Oct. 21, 1947. I. S. ROBERTS 2,429,330

FLYER TWISTING MACHINE

Filed Jan. 19, 1944

Fig. 1

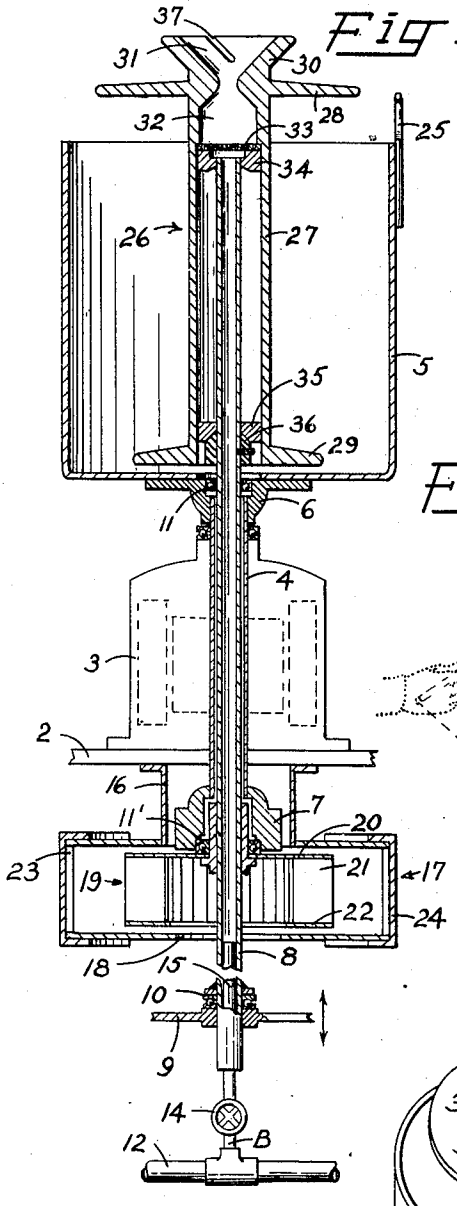


Fig. 2

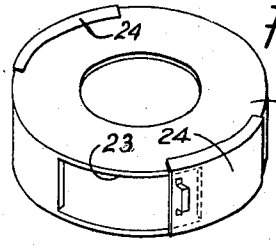


Fig. 3

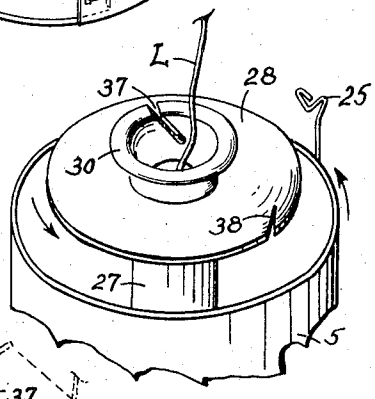


Fig. 4

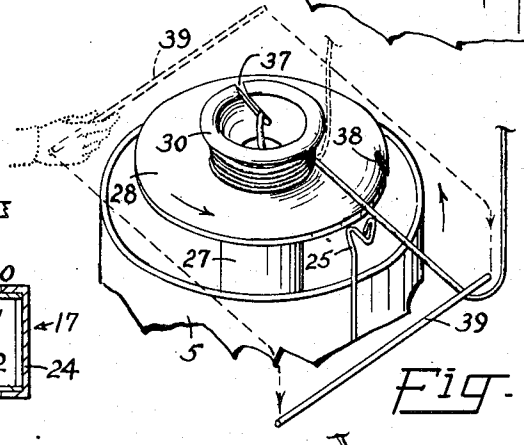


Fig. 5

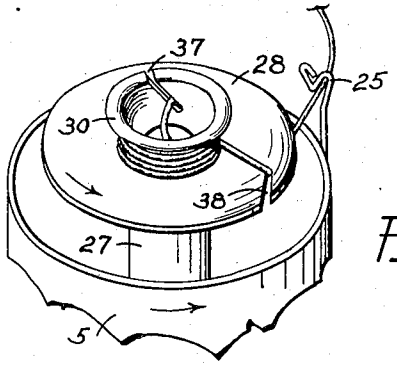
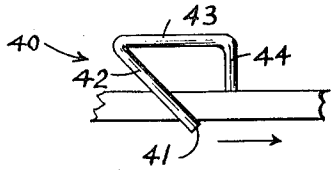


