever to limit the extent of movement of said lever, said stop means including a bracket secured to said support and formed with an aperture and including a bolt threadedly supported in said aperture for adjusting the position of said lever, and a spring mounted on said support having one end secured to said stop means and having the other end abutting said lever for urging said lever towards one end of said bolt.

3. In a yarn winding machine, the combination of spindle shaft having a free end, a support for the other end of said shaft, a stationary handle on said support adjacent said shaft, means for operating a yarn package tube holder including a first member secured to the free end of said shaft and a second member slidably mounted on said shaft and spaced from said first member, a spring for urging said second member in a direction towards said first member to operate the holder to secure a tube thereon, and manually operable means including a lever pivotally mounted on said support and connected at one end to said second member for moving said second member in a direction in opposition to said spring to operate the holder to release the tube thereon, said lever having a handle at the other end thereof closely adjacent said first handle to facilitate grasping said handles in the palm of the hand and squeezing the same together to operate said lever.

4. In a yarn winding machine, the combination of a spindle shaft having a free end, a support for the other end of said shaft including bearing means, a stationary handle on said support adjacent said shaft, means for operating a yarn package tube holder including a first mem-

ber secured to the free end of said shaft and a second member slidably mounted on said shaft and spaced from said first member, a spring having one end thereof limited against movement by said bearing means and having its other end positioned for urging said second member in a direction towards said first member to operate the holder to secure a tube thereon, and manually operable means including a lever pivotally mounted on said support and connected at one end to said second member for moving said second member in a direction in opposition to said spring to operate the holder to release the tube thereon, said lever having a handle at the other end thereof closely adjacent said first handle to facilitate grasping said handles in the palm of the hand and squeezing the same together to operate said lever.

5. In a yarn winding machine, the combination of a spindle shaft having a free end, a support for the other end of said shaft including bearing means, a ring on said shaft adjacent said bearing means, a stationary handle on said support adjacent said shaft, means for operating a yarn package tube holder including a first member secured to the free end of said shaft and a collar member having a bore at its outer end for slidably mounting the same on said shaft in spaced relation from said first member and having an annular external groove at its inner end and having an enlarged bore at its inner end formed with a shoulder, a cylindrical spring on said shaft and extending into said enlarged bore having one end thereof engaging said ring and having the other end thereof engaging said shoulder to thereby manually urge said collar member

in a direction towards said first member to operate the holder to secure a tube thereon, and manually operable means including a lever pivotally mounted on said support and formed with a pair of pins at one end extending into said groove of said collar member for moving said collar member in a direction in opposition to said spring to operate the holder to release the tube thereon, said lever having a handle at the other end thereof closely adjacent said first handle to facilitate grasping said handles in the palm of the hand and squeezing the same together to operate said lever.

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