April 24, 1928. 1,666,894

E. GMINDER

SPINNING

Filed Sept. 17, 1925

Fig. 1.

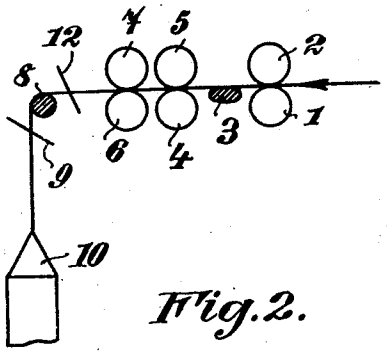



Fig. 3.

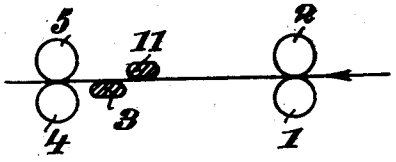



Fig. 2.

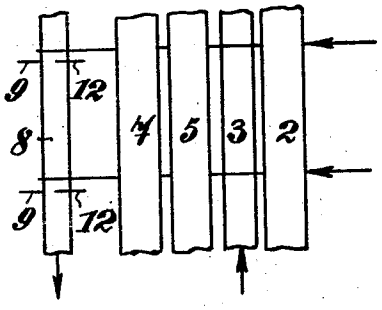
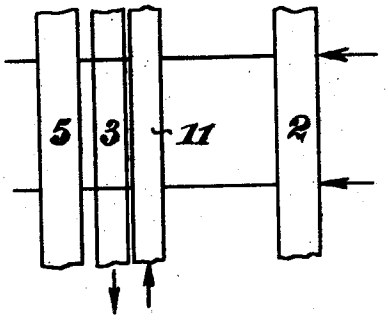



Fig. 4

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# UNITED STATES PATENT OFFICE.

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## SPINNING.

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Spinning machines, and more particularly ring spinning frames, especially those intended for cotton, wool and similar materials, have, as is known, the serious disadvantage that the yarn tension produced as a result of the spinning process acts right up to the front rollers, and the part of the thread in process of formation and extending partly round the front lower roller is endangered between the point where the thread leaves the front lower roller and the nipping point of the front rollers owing to the fact that this portion does not share in the twist or only does so to a very slight extent. This results in comparatively frequent breakage of the thread, and this, in the case of fairly long fibres, diminishes the yield and the quality and smoothness of the yarn and, in the case of shorter fibres, such as artificial wool, artificial cotton and the like, makes spinning almost impossible. At the place mentioned there also arises, owing to the yarn tension on the one hand and of the defective twist on the other hand, an uncontrollable and therefore undesirable draft, which, if it does not lead to breakage of the thread, frequently causes a thin place in the yarn, which has to be taken into consideration when giving the twist, by unnecessarily increasing the co-efficient of twist.

Numerous attempts to eliminate these defects, as for example, by inclining the plane of the drawing rollers or of the spindles, by altering the spindle speed, and by other similar means, have not led to the desired result, but have brought with them other disadvantages instead, which greatly reduce the advantages attained, if they do not more than counter-balance them. These means involve, for the most part, complicated, expensive and inconconvenient apparatus.

The distance between the first two pairs of rollers in the case of yarns prepared on flyer frames, has on this account hitherto been greater than the maximum staple of the material, because otherwise the true twist cannot be undone. A greater draft is not possible in this case because the slipping of the fibres, in consequence of the twisting pressure still being operative, always takes place unequally, thereby resulting in considerable irregularities. In the case of carded wool yarn rovings made on the web divider this does not apply, but the danger of increasing the rather great irregularity already existing by employing a roller draft is here even greater, for which reason these rovings have hitherto either not been drawn by means of rollers at all, or else only by the aid of complicated devices, which, by imparting a preliminary twist (spinning tubes and the like) render possible the employment of a slight compensating draft.

The process according to the invention obviates all these disadvantages in a very cheap and simple manner by subjecting the thread in course of formation to one or more continuously acting transverse frictional influences. The devices for this purpose are easy to fit to existing machines. The invention therefore involves not merely a technical improvement, but also an increase in economy.

Means for carrying out the process are shown in the accompanying drawings.

Figures 1 and 2 show diagrammatically, in side elevation (partly in section) and in plan respectively, drawing rollers according to the invention for flyer frame rovings; while

Figures 3 and 4 show corresponding views of drawing rollers according to the invention for web divided rovings.

Figures 1 and 2 show the apparatus according to the invention as applied to flyer frame rovings, which already have a certain preliminary twist from the flyer frame. The thread in process of production is subjected to the frictional action of a transversely moving wire 8 or of a friction surface which transmits the twists originating from the spindle 10 right up to the nipping point of the front rollers 6 and 7. Consequently a horizontal arrangement of the plane of the drawing rollers is possible, with all its advantages.

Between the first pair of rollers 1, 2 and the second pair of rollers 4, 5 is also arranged a friction surface 3. A pin 9 prevents the yarn from slipping off sideways, and in certain cases it is advisable to provide an additional pin 12 for the same purpose. From Figure 2 will also be seen the direction of movement of the friction surfaces 8 and 3, of which 8 runs in the twisting direction of the thread, while 3 runs in the opposite direction.

Figures 3 and 4 illustrate the application of the invention to drawing rollers for web divider yarns. Between the first pair of drawing rollers 1, 2 and the second pair of drawing rollers 4, 5 are arranged a lower

friction surface 3 and an upper friction surface 11, which move in opposite directions.

