Aug. 12, 1969 H. LAUMEN ET AL 3,460,227

APPARATUS FOR IMPLEMENTING PLACEMENT OF YARN PACKAGES ONTO ELASTIC HOLDING DEVICES

Filed Sept. 8, 1966 2 Sheets-Sheet 1

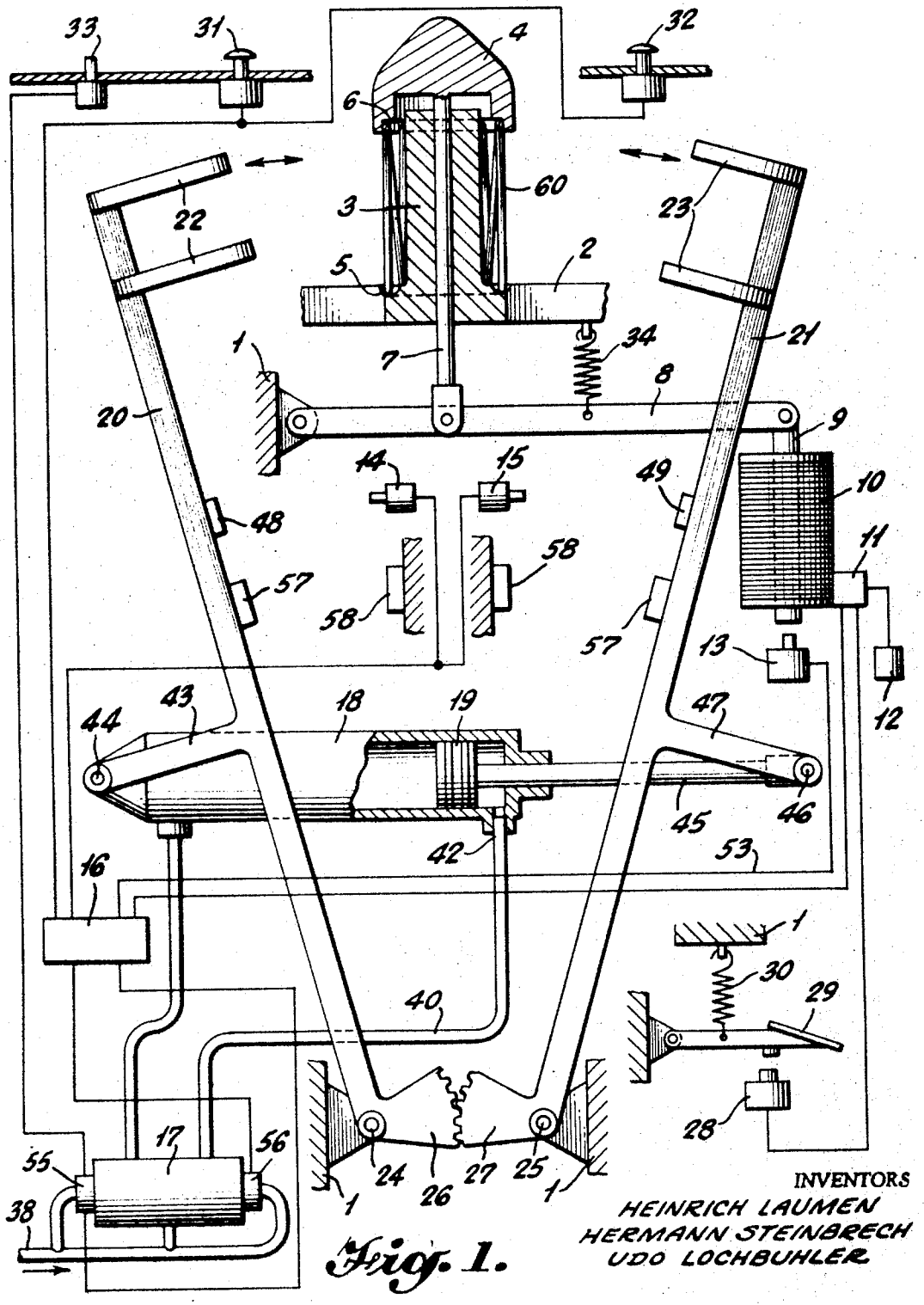


Fig. 1.

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Fig. 2.