Fig. 6



INVENTOR.
INGHAM S. ROBERTS
BY
Carl A. Castellan
ATTORNEY

Patented Oct. 21, 1947

2,429,330

UNITED STATES PATENT OFFICE

2,429,330

FLYER TWISTING MACHINE

Ingham S. Roberts, Ridley Park, Pa., assignor to American Viscose Corporation, Wilmington, Del., a corporation of Delaware

Application January 19, 1944, Serial No. 518,783

20 Claims. (Cl. 57—67)

1

This invention relates to flyer-type twisting and/or doubling machines, and particularly to that type which utilizes what is sometimes referred to as an "inverted flyer."

The main object of this invention is to so arrange this type of twisting machine that it can be semi-automatically laced up or threaded while the machine is running and thus to make its use particularly advantageous in cases where the yarn is delivered to the machine continuously at a high rate of speed. Heretofore it has been necessary to bring this type of machine to a full stop to enable the operator to safely wind the leading end of the yarn or yarns to be twisted or doubled about the bobbin, cop tube, or other yarn package support. This is a difficult procedure when the yarn is being delivered rapidly and must be wound before becoming tangled. In addition, this procedure is unreliable in that the leading end frequently becomes loosened and unwraps from the yarn carrier upon starting of the machine.

An ancillary object of the invention is to provide a novel form of bobbin adapted to co-operate with the various parts of the machine to accomplish semi-automatic lacing. Another ancillary object is to provide a package of yarn which will have a "tail" or extension of the inside layer of yarn available to the outside of the package to serve as a means of interconnecting two packages to facilitate subsequent continuous unwinding. Other objects and advantages will be apparent from the drawing and the description thereof hereinafter.

In the drawing which is illustrative of the invention,

Figure 1 is an elevation, partly in cross-section, of the device of this invention;

Figure 2 is a perspective view of the drag fan housing; and

Figures 3 to 5 are perspective partial views looking down at the top of the twister and illustrate the lacing up of the device; and

Figure 6 is an elevation of a modified detail.

With reference particularly to Figure 1, the twister comprises a suitable stationary supporting rail 2 for the driving motor 3. The rail 2 may support a row of the machines, though only one is shown. A hollow shaft 4 is driven by the motor and is secured at its upper end to a cylindrical cup or flyer 5 by means of the coupling member 6. The hollow shaft 4 extends down through the rail 2 and carries a sleeve member 7. A hollow spindle 8 is rotatably mounted within a traverse rail 9 to which is imparted vertical reciprocatory

2

motion by conventional means. A thrust bearing 10 supports spindle 8 upon traverse rail 9. The hollow spindle 8 is rotatable and reciprocable within the hollow driving shaft 4, suitable bearings 11 and 11' being provided between the spindle 8 and members 6 and 7 respectively. The machine also is provided with a conduit 12 connected to a vacuum pump (not shown). The conduit has branch connections B, each of which may be a valve 14 and terminates in a slender tube 15 extending within the hollow spindle 8. The tube 15 extends upwardly a sufficient distance to permit the spindle 8 to make a complete traverse without being removed from the tube. The tube 15 is preferably made as large as possible without interfering with the rotary motion of the spindle 8 within which it extends throughout operation. Secured beneath the rail 2 by means of a tubular member 16 is a cylindrical housing 17, provided with an opening 18 in the bottom permitting free passages of the spindle 8 and the intake of air. Within the housing 17 there is mounted for rotation with spindle 8 a fan 19 comprising an upper plate 20 which carries a plurality of radial vanes 21 which may in turn be secured to an annular bottom plate 22. The periphery of the housing 17 may be provided with one or more openings 23 (two being shown) which may be provided with the slidable covers or dampers 24 which permit of adjustment of the size of the openings 23 for a purpose hereinafter described.