The friction surfaces move endlessly past all the threads of the same machine and may be so arranged as to run in one direction on one side of the machine and back on the other side, and on the working side of the machine to run over one driving pulley each.

The working process is arranged as follows:

*1. For flying frame roving.*

The slightly twisted roving supplied through the first pair of drawing rollers 1, 2 passes over the friction surface 3 to the second pair of rollers 4, 5. Owing to the fact that the friction surface 3 runs in a direction opposite to the direction of twist of the roving this slight twisting is loosened and a uniform drawing of this now opened piece of roving is rendered possible. Between the second pair of rollers 4, 5 and the front pair of rollers 6, 7 the roving now receives its main draft, and after leaving the nipping point between these two rollers it also immediately receives the spinning twist, which originates from the spindle 10 and is transmitted by the laterally moving friction surface 8 to the length of yarn located between the friction surface 8 and the front pair of rollers 6 and 7. Owing to the sharp deflection of the thread at 8, moreover, the yarn tension produced by the winding-on traveller is to some extent restrained, and is therefore smaller in the thrum between the friction surface 8 and the front pair of rollers 6 and 7 than between the friction surface 8 and the spindle 10. The pin 9 and, if necessary, the pin 12, prevent the thread from sliding off sideways in the direction of movement of the friction surface 8.

*2. For web divider roving.*

The roving is drawn between the first pair of drawing rollers 1, 2 and the second pair of rollers 4, 5. As set forth above, however, that is not possible in the case of a completely untwisted roving, so a slight-so-called false twist is produced in the neighbourhood of the rollers 4 and 5 by the friction surfaces 3 and 11 running in opposite directions. This twist then permits of the drawing of the roving between the two pairs of drawing rollers. The drawn roving leaving the rollers 4 and 5, and now free from twist again, may then be either spun immediately or may first be further drawn by providing an additional pair of rollers and then spun according to Figure 2 or in the manner hitherto usual on a self-acting mule. In conclusion it may be observed that in Figures 1 and 2, instead of the friction surface 3 engaging below the thread, a friction surface such as 11, moving in the opposite direction, may be arranged above the thread.

What I claim is:—

1. In a spinning process, deflecting the thread in process of formation through approximately a right angle, thereby diminishing the yarn tension originating from the spindle, imparting a spinning twist to the thread at the spindle and applying to the thread, at a place where said deflection occurs, a twist in the direction of twist of the thread imparted by the spindle, said last mentioned twist extending right back to the nipping point.

2. A spinning machine comprising a spindle adapted to impart a spinning twist, drawing rollers, a calender roller, and a friction surface moving parallel to the drawing rollers, in the direction of twist of the thread imparted by the spindle, and in contact with the thread in the neighborhood of the point of intersection of the axis of the spindle and the plane of the drawing rollers.

3. A spinning machine comprising a spindle adapted to impart a spinning twist, drawing rollers, a calender roller, and a friction surface moving parallel to the drawing rollers, in the direction of twist of the threads imparted by the spindle, and in contact with the thread in the neighborhood of the point of intersection of the axis of the spindle and the plane of the drawing rollers, said friction surface passing endlessly over all the threads that are being formed in the machine.

4. A spinning machine for web divider rovings, comprising two pairs of drawing rollers and two friction surfaces moving parallel to the drawing rollers, in opposite directions on opposite sides of the thread, and in contact with the thread between the first and second pairs of drawing rollers, said friction surfaces passing endlessly over all the threads that are being formed in the machine at different distances from the drawing rollers, whereby they are not in superposed relationship.

5. The process of spinning, which includes passing the thread from drawing rolls to a spindle, imparting to the thread a spinning twist at said spindle deflecting the thread at approximately right angles at a point intermediate of the drawing rolls and the spindle, thereby reducing the thread tension due to the spindle, and rotating the thread at the deflection point, in the direction of the twist of the thread, to transmit to the nipping point of the drawing rolls a portion of the twisting effect of the spindle.

6. A spinning machine including a spindle acting to impart a spinning twist to the thread, a plurality of drawing rolls and a wire disposed in the intersection of the spindle axis and the plane of the drawing rolls,

whereby the thread is caused to bend substantially at right angles in passing from the drawing rolls to the spindle, said wire being disposed substantially parallel to the drawing rolls and movable endwise to rotate the thread and transmit to the nipping point of the last drawing rolls a portion of the twisting effect imparted to the thread by the spindle and effect a reduction of the tension of the thread between said wire and the drawing rolls.

7. A spinning machine including a plurality of pairs of drawing rolls and a frictional band movable in a direction parallel to the axes of the rolls and between adjacent pairs, said band frictionally engaging with the thread to effect a change in the extent of the twist of the latter, and the thread opposite to the band being unsupported whereby the band offers but slight resistance to the endwise movement of the thread.

8. A spinning machine including a plurality of pairs of drawing rolls and a pair of friction bands disposed substantially parallel to the axis of said rolls and between adjacent pairs, one of said bands being movable endwise in one direction, and the other being movable endwise in the opposite direction to effect a change in the extent of the twist of the thread, said bands being at different distances from the next succeeding pair of drawing rolls, whereby the bands are not in superposed relationship, and the thread is not gripped between them.

In testimony whereof I have signed my name to this specification.

EMIL GMINDER.