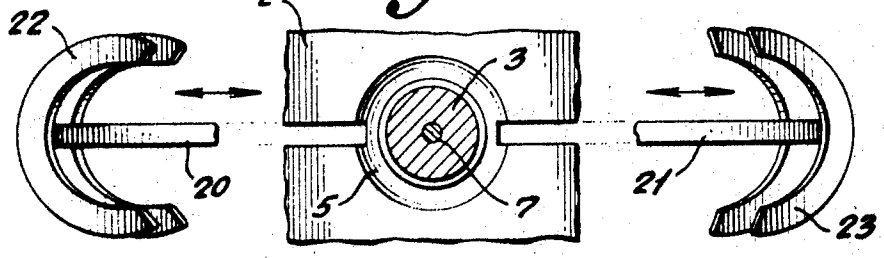


Fig. 4.

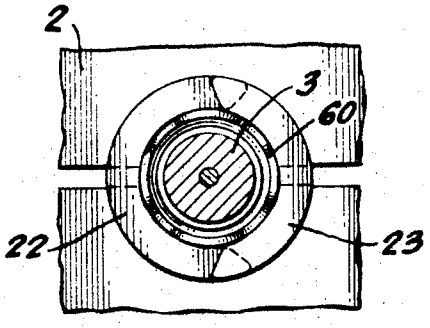
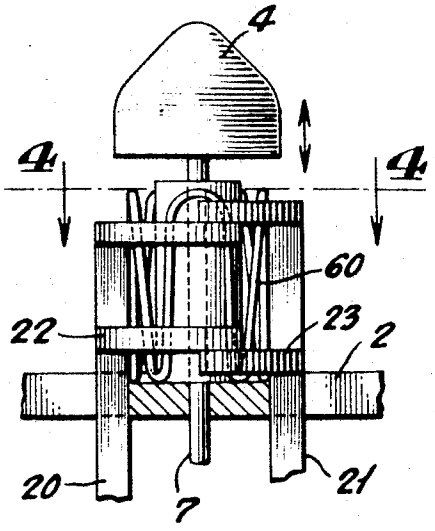


Fig. 3.



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APPARATUS FOR IMPLEMENTING PLACEMENT OF YARN PACKAGES ONTO ELASTIC HOLDING DEVICES

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U.S. Cl. 29—200 9 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for implementing placement of an elastic, radially compressible spool within the hollow portion of a warped yarn package having support means for positioning the spool in expanded condition, groove means on the support means, clamping means for radially compressing the spool and cap means operably associated with the support means for engaging the upper portion of the compressed spool and for inserting the lower portion of said spool into the groove means on said support. This apparatus includes control means for actuating the clamping and cap means in sequence whereby the spool is compressed, the cap and groove means retaining the compressed spool, the clamping means being movable out of engagement with the compressed spool to permit placement of a yarn package over the spool, said cap means being releasable from said spool to permit the spool to move out of the groove means and expand into wedging engagement with a yarn package placed over the compressed spool. Uniform release of the spool is achieved and damage to the wound threads due to abrasion is avoided.

This invention relates to an apparatus for implementing placement of a wrapped yarn package onto a compressible holder, e.g., spool, centering support or like elastic holding device and in particular to an apparatus having means for radially compressing the holding device and then releasing it after the package has been placed thereon.

In the manufacture of artificial threads, yarns and the like from viscose, it is usual to make "wrapped" packages. The threads or yarns are wound on bobbins on which knitted sleeves are provided. When the package is completed, it is, together with the sleeve, removed from the bobbin and wrapped within the sleeve. Then after-treatment of the package, e.g., washing, drying and the like, takes place. In order to improve the unwinding properties of the treated packages, they must be placed on permanent spools. To this end, use is made of an elastic, radially compressible holder, spool, or the like which may, for instance, be formed of a helically bent steel wire.

For the purpose of inserting such compressible devices into yarn packages, various apparatuses are know. For instance, it has been proposed to insert a compressible spool into a piece of piping which has a conical portion at its inlet and a substantially cylindrical portion extending therefrom. The package is placed on the cylindrical portion and the pipe is subsequently removed in upward or downward direction. This arrangement, however, presents considerable drawbacks. For instance, it is not possible to avoid the continual abrasion which damages the thread winding and leads to wear of the spools. Moreover, release of the spool is not uniform. Consequently, the spools first assume a conical shape, giving rise to changes in the package build-up.