The flyer 5 is provided with an upstanding yarn guide 25 in the form of a hook. A yarn-receiving element in the form of a bobbin 26, shown in Figures 1 and 3 to 5, comprises a cylindrical body portion 27, upper and lower flanges 28 and 29 respectively, and an axially projecting portion 30 having an axial passage 31 to a chamber 32 within the body of the bobbin. A screen 33 is supported by an annular reinforcing member 34 and defines the bottom of the chamber 32. Another annular reinforcing member 35 is secured within the body portion of the bobbin near the other end. The members 34 and 35 serve to position the bobbin upon the hollow spindle 8, and for this purpose the member 35 is provided with a conical portion adapted to rest snugly about an upper conical portion of the collar 36 fixedly secured to spindle 8 such as by a set screw. The lower face of the member 34 may comprise a conical portion to facilitate placing the bobbin in proper position on spindle 8.

The passage 31 is preferably flared in the form of a funnel and is preferably necked down con-

siderably as it approaches the chamber 32 to enhance the effect of suction exerted when the vacuum line is connected to the spindle 8 in lacing up as will be described hereinbelow. The projecting portion 30 is provided with a slot or notch 37, which is cut back in a direction opposite to that in which the flyer 5 is rotated. The upper flange 28 is provided with a notch 38, which is cut inwardly from the edge of the flange in the direction of rotation of the flyer 5.

In operation during twisting or doubling and winding, the flyer 5 is rotated in the direction indicated by the arrow in Figure 3 and the yarn or yarns passes or pass from any suitable source or guide above the twister around the outside of hooked flyer guide 25 and thence to the bobbin at a position therealong controlled by the traverse mechanism. The bobbin 27 rotates as a result of friction in the bearings 11 and 11' but at lower speed than the flyer cup 5, due to wind resistance and to the drag of bearing 10. The fan 19 exerts additional drag on the spindle 8, and the amount of drag can be controlled by adjusting the covers 24. In operation, this drag controls the tension on the yarn as it is delivered to the bobbin. In doffing, the operator cuts the advancing yarn and allows it to go to waste for the required interval, arrests the rotation of bobbin 26 by lightly grasping the projecting portion 30 with a gloved hand, lifts the full bobbin from the spindle 8 without stopping the motor, places another empty bobbin in position on the spindle 8, cuts the yarn again and then laces up the empty bobbin by any one of several techniques. In the preferred technique, he feeds the leading end into the passage 31. If the valve 14 is ordinarily kept closed during operation of the machine, it may be opened at any time prior to the insertion of the leading end into the passage 31. Conveniently, the valve 14 may be opened just before doffing the full bobbin.

The preferred procedure of lacing up preparatory to twisting on a fresh bobbin is more particularly shown in Figures 3 to 5. Figure 3 shows the leading end L of the yarn extending through passage 31 and being drawn into the chamber 32 by the suction applied through the spindle 8. After allowing several feet of yarn to be drawn into chamber 32, the operator places a rod or wand 39 on the left side of strand L, as shown in Figure 3, and moves the rod to the right until the strand engages the notch 37 and begins to wind upon projection 30. After allowing several laps to be formed on projection 30, the operator continues the motion of the rod to the right, as shown in Figure 4, carrying the yarn laterally of the machine, and then swings the rod and yarn downwardly, so that the latter will be across the path of the yarn guide 25. The yarn guide 25 catches the yarn which is then allowed by the operator to slip over the end of rod 39. Since the yarn-guiding bight of the hook 25 is below the level of flange 28, the length of yarn extending from the portion 30 of the bobbin to the guide 25 drags over the periphery of flange 28. Since the speed of guide 25 is greater than the bobbin 26, the yarn is then caught in notch 38 of flange 28, as shown in Figure 5. From this position, the yarn proceeds to wind about the bobbin. The bobbin assumes a speed relative to that of the flyer which is determined by the diameter of the bobbin and the speed of the advancing yarn. The tension on the yarn may be adjusted to an optimum value by positioning the fan dampers 24.

