

July 10, 1962

J. RUF

3,043,527

BALL WINDING MACHINE

Filed Sept. 22, 1959

3 Sheets-Sheet 1

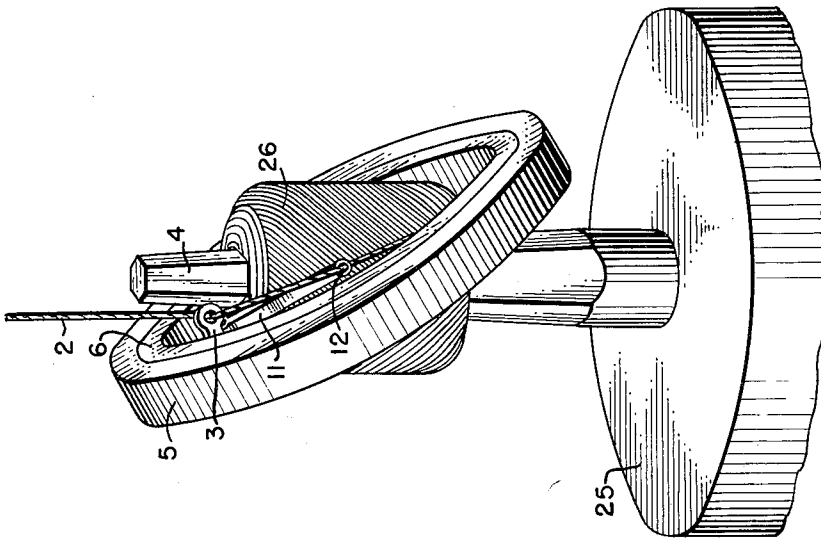


FIG. 2

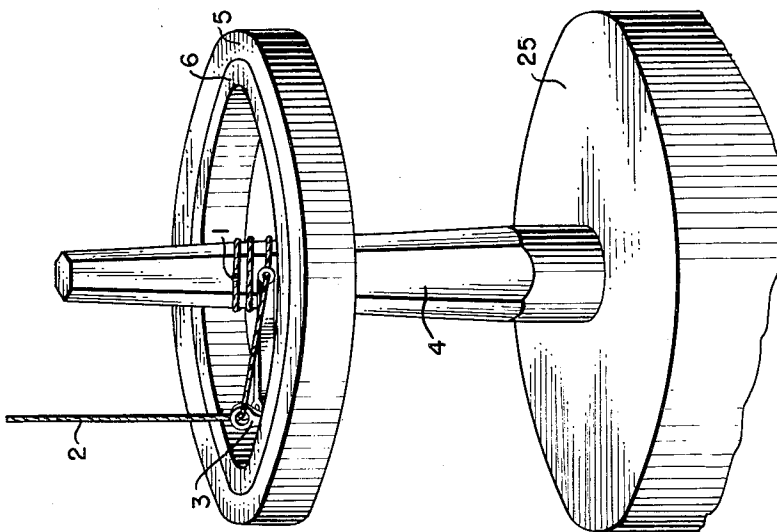


FIG. 1

INVENTOR
JOSEF RUF

BY *McClure and Toren*

ATTORNEYS

July 10, 1962

J. RUF

3,043,527

BALL WINDING MACHINE

Filed Sept. 22, 1959

3 Sheets-Sheet 2

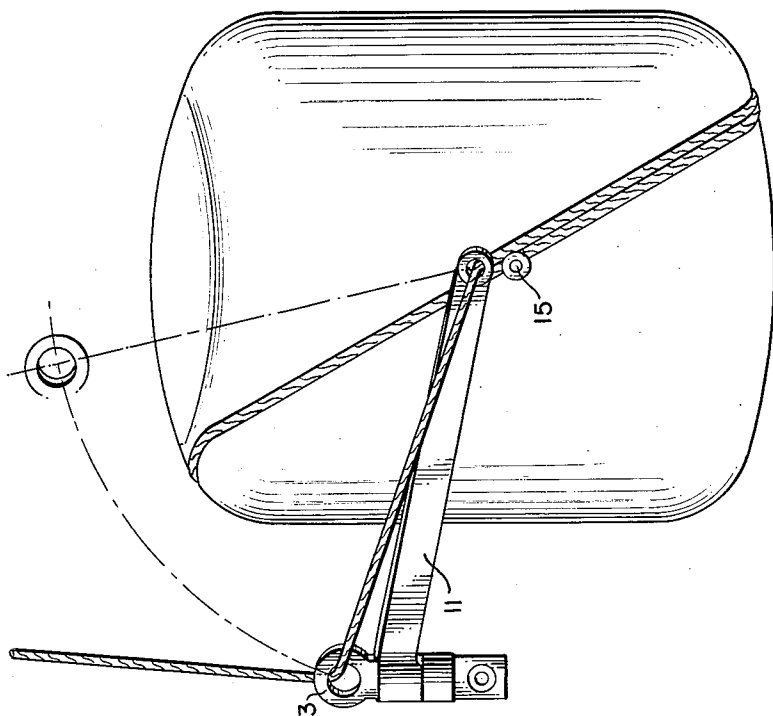


FIG. 4

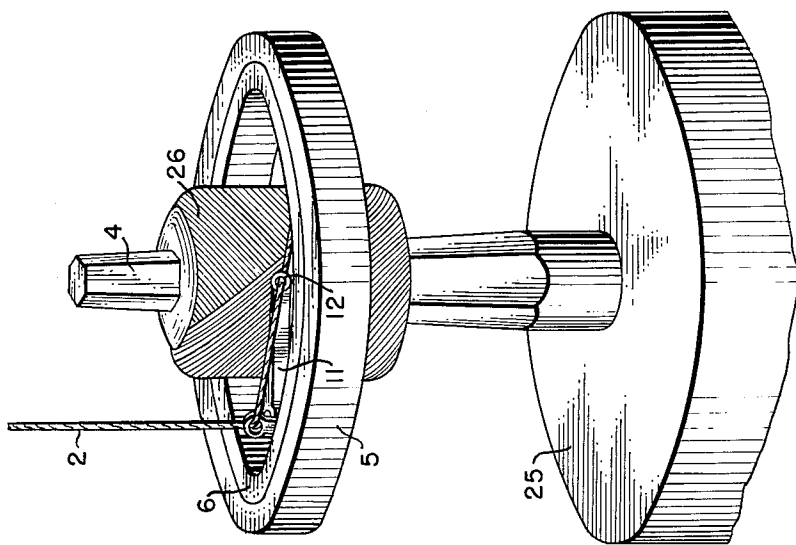


FIG. 3

INVENTOR

JOSEF RUF

BY

W. Glaw and Toren

ATTORNEYS

July 10, 1962

J. RUF

3,043,527

BALL WINDING MACHINE

Filed Sept. 22, 1959

3 Sheets-Sheet 3

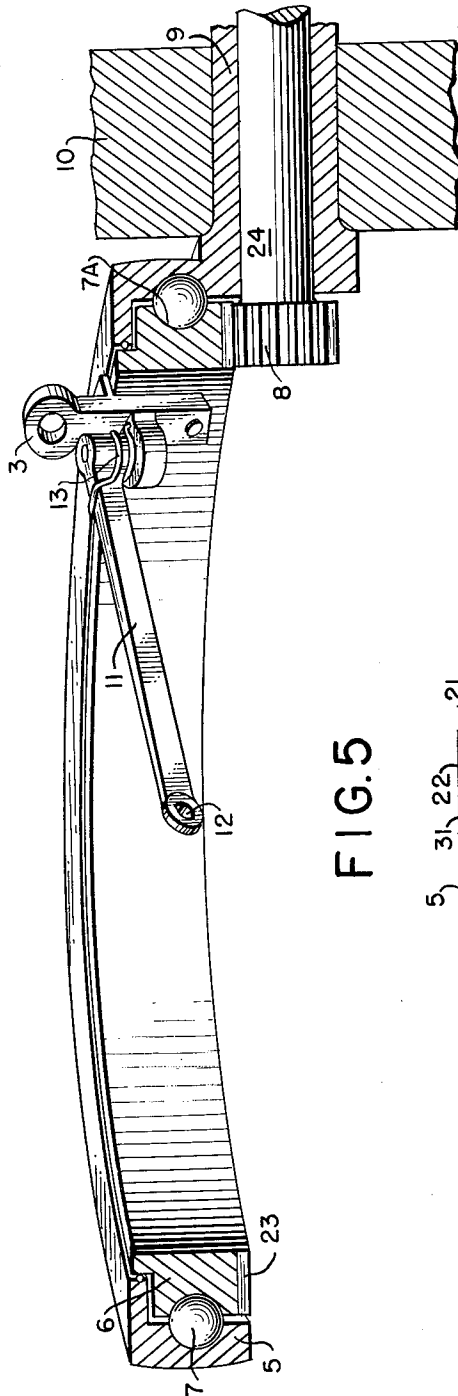


FIG. 5

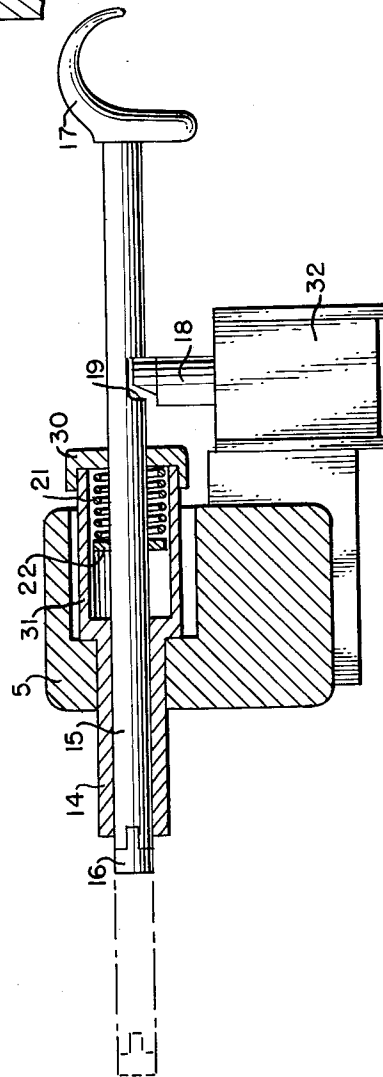


FIG. 6

INVENTOR

JOSEF RUF

BY

McGraw and Toren

ATTORNEYS

1

3,043,527

BALL WINDING MACHINE

Josef Ruf, Memmingerberg, near Memmingen, Allgau, Germany, assignor to Maschinenfabrik Memmingen KG Ing. Theodor Otto, Memmingen, Allgau, Germany
Filed Sept. 22, 1959, Ser. No. 841,512
12 Claims. (Cl. 242—2)

The present invention relates, generally, to apparatus for winding thread like materials, such as twine or the like into spool form and, in particular to a spool forming device of the type having a body member which rotates about a revolving winding mandrel and which is provided with thread-guiding means.

