

May 29, 1934.

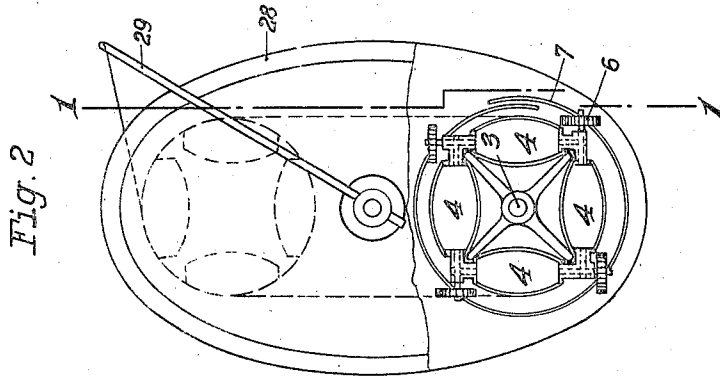
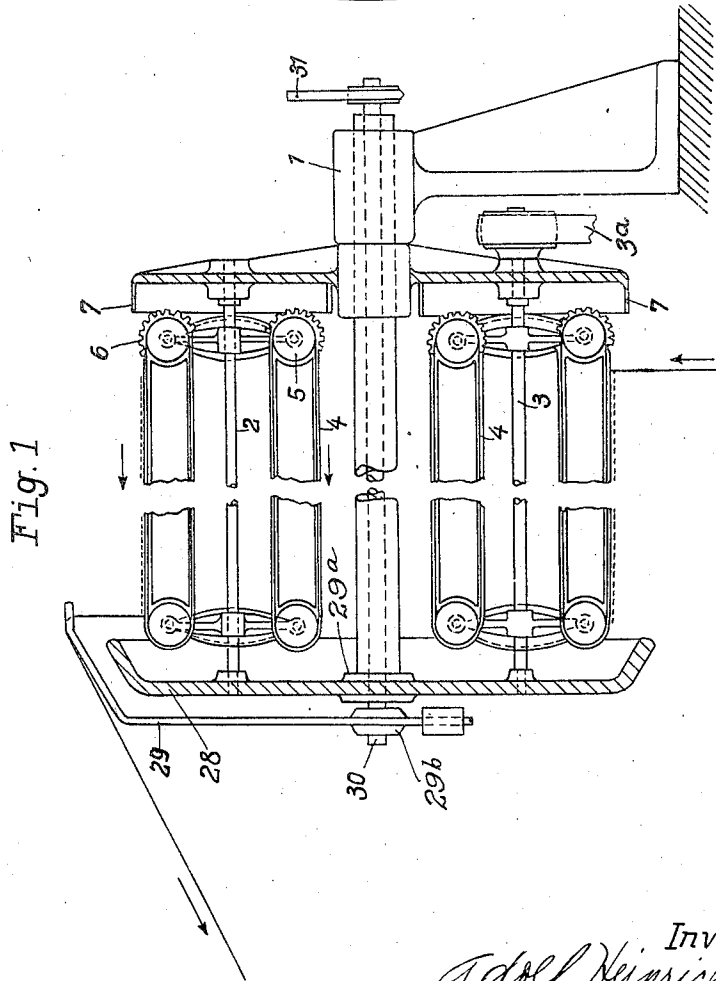
A. H. JUNKERS