The tail comprises the several laps of the strand wound about projection 30 and the length of yarn drawn into chamber 32 in the manner described above.

Instead of using a rod 39 the operator may use his finger to draw the yarn laterally of the machine and downwardly into the path of the guide 25. While the lacing manipulation is shown as being effected while the bobbin is at the lower-most position in its traverse, lacing may be effected at any other position in the traverse, it being only necessary to draw the yarn down a greater distance to bring it across the path of guide 25.

In the simplest procedure, the spindle 8 need not be hollow, the vacuum line may be omitted, and the bobbin may be simplified by omitting the portions 30, 31, 32, 33 and 37. In this procedure, it is merely necessary to provide the upper flange 28 with a tapered notch 38 or other means in which the end of the yarn may be securely caught. After catching the yarn in the notch 38, the operator leads it across the path of the hook guide 25 as in Figure 4, and he may then permit the bobbin to pick up its own speed through the friction in the bearings 10 and 11.

The cup 5 may be replaced by any suitable support for the flyer guide 25, and this support may be provided with a balancing member. Again, while the leading end or ends of the yarn or yarns to be twisted or doubled are caught by notches 37 and 38, wire hooks may be substituted therefor. For example, in Figure 6, which is an elevation of a part of the periphery of flange 29, the notch 38 is replaced by the wire hook 40 comprising a portion 41 extending outwardly from the flange in a direction approximately perpendicular to the plane of the drawing and a portion 42 bent back and upwardly from the outer end of portion 41. From the upper end of 42, portion 43 may extend forwardly and inwardly terminate in a portion 44, the foot of which is secured in the top of the flange 28.

In the claims, the word "strand" is intended to be generic to singles yarns, plied yarns, cords and the like.

Certain subject matter disclosed but not claimed herein, is the subject matter of applicant's copending divisional application Serial No. 730,811, filed February 25, 1947.

While preferred embodiments are disclosed, changes and variations may be made without departing from the spirit and scope of the invention as defined by the appended claims.

I claim each and every novel and inventive feature described herein and particularly:

1. In a twisting machine comprising a flanged strand receiving element mounted rotatably, a flyer guide, means for rotating the guide about the element, and means whereby relative reciprocatory motion can be effected between the element and the guide axially of the element, the combination of a tapered notch in one flange of the element and extending transversely of the flange and adapted to catch and hold by wedging action the strand inserted therein.

2. In a twisting machine comprising a strand receiving element mounted rotatably, a flyer guide, means for rotating the guide about the element, and means whereby relative reciprocatory motion can be effected between the element and the guide axially of the element, the combination of suction means associated with the element for holding a strand led thereto.

3. In a twisting machine comprising a strand receiving element mounted rotatably and having flanges adjacent its ends, a flyer guide extending

upwardly from a rotatable support therefor arranged beneath the receiving element, means for rotating the guide about the element, and means whereby relative reciprocatory motion can be effected between the element and the guide axially of the element, the combination of a member extending upwardly from the upper flange of the element, a passage through the member, and suction means communicating with the passage.

4. In a twisting machine comprising a strand receiving element mounted rotatably and having flanges adjacent its ends, a flyer guide extending upwardly from a rotatable support therefor arranged beneath the receiving element means for rotating the guide about the element, and means whereby relative reciprocatory motion can be effected between the element and the guide axially of the element, the combination of a member extending upwardly from the upper flange of the element, a notch in the member cut back with respect to the direction of rotation thereof a passage through the member and suction means communicating with the passage.

