March 14, 1950 A. D. ICKRINGILL 2,500,827

FLYER FOR SPINNING FRAME

Filed Nov. 10, 1947 2 Sheets-Sheet 1

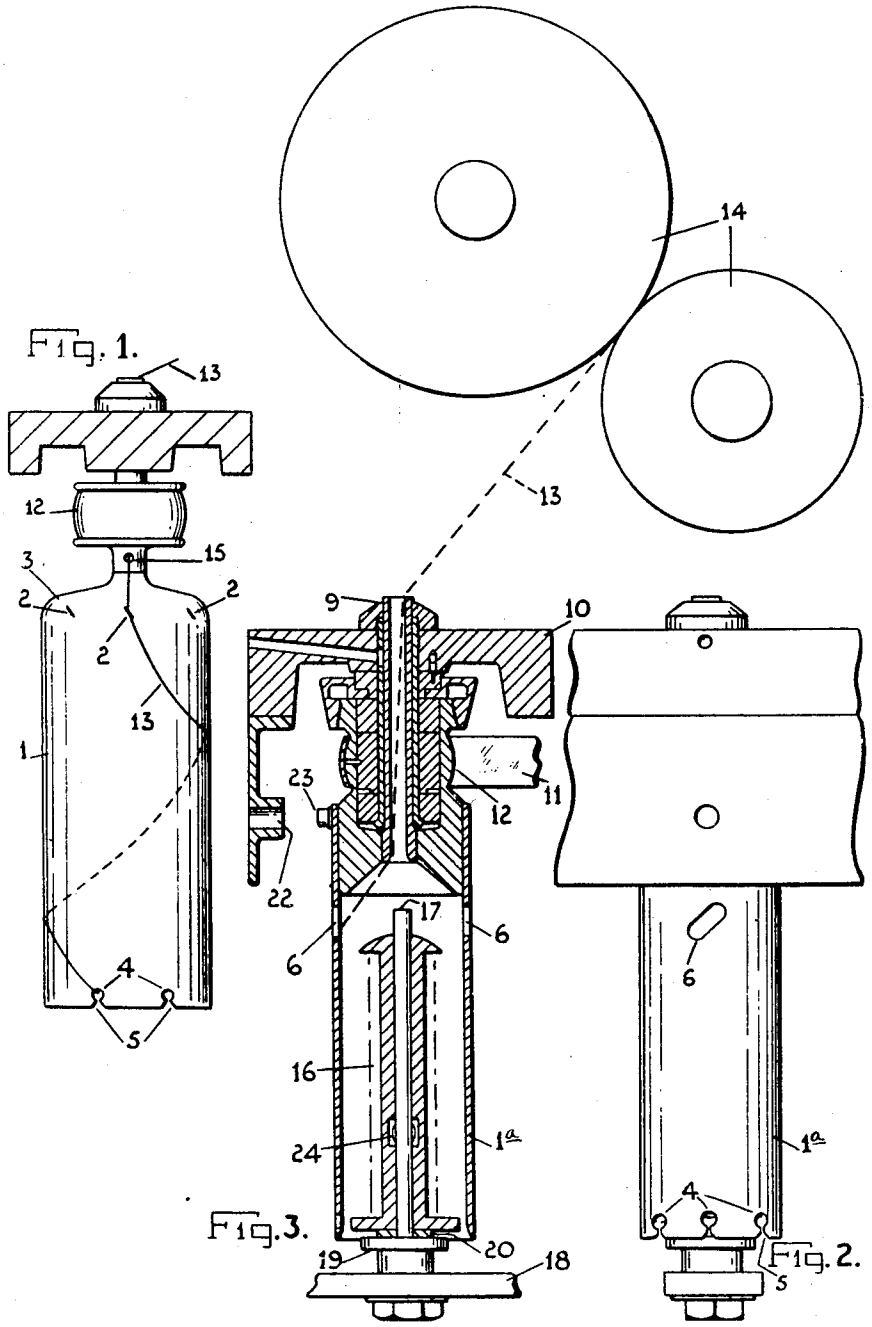

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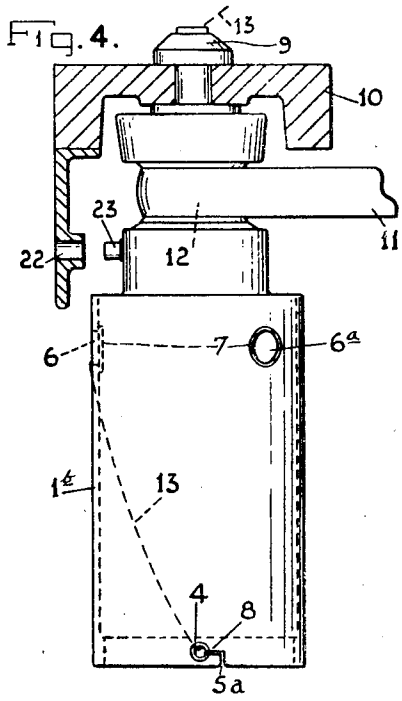
Fig. 4.



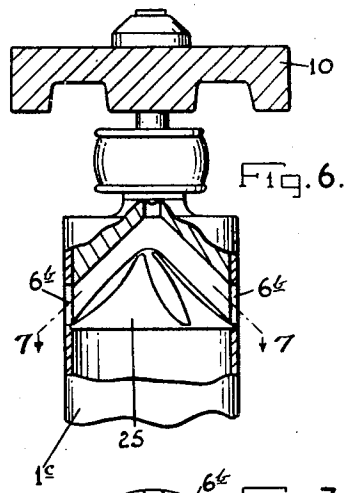


Fig. 6.

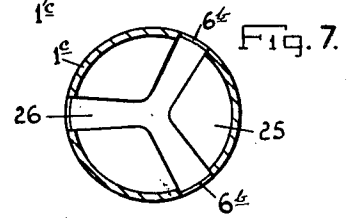


Fig. 7.

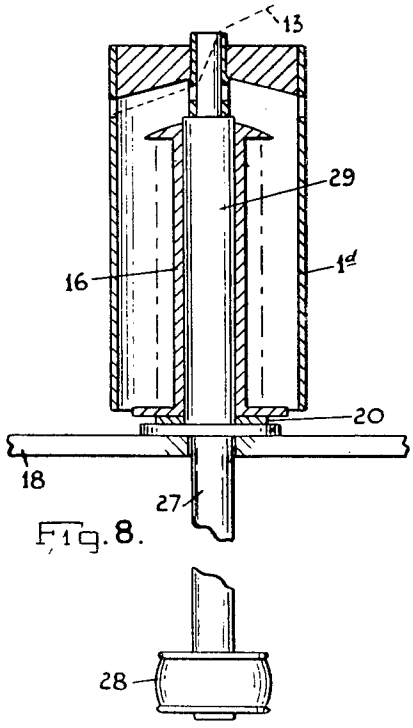


Fig. 8.

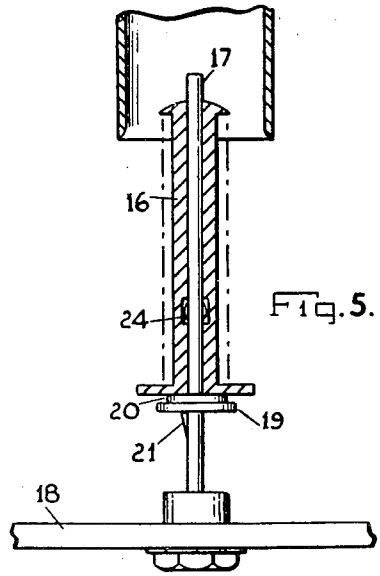


Fig. 5.

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UNITED STATES PATENT OFFICE

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FLYER FOR SPINNING FRAME

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5 Claims. (Cl. 57—115)

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This invention relates to flyers for spinning frame devices for spinning and/or twisting natural or artificial fibres.