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APPARATUS FOR WINDING YARN

Filed Sept. 24, 1929

2 Sheets-Sheet 1



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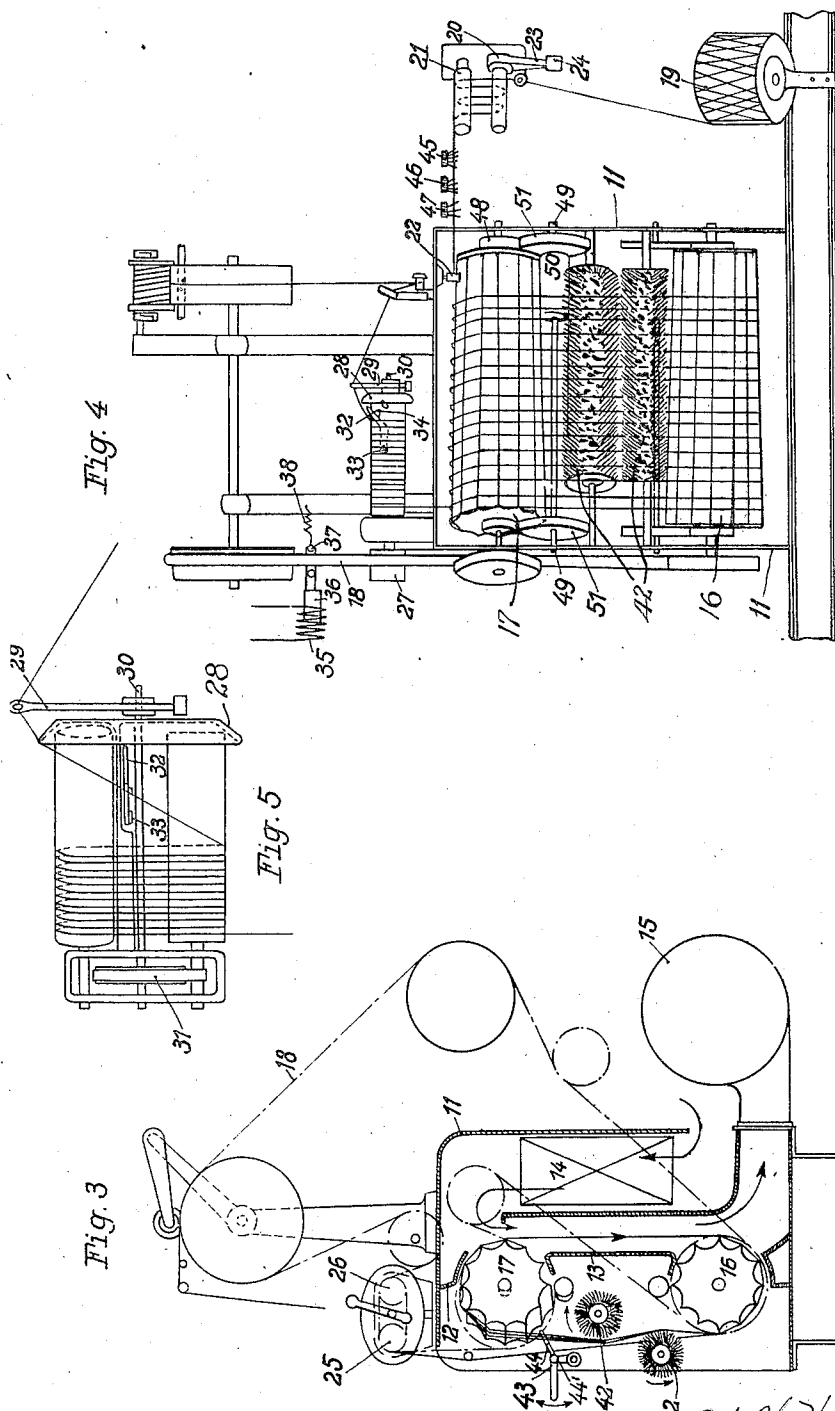
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UNITED STATES PATENT OFFICE

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APPARATUS FOR WINDING YARN

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13 Claims. (Cl. 242—53)

The invention relates to a device for winding up yarn for the purpose of serving as a yarn store adapted to feed any yarn treating or consuming machines with an uninterrupted yarn.

5 In a former United States Patent No. 1,851,252 I have described for this purpose a yarn spooling device, consisting of a yarn winding sleeve or of a pair of drums, and having means for axially displacing the yarn during the winding operation, so as to be able to be drawn off at will on a free head end of the winding sleeve or drums. The invention has the new feature that such a device is provided with a thread guiding member rotatably supported near the free head end 10 in such way that the yarn in being drawn off is securely guided and held under uniform tension. Thereby yarn may be drawn off from the storing device uninterruptedly, may said device revolve or may it be at rest for yarn repairing purposes, 15 and very uniform feeding of any machine is thus made possible.