5. In a twisting machine comprising a strand receiving element mounted rotatably and having flanges adjacent its ends, a flyer guide extending upwardly from a rotatable support therefor arranged beneath the receiving element means for rotating the guide about the element, and means whereby relative reciprocatory motion can be effected between the element and the guide axially of the element, the combination of a member extending upwardly from the upper flange of the element, a notch in the member cut back with respect to the direction of rotation thereof a passage through the member, a screen in the bobbin, and suction means communicating with the passage through the screen.

6. In combination in a twisting machine, a rotatable hollow spindle, a strand receiving element carried by the spindle near its upper end, a flyer guide, means for rotating the guide about the element, means whereby reciprocation of the spindle and the element as a unit axially with respect to the guide can be effected, an axial passage into the upper end of the element, communicating means in the element connecting the channel of the hollow spindle with the passage, and means for applying suction to the channel of the hollow spindle.

7. In combination in a twisting machine, a rotatable hollow spindle, a strand receiving element carried by the spindle near its upper end and having flanges adjacent its ends, a flyer guide, means for rotating the guide about the element, means whereby reciprocation of the spindle and the element as a unit axially with respect to the guide can be effected, an axial passage into the upper end of the element, communicating means in the element connecting the channel of the hollow spindle with the passage means for applying suction to the channel of the hollow spindles, a tapered notch in the upper flange of the element adapted to catch and hold the strand at a point along a length extending from the passage in the element to the flyer guide.

8. In combination in a twisting machine, a rotatable hollow spindle, a strand receiving element carried by the spindle near its upper end and having flanges adjacent its ends, a flyer guide, means for rotating the guide about the element, means whereby reciprocation of the spindle and the element as a unit axially with respect to the guide can be effected, a member projecting upwardly from the upper flange of the element,

a notch in the member cut back with respect to the direction of rotation thereof, an axial passage through the member into the upper end of the element, communicating means in the element connecting the channel of the hollow spindle with the passage means for applying suction to the channel of the hollow spindles, a tapered notch in the upper flange of the element adapted to catch and hold the strand at a point along a length extending from the passage in the element to the flyer guide.

9. In combination in a twisting machine, a rotatable hollow spindle, a strand receiving element carried by the spindle near its upper end and having flanges adjacent its ends, a hollow shaft about an intermediate portion of the spindle, bearing means connecting the spindle and shaft for permitting relative rotation therebetween, a flyer guide spaced laterally of the element and connected to the shaft for rotation therewith, means whereby reciprocation of the element axially with respect to the guide can be effected, an axial passage into the upper end of the element, communicating means connecting the channel of the hollow spindle with the passage, and means for applying suction to the channel of the hollow spindle.

10. In combination in a twisting machine, a rotatable hollow spindle, a strand receiving element carried by the spindle near its upper end, a hollow shaft about an intermediate portion of the spindle, bearing means connecting the spindle and shaft for permitting relative rotation therebetween, a flyer guide spaced laterally of the element and connected to the shaft for rotation therewith, means whereby reciprocation of the element axially with respect to the guide can be effected, a member projecting upwardly from the upper flange of the element, a notch in the member cut back with respect to the direction of rotation thereof, an axial passage through the member into the upper end of the element, communicating means connecting the channel of the hollow spindle with the passage, and means for applying suction to the channel of the hollow spindle, a tapered notch in the upper flange of the element adapted to catch and hold the strand at a point along a length extending from the passage in the element to the flyer guide.

11. A bobbin having a partially hollow body portion and flanges at each end thereof, means within the body portion adapted to seat the bobbin on a support, a strand receiving chamber within the body portion, a transverse screen separating the chamber from the seating means and an axial passage through one flange of the bobbin affording an entrance into the chamber.

12. A bobbin having a partially hollow body portion and flanges at each end thereof, a member projecting axially from one of the flanges, means within the body protion adapted to seat the bobbin on a support extending through the other flange, a strand receiving chamber within the body portion, a transverse screen separating the chamber from the seating means, and an axial passage through the projecting member and flange of the bobbin affording an entrance into the chamber.