In the spinning industry, apart from the spinning mule, spinning frames come under two main headings, i. e., ring or cap spinners and flyer spinners. In the one case a stationary cap is adapted to surround a bobbin on to which the yarn is wound and this is usually referred to as a leading bobbin due to the fact that it is driven to draw the yarn to itself as it is raised and lowered by the usual lifting gear. The main advantage with this arrangement is that relatively high speeds can be obtained, but a great disadvantage is that due to the high speed the yarn balloons and is more or less uncontrolled from where it passes under the lower edge of the cap right up through the guide eye to the nip of the last drafting rollers. As a result of this, twist is being put into the yarn over a good number of inches say, eight or nine, and in weak spots the yarn receives far too many twists per inch which results in poor yarn. In the case of the flyer the yarn is more controlled due to the fact that after leaving the nip of the rollers it passes down through the hollow flyer spindle to be passed round one of the arms of the flyer before being led through the lower eye on to the bobbin. In view of this the twist is put into the yarn over only a short distance between the flyer and the rollers and also the tension of the yarn over such distance is more controlled. This tensioning of the yarn is of great importance in that yarns vary in strength and characteristics and thus the tension requires to be adjusted according to the type of yarn being spun. If the tension is too slack for a particular type of yarn then snarling will occur, and if the tension is too great then the yarn will naturally snap. In both these cases there is loss of production in that the yarn must be pieced by the ends of the yarn being joined together. The flyer whilst overcoming some of these difficulties of control has a disadvantage in that the yarn must be taken in complete turns around the arm of a flyer. Thus a fine degree of tensioning adjustment cannot be obtained in that in some cases part of a turn would give ideal conditions. Another disadvantage with the flyer is that its speed of operation is far below that of the cap spinner in that above a given speed the flyer arms flex outwardly. Similar difficulties arise in the twisting frame.

The main object of this invention is to overcome the difficulties hitherto experienced by providing an improved method of spinning and/or

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twisting and means for carrying out either process.

Accordingly a method of spinning and/or twisting yarn consists in passing the yarn from the drafting or other rollers onto a rotary tubular flyer furnished with guide means for the yarn which passes from the tubular flyer onto a bobbin and driving said tubular flyer to rotate about the bobbin which should have a lagging action. The method may be such that the length of yarn having frictional contact with the periphery of the tubular flyer can be adjusted to a relatively fine degree for enabling fine adjustment of the tension of the yarn over the part where the twisting occurs between the rotating tubular flyer and the rollers.

A means for carrying out the above method may comprise a tubular flyer mounted to be driven and furnished with yarn guide means at its upper and lower ends so that yarn passing onto the periphery of the tubular flyer through the first guide means can pass a selected distance, vertically, or at an angle of inclination in a part turn or in one or more turns, down the periphery of the tubular flyer and through the lower guide means before passing to the bobbin. The rotary tubular flyer may be carried by a driven short hollow spindle mounting at its upper end or by a spindle passing up through the bobbin.

Means may be furnished for the hand or automatic doffing of the wound bobbins. The bobbin may rest on a friction washer or friction face on a displaceable rest or other element so as to be movable to a convenient position for piecening purposes. Each bobbin spindle, or the lifting rail carrying all the spindles, may be displaceable for moving or tilting the bobbins out of alignment with the rotary tubular flyers for facilitating the doffing operation.

Referring now to the accompanying drawings in which embodiments of the invention are shown:

Fig. 1 is a front view of one form of rotary tubular flyer;

Fig. 2 is a front view of a modified mounted rotary tubular flyer;

Fig. 3 is a sectional elevation at right angles to Fig. 2;

Fig. 4 is a part sectional side elevation of a larger type of rotary tubular flyer;

Fig. 5 is a sectional front view of a modified bobbin mounting;

Fig. 6 is a part sectional side view of a rotary tubular flyer with internal yarn guide means;

Fig. 7 is a sectional plan on line 7—7 of Fig. 6, and

Fig. 8 is a part sectional front view of a modified tubular flyer and mounting.