Advantageously, this invention provides an apparatus that compresses and releases a compressible spool in a sequential manner that allows placement of a yarn package without abrasion or other of the above described problems.

Thus this invention contemplates an apparatus for facilitating placement of an elastic, radially compressible spool or like holding device within the hollow portion of a wrapped yarn package which comprises support means adapted to position a compressible spool in its expanded condition, groove means on the support means, clamping means for radially compressing a spool positioned on the support means, cap means operably associated with the support means for engaging the upper portion of the compressible spool and for inserting its lower portion into the groove means and control means for actuating the clamping means and the cap means in sequence whereby (1) the clamping means compresses the spool, (2) the cap means and the groove means retain the spool in a compressed condition, (3) the clamping means moves out of engagement with the compressed spool to allow placement of a yarn package over the spool and (4) the cap means releases the spool to allow it to move out of the groove means and to expand into wedging engagement with the yarn package which may then be removed upwardly over the cap means.

More particularly, the apparatus of this invention has a positioning core vertically located on a work table which is adapted to support a compressible spool or the like in its expanded condition. The core has an axial bore and an annular groove at its base that extends below the surface of the work table. A movable cap is positioned over the positioning core and its connected with a draw rod that extends through the bore of the core. The cap has a recess on its underside which is adapted to engage the upper portion of a compressible spool in a compressed condition and which has a configuration that corresponds generally to that of the groove at the base of the positioning core.

In addition, the apparatus has a pair of inter-coupled clamping arms which are provided with clamping jaws at their upper ends that are shaped to compress the compressible spool placed over the positioning core. Simultaneous movement of the arms is effected by pneumatic means which are actuated by the control system of the apparatus. In their clamping positions when the spool is being compressed, the arms act upon a pair of limiting switches which actuate a solenoid that causes the cap to be lowered onto the compressed spool. In this energized position, the solenoid also actuates a limit switch in the control system which causes the pneumatic means to move the clamping arms away from each other. This movement allows the compressed spool to be retained by the cap and groove at the base of the positioning core and enables a wrapped yarn package to be slipped over the cap and onto the compressed spool.

For safety, the apparatus is so constructed that an operator must use both of his hands to simultaneously work a pair of coupled switches to initiate its operation and also so that up to the moment the clamping arms are released, its operation is automatic. The release of the spool after the package has been slipped on may be effected, for example, with the aid of a foot pedal or the like switching device which is part of the control system.

One embodiment of the present apparatus is further described with reference to the accompanying drawings in which:

FIGURE 1 is a schematic representation of the apparatus;

FIGURE 2 is a plan view of the clamping jaws positioned adjacent to the positioning core of the invention

with the core shown in section and the compressible spool omitted;

FIGURE 3 is an enlarged elevation view of the clamping arrangement of the clamping jaws and positioning core when a compressible spool is being compressed; and

FIGURE 4 is a plan view partly in section taken along line 4—4 in FIGURE 3.

In order to more clearly illustrate the invention, the machine frame of the apparatus is not shown; those places where elements of the apparatus are connected to the frame are denoted by the reference numeral **1**.

On the work table **2**, there is provided a positioning core **3** which is covered with a recessed cap **4** and which has an annular groove **5** at its base. The cap is connected to an electric solenoid **10** via the draw bar **7**, the lever **8** and the draw rod **9** (which may for example also form the magnetic core of the solenoid.) Two clamping arms **20** and **21** with their jaws **22** and **23** are so dimensioned that the jaws **22** of the clamping arm **20** fit inside the jaws **23** of the clamping arm **21** in an overlapping arrangement so that a spool may be completely encompassed therein. (This arrangement is shown more fully in FIGURE 3). The jaws **22** and **23** preferably have the semi-circular configuration shown in FIGURE 2.

The enlarged spacing between jaws **22** on arm **20** make it possible for a spool or like holding device to slip between them. (As shown in FIGURE 3, these jaws extend past their circular center and conform to the final shape of the compressed spool.) The two clamping arms **20** and **21** are rotatably mounted on the pivots **24** and **25** and are inter-coupled by means of gear toothed segments **26** and **27** so that they are driven in a simultaneous manner.

