

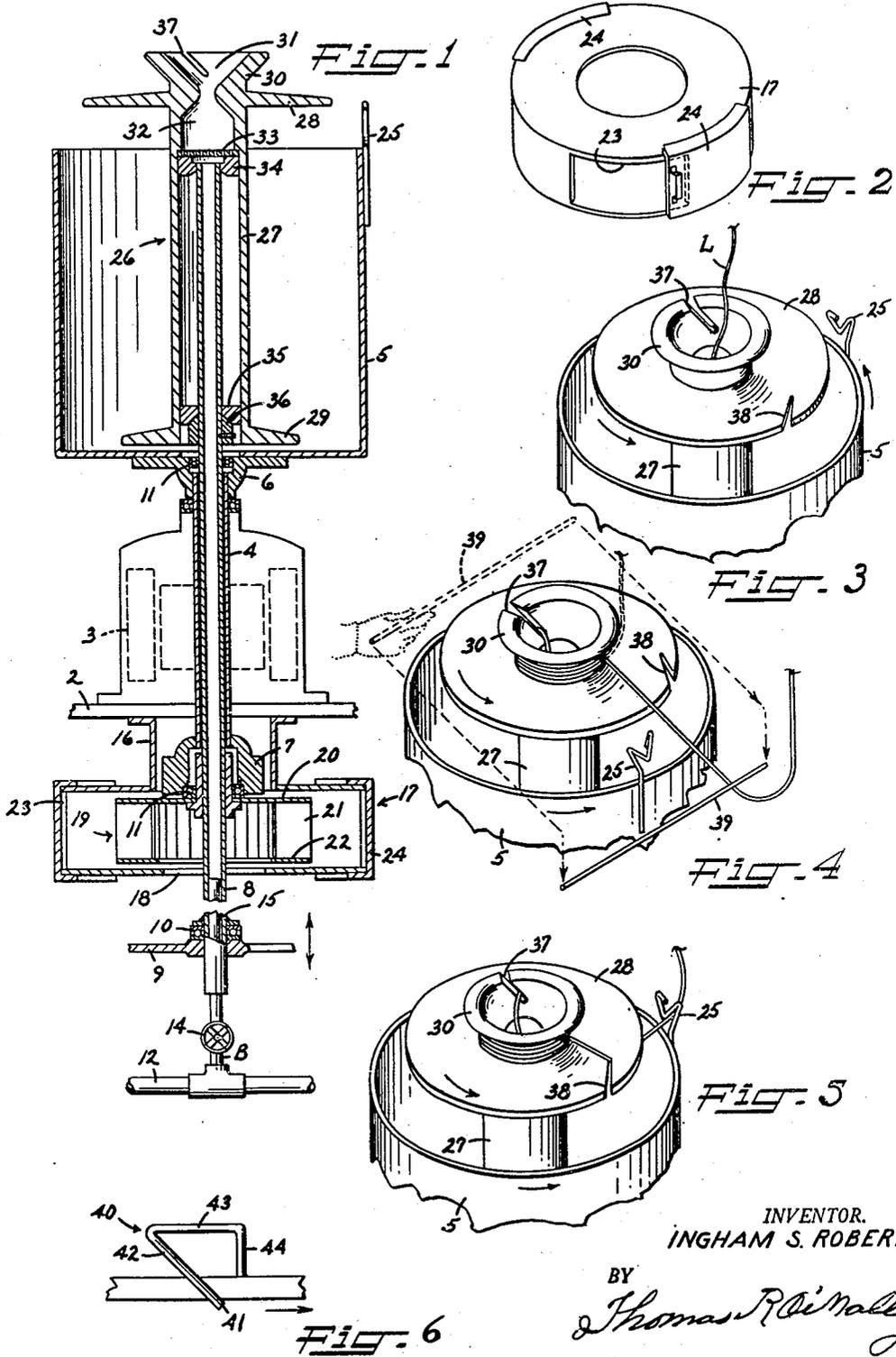
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METHOD AND APPARATUS FOR COLLECTING YARNS

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METHOD AND APPARATUS FOR COLLECTING YARNS

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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." This application is a division of my copending application Serial No. 518,783, filed January 19, 1944, now Patent 2,429,330.

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.

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A hollow spindle 8 is rotatably mounted within a traverse rail 9 to which is imparted vertical reciprocatory 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 foraminous member or 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 considerably 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 lowermost position in its traverse, lacing may be effected at any other position in the traverse, it being only necessary to draw the yarn 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 28, 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.

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:

1. In combination in a twisting machine, a strand-receiving element mounted rotatably, a flyer guide, means for rotating the guide about the element, means for imparting relative reciprocal motion between the element and the guide axially of the element, a drag fan secured for rotation with the element, a stationary housing about the drag fan and adjustable openings in the housing.

2. In combination in a twisting machine, a strand-receiving element mounted rotatably, a flyer guide extending upwardly from a rotatable support therefor arranged beneath the receiving element, means for rotating the guide about the element, means for imparting relative reciprocal motion between the element and the guide axially of the element, a drag fan secured for rotation with the element, a stationary housing about the drag fan and adjustable openings in the housing.

3. In combination in a twisting machine, a strand-receiving element mounted rotatably, a flyer guide extending upwardly from a rotatable support therefor arranged beneath the receiving element, means for rotating the guide about the

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element, means for imparting relative reciprocal motion between the element and the guide axially of the element, and adjustable means for retarding said element.

4. In combination in a twisting machine, a rotatable 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 between the spindle and the shaft, a flyer guide spaced laterally of the element and connected to the shaft for rotation therewith, means for reciprocating the element axially with respect to the guide, a drag fan fixedly secured to the spindle beneath the shaft, a stationary housing about the fan, and adjustable openings in the housing.

5. In combination in a twisting machine, a rotatable 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 between the spindle and the shaft, a flyer guide spaced laterally of the element and connected to the shaft for rotation therewith, means for reciprocating the element axially with respect to the guide, and adjustable means for retarding said spindle.

6. The method of collecting yarns comprising feeding yarn longitudinally into a rotating confining chamber, depositing the yarn against one surface of a foraminous member defining a wall of the chamber, and applying suction to the opposite surface during such deposition.

7. The method of collecting yarns comprising feeding yarns longitudinally through a narrow passage into a rotating confining chamber, depositing the yarn against one surface of a foraminous member defining a wall of the chamber, and applying suction to the opposite surface during such deposition.

8. The method of claim 7 in which the path

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of the air through the member is generally parallel to the axis of rotation.

9. The method of claim 8 comprising the additional step of winding a subsequently delivered length of yarn about the outer wall of the chamber.

10. Apparatus for collecting yarn comprising a container having a foraminous wall, suction means outside the container for withdrawing air from within the container through the foraminous wall, a narrow passage in a wall of the container other than the foraminous wall to provide a yarn entrance adapted to direct the yarn into the container, and means for rotating the container about an axis generally parallel to the direction of the passage.

11. Apparatus in accordance with claim 10 in which the container has an annular peripheral wall and the foraminous wall extends transversely of the peripheral wall.

12. The method of collecting yarns on a bobbin having an axial passage extending therethrough and a transverse foraminous member in the passage spaced from one end of the bobbin comprising feeding yarn longitudinally through said end of the bobbin into the passage, applying suction to the yarn in the passage through the foraminous member, rotating the bobbin, deflecting the yarn from a direct path into the passage outwardly and axially alongside the bobbin into the path of a flyer rotating concentrically about the bobbin.

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