In a particular embodiment of the invention shown in Fig. 1, the rotary tubular flyer 1 is constructed similar to that normally in use in a stationary position but in this instance is furnished with one or more upper yarn guide grooves 2 (or equivalent means) in the shoulder 3 of the tubular flyer and a plurality of yarn guide holes 4 arranged around, and in close proximity to, the lower rim of the tubular flyer. To facilitate the passage of yarn into the guide holes, slits 5 lead thereinto from the rim. Such slits flare slightly at their outer ends to facilitate the entry of the yarn into the guide holes.

In Figs. 2 and 3 a slightly modified form of rotary tubular flyer 1^a and mounting is shown but the latter forms no part of this invention. In this tubular flyer 1^a the upper yarn guides comprise two diametrically opposite eyes 6. These are shown in the form of inclined slots which facilitate the yarn threading and piecening operations but holes or other shaped openings may be used. Also the number and relative positions of the upper and lower yarn guides may be modified to suit requirements. In Fig. 4 a tubular flyer 1^b is shown enlarged to receive large bobbins, with three upper yarn guide eyes 6^a (in the form of round holes) equally spaced apart and only two lower guide holes. By locating the latter diametrically opposite each other and at right angles to one of the upper guide eyes the required yarn adjustments may be obtained as hereinafter described. This tubular flyer 1^b has hardened renewable inserts 7 for the guide holes 6^a and also a renewable hardened insert 8 to form each of the lower guide holes 4^a. To prevent any possibility of the yarn slipping inadvertently out of a lower eye 4^a, right angular slits 5a are provided. The arrangement of guide eyes may be reversed, i. e., two upper and three lower in the same relative positions.

Hardened inserts or porcelain eyes may be used for upper and/or lower eyes in any of the tubular flyers, and colour and/or other characteristic markings may be associated with any of the eyes. Such markings may be used to facilitate the selection of certain eyes for particular types of yarn.

Any of the above tubular flyers can be mounted in a spinning frame of the type normally constructed to employ flyers but in the present instance the usual flyers are all replaced by the novel tubular flyers according to the invention. Any known or other form of mounting 9 (incorporating or forming a short hollow spindle) is carried by the flyer mounting rail 10 and rotated as usual by a belt 11 passed round the pulley 12. The tubular flyers are simply each secured to the short hollow driven spindle mounting through which the yarn 13 is led down from each pair of drafting rollers 14 to pass out laterally through the guide eye 15 in the wall of the short hollow spindle as in Fig. 1, or out of its lower end as in Figs. 2–4. Yarn so led through the hollow spindle eye 15 passes over the shoulder of the tubular flyer, is slipped into a guide groove 2 and then carried straight down or the required amount around the periphery of the rotary tubular flyer to pass through the selected guide hole 4 near the lower rim of the tubular flyer. In the other tubular flyers the yarn is led out through one of the guide eyes 6 and thence to a hole 4 in like manner. The yarn passes onto the bobbin 16 which is mounted on the bobbin spindle 17. The bobbin spindles may be of the usual length, or extended below the normal level, to be carried by the usual common lifter rail 18, which can be connected to any known form of lifting mechanism. The bobbin itself rests on a small plate 19 or other element with the usual form of felt or other friction washer 20 interposed to give the required lagging motion to the bobbin operation. With an extended spindle as shown in Fig. 5 this rest plate 19 is normally retained in position by a spring (or other) retaining element 21 which can be operated quickly, i. e., pressed inwardly, for allowing the bobbin and its rest plate to drop down the spindle to be wholly clear of the tubular flyer for piecening purposes. The bobbin with its rest plate can be raised to their normal position (which may be limited by stop means) and there retained by the aforesaid spring or other retaining element. When piecening or threading yarn, a tubular flyer may be held stationary by the insertion of a key through the opening 22 in the rail 10 to engage the pin 23 projecting from the tubular flyer.