A further detail consists in providing the guiding member with a positive drive so as to be able to wind up yarn, for example for filling up the 25 store, and especially a store consisting of a pair of drums with axes crossing each other in different planes, during slowly drawing off yarn from it, or for filling up with yarn at the beginning of working the entire storing device.

30 Further details of the invention will appear below.

The invention is shown by way of example in the drawings, in which

35 Fig. 1 is partly an elevation and partly a longitudinal section on the plane indicated by the line 1—1 of Fig. 2, of a winding device having two cores provided with endless belts.

Fig. 2 is an end elevation of the same.

40 Figs. 3, 4 and 5 are an end view, partly in section, a lateral view and an enlarged partial top view of a winding device comprising a yarn treating device and a store inserted in the yarn running out from it.

45 According to Figs. 1 and 2 the device comprises two winding cores mounted in a machine frame 1 on parallel shafts 2, 3, one of them being driven by a belt 3a, the other being freely rotatable, and each comprising four endless belts 4 stretched out over rollers 5 mounted on said 50 shafts 2, 3. Said rollers 5 are of such barrel shape that the belts 4, manufactured for example of rubber, form an approximately cylindrical cross section of each entire core. For driving said belts 4, the rollers 5 of the one end are 55 provided with obliquely toothed rims 6, in which

spiral-shaped ribs 7 of the machine frame 1 are in engagement, so that the spiral rib 7 acts as one worm tooth on a corresponding tooth of each roller 5, and thereby each roller 5 during one revolution about the axle 2 or 3 is rotated 60 about an angle corresponding to one tooth and thereby displaces the belt 4 correspondingly. The yarn wound up round both cores is in this way axially displaced so as to run as a continuous thread round them independently upon a 65 greater or smaller running velocity of the yarn.

The yarn portions freely extended between the cores are free for the application of any treating devices or means, such as brushes, drying air currents and the like. 70

The shafts 2, 3 are held only on their one ends in the frame 1, the other head ends being free for axially drawing off the yarn with any desired velocity, independently of the velocity with which the yarn enters the device and eventually 75 is treated in it. The last thread windings of the cores serve in this case as a yarn store, only the other windings being covered by the treating devices.

For securing a yarn, being only slowly drawn 80 off, against coming into disorder, the free ends of the shafts 2, 3 are covered by an oval or circular guiding cup 28, over the edge of which the yarn runs, in being drawn off. Before said cup 28, a guiding arm 29 is mounted which guides the yarn 85 by a guide eye. Said arm 29 is mounted on a shaft 30 by aid of a frictional clutch (similar to a watch hand clutch), consisting of two cups 29a, 29b, one of which elastically presses the arm 29 against the other cup, which is fastened to the 90 shaft 30 and the shaft 30 is driven by a belt drive 31 from any speed changing gear, such as stepped or conical pulleys, and said gear is driven in a similar way as the shafts 2, 3, so that the arm 29 has the same direction of rotation as said shafts. 95

The action is the following. If the machine to be fed by the device draws off the yarn with a higher velocity than it is delivered from the storing or treating device, more and more windings are drawn off over the head end of the device, the 100 guide arm 29 being slowly rotated by the yarn against the driving force of its shaft 30 by overcoming the friction of its clutch. This most favorable case can usually be obtained by regulating the velocity of rotation of the shafts 2, 3 in such 105 way, that during the winding off and treating the yarn from a spool, the storing cores, which are fully threaded with yarn in the beginning, lose only a part of the yarn threads by the drawing off over the head ends. If the machine to be fed 110

operates with a smaller velocity than the storing and treating device, the drive 30, 31 acts through the frictional clutch on the guide arm 29, so that the latter follows the yarn on the cores and aug-
 5 ments the number of threads on them. This gives also the possibility of filling the cores with yarn threads in the beginning of operation.

In this way independently of the entrance of yarn to the storing device, the yarn can be de-
 10 livered to any winding device with any desired velocity and with a uniform tension regulated by the frictional clutch.