Prior art spool forming machines are provided with wing winding devices constituted by a rotating disk-shaped body. At the periphery of said body provision is made for lever arms which extend parallel to the axis of rotation and thread-guide eyelets are provided at the free ends of said arms. These lever arms rotate about a winding mandrel on which the threaded material is to be wound into spool form.

If such a machine is used to form an oblique winding, the entire bearing housing, in which the rotating mounting is mounted, must be pivoted. Consequently, the thread guide outlets on the levers define different angles with the axis of the winding mandrel.

The described prior art devices have the serious disadvantages of excessive weight and irregular distribution of the dead weight in the lever arms. Consequently, due to the unbalanced weight distribution, the speed of rotation of the rotating body cannot exceed a predetermined limit. As a result the prior art machines have only a limited capacity.

It is a known prior art practice in ring twisting machines to provide a fixed ring having a runner loosely inserted therein and is taken along by the thread being spooled. The thread then drives the loose ring. As a result, considerable frictional stress develops between the thread and the guide portion of the ring. With such a prior art device, heavy yarn cannot be formed into spools. In addition, the loose ring cannot withstand a heavy load for any appreciable period.

In view of the foregoing, it is an object of the present invention to provide means which result in the elimination of the disadvantages of prior art machines.

Thus, the invention applies a simple device for winding thread, line and similar material onto a mandrel and includes an annular guide member which is pivotally supported at its outer periphery at one location and an inner annular element which is rotatably mounted there-within. The inner annular element carries an eyelet adjacent its inner periphery and a shifting lever with an eyelet at its outer end for guiding the eyelet onto the mandrel.

The end of the shifting lever is biased in a direction toward the mandrel and rotation of the mandrel would be effective to wind the line thereonto.