13. A bobbin having a partially hollow body portion and flanges at each end thereof, a member projecting axially from one of the flanges, means within the body portion adapted to seat the bobbin on a support extending through the other flange, a strand receiving chamber within the body portion, a transverse screen separating

the chamber from the seating means, and an axial passage through the projecting member and flange of the bobbin affording an entrance into the chamber, a notch in the member cut back with respect to the direction of rotation thereof, and a tapered notch in the first-mentioned flange of the bobbin adapted to catch and hold a strand inserted therein.

14. In a twisting machine comprising a strand receiving element mounted rotatably and having flanges adjacent its ends, a flyer guide mounted rotatably adjacent one end of the element and extending from its mounting along side the element, means for rotating the guide about the element, and means whereby relative reciprocatory motion can be effected between the element and the guide axially of the element, the combination of a tapered notch extending transversely in that flange of the element away from the end adjacent which the flyer guide is mounted and adapted to catch and hold by wedging action the strand inserted therein.

15. In a twisting machine comprising a strand receiving element mounted rotatably, a flyer guide, means for rotating the guide about the element, and means whereby relative reciprocatory motion can be effected between the element and the guide axially of the element, the combination of an axial passage through the element, and suction means communicating with the passage.

16. In a twisting machine comprising a strand receiving element mounted rotatably, a flyer guide, means for rotating the guide about the element, and means whereby relative reciprocatory motion can be effected between the element and the guide axially of the element, the combination of a passage through the element, a transverse screen in the passage, and suction means communicating with the passage through the screen.

17. In a twisting machine comprising a strand receiving element mounted rotatably and having flanges adjacent its ends, a flyer guide mounted rotatably adjacent one flange of the element and extending from its mount alongside the element, means for rotating the guide about the element, and means whereby relative reciprocatory motion can be effected between the element and the guide axially of the element, the combination of a member extending from the other flange away from the first-mentioned flange, a passage through the member, and suction means communicating with the passage.

18. A package comprising a strand wound about a bobbin having a receiving chamber therein, said strand being wound about the bobbin in

a plurality of generally cylindrical layers, each layer being connected to each adjoining layer at a single turn only of the layer, said package having a tail comprising a portion of the strand wound about the outer periphery of the bobbin adjacent one end thereof and extending from the inside layer of the winding into the chamber.

19. A bobbin having a partially hollow body portion and flanges near each end thereof, means on the bobbin for seating the bobbin on a support, a strand-receiving chamber within the bobbin, a transverse screen separating the chamber from the seating means and an axial passage from one end of the bobbin affording an entrance into the chamber.

20. A bobbin having a partially hollow body portion and flanges near each end thereof, means on the bobbin for seating the bobbin on a support, a strand-receiving chamber within the bobbin, a transverse screen separating the chamber from the seating means and an axial passage from one end of the bobbin affording an entrance into the chamber, and a passage leading from the other end of the bobbin to the screen.

INGHAM S. ROBERTS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
911,170	Smith	Feb. 2, 1909
1,029,020	Marazzi	June 11, 1912
2,220,529	Lahr	Nov. 5, 1940
433,122	Good	July 29, 1890
386,810	Gill et al.	July 31, 1888
1,669,442	Bettini	May 15, 1928
537,518	Anderton	Apr. 16, 1895
1,683,436	Barbour	Sept. 4, 1928
2,262,145	Kimpton	Nov. 11, 1941
1,898,206	Niogret	Feb. 21, 1933
1,661,817	Colman	Mar. 6, 1928
1,868,408	Clinton	July 19, 1932
1,881,383	Wylie	Oct. 4, 1932
2,048,995	Clinton	July 28, 1936
1,580,374	Hulbert	Apr. 13, 1926
299,739	Clark	June 3, 1884
2,304,260	Keller	Dec. 8, 1942

FOREIGN PATENTS

Number	Country	Date
277,151	Great Britain	Sept. 15, 1927
8,290	Great Britain	1859
392,057	Great Britain	May 11, 1933