It may be seen that the new apparatus gives the possibility of treating a yarn, stretched out in
 15 multiple threads, in running state by any desired tools, and at once the yarn can be wound to any desired spools by an immediately following spooling device without the slightest trouble arising from differences of velocities between both ma-
 20 chines.

According to Figs. 3 to 5, a storing device is at-
 tached as a separate member to a treating device.

The treating device is the following. A casing
 11 is partly closed by a front wall 12 and contains an inner division wall 13 and behind the latter a
 25 heating body 14. A fan 15 is connected to the fore compartment for sucking the air warmed on the heater 14 to the fore chamber and then lead-
 30 ing it off, whereas fresh air enters from below to the heater.

In the fore chamber, two drums 16, 17 are
 mounted, the axes of which cross each other in different planes. In the illustrated example the
 35 lower drum 16 has its axis parallel to the longi-
 tudinal direction of the entire apparatus, whereas the upper drum is mounted obliquely in the hori-
 40 zontal plane, so that a yarn wound in many windings round the drums is able to continuously run round them with properly distanced thread
 windings. A drive 18 shown in dash and dotted
 lines serves for driving both drums in equal direc-
 tion. With strong yarn only one drum needs to
 be driven as the yarn suffices for driving the other.

The kind of crossing of the drum axes and the
 45 shape of the drums 16, 17 depends upon the kind of yarn to be treated and upon the kind of treat-
 ment.

If, for example, the yarn increases in length
 during the treatment, as in "mercerizing", the
 50 shortest distance between both drum axes, the crossing point, as shown in Fig. 3 lies on the yarn
 entrance, so that against the yarn exit the drum
 distance is augmented more and more, and the
 yarn is everywhere held under tension. If in-
 55 versely the yarn decreases in length, the crossing
 point is arranged near to the yarn exit end of the drums. If the lengthening or shortening pro-
 cesses are discontinuous or stronger than may be
 made up by the different axis distances of the
 60 drums, then the drums are not made cylindrical
 but with diameters increasing from one cross sec-
 tion to another, so as to have conoidal or sphe-
 roidal or other shapes. The drums have increas-
 65 ing diameters on each spot where the yarn in-
 creases in length, and decreasing diameters on
 each spot where the yarn decreases in length, so
 that everywhere the yarn is under a desired ten-
 sion and eventually stretched as desired.

In the example shown in Fig. 4 the drums have
 70 diameters increasing from the right to the left
 end of the drums, according to a lengthening of
 the yarn during treating.

A yarn tensioning device for guiding the yarn
 75 from a spool 19 to the machine is constructed as
 follows. Two small crossed feeding drums 20, 21

of essentially the same arrangement as the main
 drums 16, 17 receive the yarn, coming from the
 spool 19, in multiple thread windings and deliver
 it over a roller 22 to the main drums 16, 17. For
 setting the yarn under tension, at least one of the
 80 drums 20, 21 is provided with a brake band 23
 loaded by interchangeable weights 24 (or by a
 spring).

The yarn coming loosely from the spool 19 is
 hereby more and more set under tension as it sur-
 85 rounds more and more times the drums 20, 21,
 and runs with the desired tension to the main
 drums 16, 17 without any damage, arising in other
 devices by friction, even if knots or other defect-
 ive spots pass through the device.
 90

The tensioning effect may also be obtained
 without weights by using a conical pulley and
 displacing the driving belt with respect to the
 latter, so as to regulate the speed of the tension-
 ing drums and hold the yarn under sufficient ten-
 95 sion. In this case no inertia forces, arising from
 accelerations or retardations of the drums, act
 upon the yarn.

A further yarn storing device is inserted into
 the yarn running out from the treating drums 16,
 17, said device also consisting of a pair of small
 drums 25, 26 with axes crossing each other. These
 drums are also driven from the machine drive
 and surrounded by the yarn in multiple threads.
 These drums 25, 26 are held in bearings only
 105 on one end so as to allow the yarn to be drawn
 off over the other free head ends with a velocity
 independent of the winding up velocity. The
 drive of said drums 25, 26 is a regulable one, the
 drums (or at least one of them) being driven by
 110 a conical pulley 27 which is axially displaceable
 against the main driving belt 18 of the entire
 machine. For guiding the yarn, a guide cup
 28 and guide arm 29 as in the first example are
 also here arranged and serve for guiding the
 115 yarn to the winding device which may be a cross-
 wise or ordinarily spooling device or a reel or
 the like.