The clamping arms are operated by the air cylinder **18** and the piston **19** which is movable therein. The air cylinder **18** is connected to the clamping arm **20** by means of the lever **43** and fulcrum **44**; and the piston **19** is connected to the clamping arm **21** via a rod **45**, the fulcrum **46** and a rod **47** which is rigidly attached to the arm. The air supplied through the feed line **38** via a changeover valve **17** may optionally be fed into the cylinder in front or in the back of the piston **19**. Operation of the arms is effected in such a manner that the jaws **22** and **23** gently come into contact with the compressible spool. Otherwise, the arms would recoil and the spool would not be properly held.

The apparatus of the invention has two switches **31** and **32**, which must be operated simultaneously before the apparatus can be actually started. Although normally, after the switches have been actuated, the various stages of the clamping procedure are automatically completed one after another, the procedure may be interrupted by operating a safety switch **33**, which causes the two clamping arms to return to their initial position.

When the two switches **31** and **32** are actuated, a switch **56**, for example, a magnetic switch, is actuated via an air control switching device **16**. As a result, compressed air from the changeover valve **17** is fed via the line **40** into the cylinder **18** at port **42**. The piston **19** will then move to the left and (because of the connection between the cylinder **18** and the clamping arm **20**) the cylinder will move to the right. The two clamping arms, intercoupled by the gear-toothed segments **26** and **27**, are in this manner brought together so as to compress a compressible spool **60** placed on the core **3**. As shown in FIGURE 3, the jaws **22** and **23** fit together and substantially encompass the spool **60**.

During the end of the clamping movement of the clamping arms, the switch members **48** and **49** act on the limit switches **14** and **15**, which as shown in FIGURE 1 bridge the two switches **31** and **32** and which also actuate the solenoid **10** via the air control switching device **16** and terminal **11**. The solenoid now pulls cap **4** downwardly by effecting movement of the rod **9**, the draw bar **7**, and the lever **8** against the action of the spring **34**.

The recess **6** of cap **4** then slips over the upper edge of the compressed spool **60** and simultaneously pushes the lower portion of the spool into the groove or recess **5** at the base of the positioning core **3**.

To prevent the two limit switches **14** and **15** from being subjected to excessive wear, the clamping arms are suitably provided with studs **57** which strike against corresponding stops **58** and limit the movement of the arms. The studs are adjustable.

At the end of the stroke of the draw bar **9** in the solenoid **10**, limit switch **13** is actuated. This switch via line **53** activates switching device **16** which in turn causes the changeover valve **17** to return to its initial position. As a result, the air cylinder **18** is pressurized on the opposite side of piston **19**, and the clamping arms **20** and **21** move away from each other. This movement releases the spool which, as shown in FIGURE 1, is then retained only by the cap **4** and the groove **5**.

Next, a wrapped yarn package is slipped over the cap **4** onto the compressed spool positioned on the core **3**. Subsequently, the solenoid **10** is made inoperative by actuating the switch **28** by use of pedal **29** (loaded by spring **30**) and the rod **9** is returned to its initial position by the spring **34**. The cap **4** is now lifted to such an extent that the compressed spool is released and allowed to come in wedging engagement with the package. Subsequently, the assembled wrapped yarn package may be removed in an upward direction over the cap **4**.

To prevent the solenoid **10** from acting too quickly after the spool has been initially compressed, in which case the spool would not properly be seized, there may be provided a time relay **12** which ensures that the solenoid **10** does not act until an adjustable period has elapsed after the limit switches **14** and **15** have been operated. Instead of a time relay other know means may be used; for instance, a damper for controlling movement of the arms **20** and **21**. Furthermore, as noted previously, the movement of the clamping arms are so controlled (for instance by an appropriate control of the compressed air supply) that the jaws **22** and **23** gently come into contact with the spool and recoiling is prevented. It is also possible to use these two last-mentioned features in combination.

If, in spite of the above arrangements, the spool is not properly encompassed by the jaws **22** and **23**, and the clamping arms **20** and **21** cannot reach their end-positions, then the two limit switches **14** and **15** cannot be operated and insufficient air pressure is applied to the cylinder **18**. In this case, the operation of the apparatus may be interrupted by operating the safety switch **33**. The two clamping arms **20** and **21** will then return to their initial positions and the entire operation of the apparatus may be resumed by actuating the two switches **31** and **32**.