A feature of the construction is that the guide member may be pivoted in order to direct the line over the mandrel at any predetermined angle and the drive for the inner ring is accommodated at the pivotal location of the outer guide member.

An object of the invention is to provide an improved thread winding device.

A further object of the invention is to provide a thread winding device which is simple in design, economical to manufacture, and rugged in construction.

Pursuant to a still further object the guide member in the cabling and twisting apparatus is rigidly connected with the frame thereof. In this construction the winding

2

mandrel is guided during oscillation for movement in the direction of its axis.

The above and other objects of the invention will become further apparent from the following detailed description, reference being made to the accompanying drawings, showing preferred embodiments of the invention.

In the drawings which illustrate the best modes presently contemplated for carrying out the invention:

FIG. 1 is a perspective view of the spool-winding device in its basic position at the start of the spool-winding operation;

FIG. 2 is a perspective view similar to FIG. 1 with the winding device in oblique operating position;

FIG. 3 is a view similar to FIG. 1 and illustrates the completion of the spool-winding operation;

FIG. 4 is a fragmentary view showing the spool with the thread-shifter in position for binding off the wound ball;

FIG. 5 is a cross-sectional view through the winding device; and

FIG. 6 is a cross-sectional view through a fixing device positioned at the winding device.

Referring now to the drawings in detail, there is shown thread or line 2 being fed through an eyelet member 3 onto a single winding mandrel 4 of a spool-winding device. The eyelet member 3 is secured to the inner wall of the body 6. The mandrel is mounted for rotation in conventional manner being positively driven by a conventional drive 25. Mandrel 4 may be of cylindrical, conical, or prismatic formation, as in FIG. 1. An annular body 6 (FIG. 5) rotates about the winding mandrel 4. Ball-bearings 7 are mounted for rotation in a race-way 7A defined by body 6 and another annular guide member 5. In lieu of ball-bearings, there may be provided needle or cylinder bearings, or other rotary elements, for example, rolls, which are mounted for rotation in guide member 5.

In ball winding machines, guide member 5 is pivotally mounted in the frame 10 of the winding machine by means of a journal 9. A pivot lever (not illustrated) is advantageously provided on journal 9 and is connected by means of a rod system to a cam or other stroke-producing member. Due to the pivotal movement of the journal 9, guide member 5 can assume any desired angular position, for example, as shown in FIG. 2, the range of angular displacement being variable as may be desired in accordance with the design of the cam. By obliquely positioning the guide member 5, the thread 2 which is guided in bearing eyelets 3 and 12 is spooled onto the winding mandrel 4 while being wound in the conventional cross-winding pattern as shown in FIG. 3.

If the winding device is to be utilized in a cabling or twisting machine, the guide member 5 is not pivoted but is rigidly secured in frame 10 of the apparatus. In the latter case winding mandrel 4 is reciprocated in conventional manner along its axis to provide a layer winding pattern.

As indicated in FIG. 5, a lever type thread shifter 11 is pivotally mounted on a projection portion of the eyelet member 3. The free end of lever 11 is provided with an eyelet 12, said lever extending toward the winding spool 26 with the eyelet 12 abutting the latter. A torsion spring 13 continuously biases the thread shifter 11 against the spool 26, however, the pull of thread 2, which is greater than the centrifugal force which acts upon the thread shifter 11 during rotation of the body 6, suffices to permit the necessary spool-winding action.

As best shown in FIG. 5, the drive shaft 24 for the rotary body 6 is mounted within journal 9 and is provided with a drive pinion 8 which meshes with teeth 23 pro-

vided on the free planar side of body 6. It is preferable to construct pinion 8 in conical form or with corrected tooth sides so as to insure a satisfactory engagement with teeth 23.

At any desired point on the pivotally mounted guide member 5, a fixing pin 15 (FIG. 6) is mounted for displacement within a bearing 14. The axis of the guide pin 15 extends radially in the direction of the axis of the winding mandrel 4. The front or inner end of pin 15 is provided with a padded cap 16 which, for example, may be formed of hard rubber or other resilient material. When the pin 15 is pushed toward the spool 26, the front end of the pin 15 serves as a detent for the thread 2 which is being wound into spool form as best seen in FIG. 4. When the guide element 5, and consequently the thread shifter 11, is pivoted into horizontal position, as shown in FIG. 3, the entrained thread 2 cannot slip off the ball or spool 26 but rests on the pin 15 so that the final binding off can be effected by making a few horizontal windings. The definitive form of ball or spool 26 is defined by the horizontal winding.