For treating the yarn, rotary brushes 42 are
 applied to the front and rear side of the front
 120 portion of the yarn extended between the main
 drums 16, 17 and said brushes 42 may be driven
 by belts from the drum 16. Said drums 16, 17
 allow the yarn to run with very great velocities,
 sufficient as brushing velocities, and hence the
 125 said brushes 42 need only to rotate with very
 small velocities in one or the other direction,
 so as to apply successively their different por-
 tions to the yarn and offer the other portions
 to inspection and, if necessary, to cleaning. A
 130 drive with a circumferential motion coincident
 with the yarn running direction obviates the ac-
 cumulation of dirt on the yarn, where it enters
 to the brush. In cases in which this does not
 suffice, the brush may be driven with a circum-
 135 ferential velocity equal to the yarn running speed
 augmented by the necessary brushing speed.

Above the brushes 42, on a swinging shaft 43 a
 comb 44 is so mounted and driven by an elastic
 drive, that it swings up and down between the
 yarns and if desired swings fully out between
 140 them on the top end of the swinging motion, for
 separating yarns adhering to each other. A drum
 44' connected to said comb serves for being ap-
 plied to the yarn when the machine is at rest,
 145 for holding the yarn under tension while the
 brushes or other tools are interchanged.

For preparing the yarn to the treatment, in
 the inlet between the tensioning drums 20, 21
 and the roller 22 three brushes 45, 46, 47 are
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applied to the yarn, the first brush 45 being moistened by water or steam, the second brush 46 being filled with paraffine or a similar smoothing material, and the third brush 47 serving for distributing the water and paraffine and removing their abundance.

For cleaning the main drums 16, 17, which are constructed as skeleton drums the following device is arranged. Each drum 16, 17 has on its ends smooth friction rims 48, and shafts 49 supporting cleaning drums 50 and friction rims 51 are mounted in elastically applied bearings in such way as to be driven from the drums 16, 17 by the friction rims 48, 51. Said cleaning drums 50 thereby grind on the skeleton drums so as to clean them from dye and other impurities deposited thereupon. They extend only over a portion of the length of the main drums 16, 17 near the yarn entrance, as only in this portion impurities are encountered.

The operation of the entire machine is the following. The yarn coming from the feed spool 19 is set under tension by the tensioning drums 20, 21, then treated by brushes or the like on the main drums 16, 17, then stored and set under uniform tension on the delivering drums 25, 26, and drawn off according to the demand by the spooling device.

The small delivering drums 25, 26 (as well as the drums shown in Figs. 1 and 2) may, if desired, transport the yarn inversely to the shown direction, i. e. the guide arm may be driven with the feeding velocity and winds the yarn onto the cores, the yarn being drawn off tangentially from the other end of said cores. The cores may in this case remain without drive and provided with a brake for uniformly tensioning the yarn. Said brake may correspond to the friction clutch of the guide arm 29, which in this case may be rigidly secured to its driving shaft. If this inverse running of the yarn is to be used in the apparatus according to Figs. 1 and 2, where the treatment of the yarn is effected on the storing cores, said cores must be driven as usual and the yarn entering over the guide arm 29 to the drums or cores leaves the latter tangentially and is lead to any further treating or spooling machine, if necessary through a further storing device of the described type.

A valuable detail, shown in Fig. 4, is further used for automatically obviating an accumulation of too much windings on the delivering drums 25, 26. Between said drums an oblique lever 32 with a balancing weight 33 is so arranged that it lies in the region of the least yarn windings on said drums. Thereby a sliding off of said windings over the heads of said drums is obviated, and an electric contact 34 is closed by said lever.