It will be appreciated that the radially compressible spool **60** illustrated in the drawings is only representative of a variety of such compressible holding devices that can be utilized with the apparatus of this invention. For example, rather than being a helically bent wire, the spool may comprise a continuous wire that is bent into a series of elongated loops which extend parallel to the longitudinal axis of the spool so as to form a cylindrical-like device that is radially compressible.

While the novel features of the invention have been shown and described and are pointed out in the appended claims, it is to be understood that various omissions, substitutions and changes in construction and arrangement of the features shown and described may be made by those skilled in the art without departing from the spirit and scope of the invention.

What is claimed is:

1. An apparatus for implementing placement of an elastic, radially compressible spool within the hollow portion of a wrapped yarn package which comprises support means for positioning said spool in its expanded

condition, groove means on said support means, clamping means for radially compressing said spool while positioned on said support means, cap means operably associated with said support means for engaging the upper portion of said compressed spool and for inserting its lower portion into said groove means, and control means for actuating said clamping means and said cap means in sequence whereby (1) said clamping means compresses said spool, (2) said cap means and said groove means securely retain the spool in a compressed condition, (3) said clamping means moves out of engagement with said compressed spool to allow placement of a yarn package over the spool and (4) said cap means releases and spool to allow it to move out of said groove means and to expand into wedging engagement with said yarn package.

2. The apparatus of claim **1** in which said clamping means comprise a pair of inter-coupled clamping arms having jaws at their upper ends and pneumatic means operably associated with said control means for effecting movement of said arm towards and away from each other, said arms initially spaced sufficiently apart to allow placement of a compressible spool on said support means and said jaws adapted to engage said compressible spool whereby actuation of said pneumatic means causes said clamping arms to move towards each other and said jaws to compress said compressible spool.

3. The apparatus of claim **2** in which said clamping arms and inter-coupled by two gear-toothed segments at their lower ends.

4. The apparatus of claim **1** in which said control means includes a pair of limiting switches which are actuated after said clamping means compress said spool, said limiting switches being operably associated with cap means whereby actuation of said switches causes said cap means to engage the spool compressed by said clamping means.

5. The apparatus of claim **4** in which said control means are provided with a time delay mechanism for preventing actuation of said cap means until said spool has been properly compressed by said clamping means.

6. The apparatus of claim **1** in which said control means includes a limiting switch which is actuated when said cap means become engaged with said compressed spool, said limiting switch being operably associated with said clamping means whereby actuation of said limiting switch causes said clamping means to release said compressed spool.

7. An apparatus for implementing placement of an elastic, radially compressible spool within the hollow portion of a wrapped yarn package which comprises support means for positioning said spool in its expanded condition, groove means on said support means, clamping means for radially compressing said spool while positioned on said support means, cap means operably associated with said support means for engaging the upper portion of said compressed spool and for inserting its lower portion into said groove means, said support means comprising a positioning core vertically extending upwardly from a work table and said cap means comprising a cap positioned over said core and a draw bar connected to said cap, said positioning core having an axial bore through which said draw bar extends whereby downward movement of said draw bar by control means causes said cap to engage the upper portion of said compressed spool, said control means actuating said clamping means and said cap means in sequence whereby (1) said clamping means compresses said spool, (2) said cap means and said groove means securely retain the spool in a compressed condition, (3) said clamping means moves out of engagement with said compressed spool to allow placement of a yarn package over the spool and (4) said cap means releases said spool to allow it to move out of said groove means and to expand into wedging engagement with said yarn package.

8. The apparatus of claim **7** in which said draw bar is coupled to an electric solenoid via a spring-biased lever and a draw rod which forms the magnetic core of said solenoid whereby actuation of said solenoid by said control means moves said cap downwardly and deactuation of said solenoid by said control means allows the spring-biased lever to raise the cap to its initial position over the positioning core.

9. The apparatus of claim **8** in which said clamping arms are provided with a damper whereby movement of said clamping arms is delayed for a pre-selected period.

References Cited

UNITED STATES PATENTS

2,642,655	6/1953	Davis et al.	29—234
2,895,215	7/1959	Neher et al.	29—235
2,947,070	8/1960	Peppercorn	29—235
3,327,376	6/1967	Freeman et al.	29—225
3,369,285	2/1968	Heim.	

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U.S. Cl. X.R.

29—235, 419