As illustrated in FIG. 6, the thread-fixing pin 15 can be loaded by a compression spring 21 mounted on the pin between a disc 22 secured on the pin and a cap 30 mounted on the enlarged portion 31 of bearing 14. The pin 15 may be retracted by means of a handle 17 which can be pulled outwardly until a locking pawl engages in a notch 19 defined in the pin. The locking pawl 18 is provided on the armature of an electromagnet or relay 32 so that upon energization of the latter the pawl 18 is retracted and withdrawn from notch 19 whereupon the fixing pin 15 is urged by spring 21 against the ball 26.

The bound off thread can then be tucked manually into the ball 26 and thereafter a sleeve (not illustrated) provided in the drive device 25 is moved axially toward ball 26 to strip the latter from the mandrel 4.

The winding device of the present invention is particularly suitable for use with automatic or semi-automatic devices which sever the thread, tuck it under, strip the spool, and again secure the starting portion or end of the thread on the winding mandrel 4 at 1 thereon, whereupon the rotation of body 6 is automatically reinstituted.

Various changes and modifications may be made without departing from the spirit and scope of the present invention and it is intended that such obvious changes and modifications be embraced by the annexed claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. Apparatus for forming threaded material into spools, comprising an elongated winding mandrel mounted for rotation about its longitudinal axis, a rotary annular element through which said mandrel extends, thread guide means provided on said rotary element including a bearing eyelet secured thereto, and a shifting lever having an eyelet at its end biased in a direction toward said mandrel, means for mechanically driving said rotary element, an annular guide member, in which said annular element is mounted for rotation, said annular guide member being mounted for pivotal movement, and the pivot axis of said

guide member being substantially perpendicular to the longitudinal axis of said mandrel.

2. Apparatus as set forth in claim 1, wherein said apparatus is provided in a ball-winding machine having a fixed frame wall, and the annular guide member is pivotally mounted in said wall.

3. Apparatus as set forth in claim 1, wherein said guide member has a pivot bearing through which said drive means passes.

4. Apparatus as set forth in claim 1, wherein said guide member has a pivot bearing through which said drive means passes, said drive means having a drive shaft provided with pinion means, and said rotary body having a free planar surface provided with tooth means engaged by said pinion.

5. Apparatus as set forth in claim 1, wherein the rotary element is mounted in the guide member by means of anti-friction means.

6. Apparatus as set forth in claim 1, wherein the said thread shifting lever is pivotally mounted at said bearing eyelet, and a thread guiding eyelet being provided at the free end of said lever.

7. Apparatus as set forth in claim 6, wherein provision is made to resiliently bias the thread shifter toward the winding mandrel.

8. Apparatus as set forth in claim 1, including a resiliently biased fixing pin mounted for radial displacement in the guide member so that upon movement in the direction of the spool said pin serves as a stop for the winding thread for binding off the thread when changing over from oblique to horizontal winding.

9. Apparatus as set forth in claim 8, including means to releasably retain said pin in retracted condition spaced from the spool.

10. Apparatus as set forth in claim 9 and means to release said pin from its retracted condition for projection into engagement with said spool.

11. Apparatus as set forth in claim 8, wherein the pin is provided at its free end with a resilient cap.

12. Apparatus for winding thread on to a spool comprising an elongated rotary mandrel, a supporting frame adjacent said mandrel, an annular guide member pivotally supported by said frame at its outer periphery, an annular element rotatably mounted within said guide member, thread guiding means on said annular element including first eyelet means secured to said annular element, and a thread shifting lever having second eyelet means at its free end rotatably mounted adjacent said first eyelet means and with its free end biased in a direction toward said mandrel, and drive means for said annular element including a rotatable shaft extending through said guide member at the pivotal mounting thereof.

References Cited in the file of this patent

UNITED STATES PATENTS

795,980	Hubbard	Aug. 1, 1905
2,583,087	Cloud et al.	Jan. 22, 1952
2,855,158	Pumphrey et al.	Oct. 7, 1958