A magnet coil 35 is thereby fed with electric current and attracts its core 36, which against the tension of a spring 38 displaces a belt fork 37 so as to displace the driving belt 18 of the spooling device on the conical pulley of the latter. This spooling device is thereby accelerated and detracts more yarn so as to diminish the number of threads on the drums 25, 26. Thereupon the contact 34 is again opened, and the normal running is restored. The oblique position of the lever 32 allows several threads of yarn to press on said lever in unison, so that also very thin yarn can operate said lever without breaking. For strong yarn a simple upright lever is sufficient.

I claim:

1. An apparatus for winding yarn, comprising in combination a core for taking up yarn, means

for rotatably supporting said core on one of its ends, the other end being free for axially drawing off said yarn from said core, means for axially displacing said yarn wound on said core, a guiding member rotatably supported oppositely to said free end and adapted to guide the said axially drawn off yarn, and means for rotating either of said rotatable parts.

2. An apparatus for winding yarn, comprising in combination a core for taking up yarn, means for rotatably supporting and driving said core on one of its ends, means for axially displacing said yarn wound on said core from said end to the other end which is free for axially drawing off said yarn from said core, and a guiding member rotatably supported oppositely to said free end and adapted to guide the said axially drawn yarn.

3. An apparatus for winding yarn, comprising in combination two essentially parallel cores adapted to be surrounded by common yarn threads, means for rotatably supporting said cores, means for driving at least one of said cores from one end, said cores being constructed and arranged for axially displacing said yarn wound on said cores from said end to the other end which is free for axially drawing off said yarn from said cores, and a guiding member rotatably supported oppositely to said free end and adapted to guide the said axially drawn yarn.

4. An apparatus for winding yarn, comprising in combination two yarn winding drums rotatably arranged with axes crossing each other in different planes so as to automatically cause a yarn wound round said drums to be axially displaced when said drums are rotated, means for driving at least one of said drums from that end from which the yarn axially travels, the other end being free for axially drawing off said yarn from said drums, a guiding member rotatably supported oppositely to said free end and adapted to guide said axially drawn yarn, and braking means on said rotatable guiding member.

5. An apparatus for winding yarn as claimed in claim 4, wherein the rotatable guiding member is provided with a drive, so as to be able to wind up yarn onto the drums.

6. An apparatus for winding yarn as claimed in claim 4, wherein the crossing point of the drums is nearer to the end of the drums, near which the yarn shall have the least length.

7. An apparatus for winding yarn, comprising in combination two yarn winding drums rotatably arranged with axes crossing each other in different planes so as to automatically cause a yarn wound round said drums to be axially displaced when said drums are rotated and braking means on one of said drums on that end from which the yarn axially travels, the other end being free for axially drawing off said yarn from said drums.

8. An apparatus for winding yarn, as claimed in claim 4, wherein an abutment is arranged near the free end of the drums, so as to prevent the yarn from descending over said free end.

9. An apparatus for winding yarn as claimed in claim 4, wherein a contact lever is arranged near the free end of the drums, so as to be depressed by a yarn travelling too far, and an electromagnetic device for regulating the velocity of drawing off the yarn is provided so as to be operated by said contact lever.

10. An apparatus for winding yarn as claimed in claim 4, wherein a driving shaft is provided for holding the rotatable guiding member and a frictional clutch is provided for connecting both said parts.

11. An apparatus for winding yarn as claimed in claim 4, wherein a cup is provided so as to cover the free ends of the drums, over the edge of which cup the yarn is axially drawn.
- 5 12. An apparatus for winding yarn, comprising in combination two yarn winding drums rotatably arranged with axes crossing each other in different planes so as to automatically cause a yarn wound round said drums to be axially displaced when said drums are rotated, means for driving
10 at least one of said drums from the end from which the yarn axially travels, the other end being free for axially drawing off said yarn from said drums, and yarn treating tools applied to the yarn extended between the yarn winding drums, said tools extending only over a part of the length
80 of said drums near the yarn entrance.
13. An apparatus for winding yarn as claimed in claim 1, wherein a cup is provided so as to cover the free end of said core, over the edge of which cup the yarn is axially drawn.
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