To facilitate the threading or piecening operations, an internal yarn guide may be provided in the tubular flyer. In Figs. 6 and 7 a cone shaped member 25 is furnished with guide grooves 26 to suit the number of eyes 6^b and secured in position with its rim immediately below said eyes. The grooves may be dispensed with but serve as a positive guide for the yarn ends or threading needle when threading the tubular flyer 1^c downwardly or upwardly.

Alternatively as shown in Fig. 8, the rotary tubular flyer 1^d may be carried by a long driven spindle 27 passing axially through the tubular flyer to be driven from below by a belt on pulley 28. In this instance the bobbin 16 may be mounted loosely directly on this driven spindle or on a sleeve 29 mounted loosely thereon. In either case the bobbin 16 is rested upon a friction washer 20, for creating the required lagging motion and supported by a lifter rail 18. Here again the construction is such that the bobbin can be doffed when full, say, by removal of the tubular flyer for the bobbin to be withdrawn from the spindle. Moreover, although a tubular flyer somewhat similar in shape and design to known stationary caps used only for guiding purposes, has been described, it will readily be understood some other form of equivalent cylindrical device may be employed to achieve the same object. Furthermore more than one size of tubular flyer can be made to be fitted onto a mounting at will to allow for interchangement.

It will readily be understood that yarn led onto the surface of the rotary tubular flyer through the upper guide means can be led down to any one of the series of lower guide holes so that in the first instance the yarn can be led down and around the periphery of the tubular flyer a selected distance and tried to see if that gives the correct tension for the yarn. If this should prove unsatisfactory then fine adjustment either one way or the other can be made by leading the yarn to one of the other lower guide holes until the required tension is obtained for the particular type and characteristic of the yarn being spun. Due to this fine adjustment of frictional resistance on the yarn for changing the tension, very soft or weak yarns can be readily twisted without fear of breakage and what may be termed a firm bobbin or yarn can be produced. This arrangement provides complete control of the tension of the

yarn and ensures that the twist is put into the yarn over a relatively short distance and can rotate at relatively high speeds with no ballooning and fear of constant breakages with consequent high degree of production.

Although the above description has dealt with spinning frames it will readily be understood the rotary tubular flyer can also be applied to twisting frames. Two or more yarns can easily be led from the usual rollers through the guide means onto the tubular flyer which will allow control of the tension.

What I claim and desire to secure by Letters Patent is:

1. Device for spinning and twisting yarn comprising a tubular flyer, an axial bearing mounting for said tubular flyer including an axial yarn passage leading to the tubular flyer, yarn guides at the upper end of said tubular flyer for guiding yarn from said axial yarn passage onto the periphery thereof, a plurality of circumferentially spaced yarn guide eyes adjacent the lower end of said tubular flyer for the passage of yarn from the periphery to the interior thereof and so arranged with respect to the upper yarn guides that yarn passed onto the periphery of the tubular flyer through a selected upper yarn guide is passed a selected distance over the periphery of the tubular flyer and through a selected lower guide eye towards the axis of the tubular flyer, and driving means for rotating the tubular flyer.

2. Device according to claim 1, characterised by the upper yarn guides comprising grooves in the shoulder of the tubular flyer.

3. Device according to claim 1, characterised by the upper yarn guides comprising openings in the wall of the tubular flyer.

4. Device according to claim 1, characterised by the lower guide eyes opening into the rim edge of the tubular flyer for yarn threading purposes.

5. Device for spinning and twisting yarn, comprising a tubular flyer adapted to be rotated about its own axis, an axial inlet for yarn in the head of the tubular flyer, at least one guide eye in the wall of the tubular flyer for the outlet of yarn onto the periphery of the tubular flyer adjacent the upper end thereof, at least two further guide eyes in the lower rim of the tubular flyer circumferentially spaced and offset from the upper guide eye, and internal guide means between said inlet and outlet for facilitating yarn threading and piecening operations.

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