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SPINNING AND ROVING FRAME

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Fig. 1

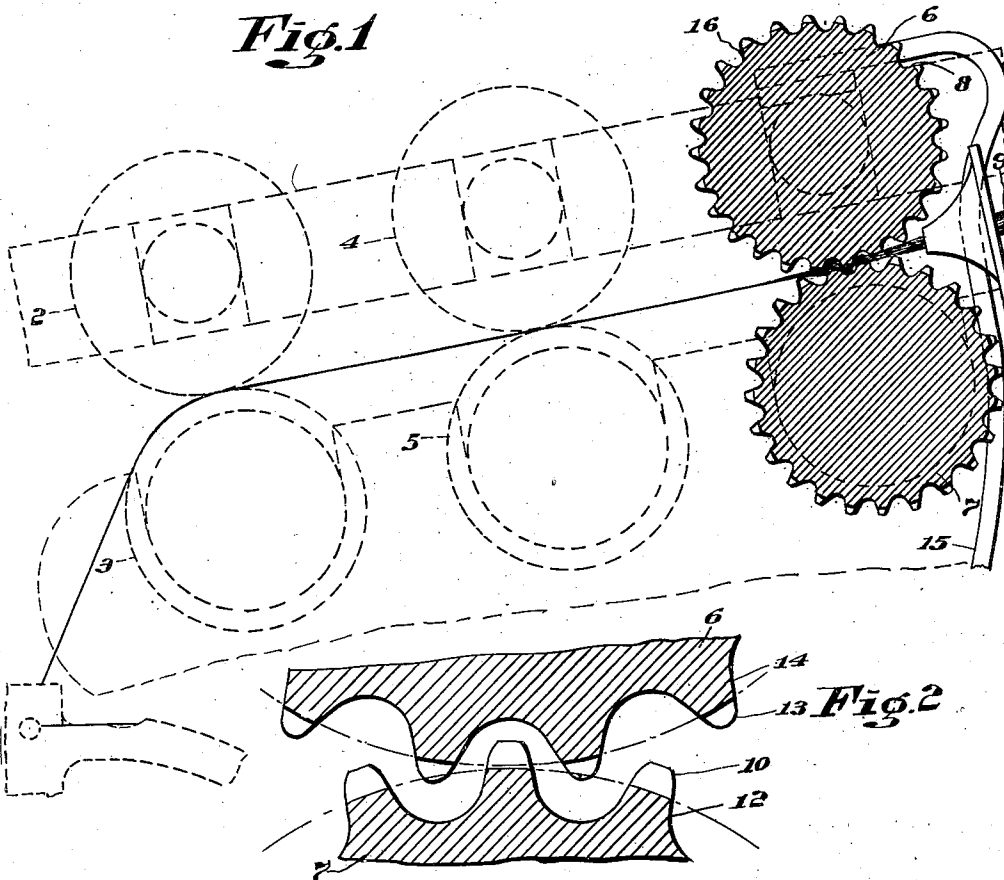


Fig. 2

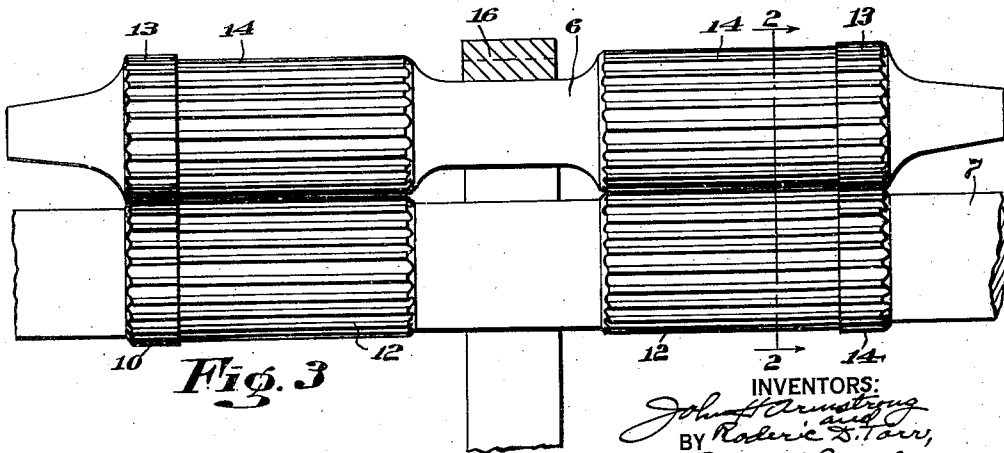
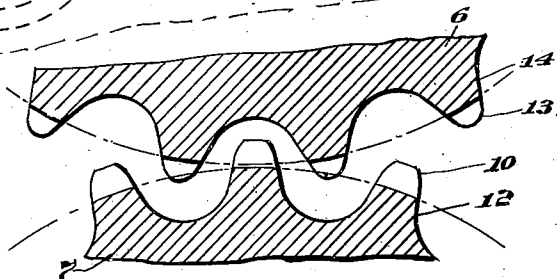


Fig. 3

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SPINNING AND ROVING FRAME

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5 Claims. (Cl. 19—130)

This invention relates to the drawing mechanisms of spinning and roving frames. Such mechanisms are customarily used in machines of this type to exert a parallelizing action on the fibers and to reduce the cross-sectional dimensions of the sliver or roving to that suitable for the particular product to be made. Usually these mechanisms consist merely of a series of pairs of upper and lower rolls arranged in line so that they act successively on one or more strands of fiber, each pair of rolls being driven at a higher speed than the preceding pair.

All of the bottom rolls are made of metal and consist of long shafts extending the entire length of the frame and provided at suitable intervals with fluted bosses for engaging and feeding the strands of roving. The top rolls, however, are short, each usually having two bosses connected by a reduced neck. The bottom rolls are positively driven by gearing at one end of the frame while the top rolls are revolved merely by contact with their respective bottom rolls. Usually, also, the top rolls are covered with a yielding material, such as leather, cork, or some synthetic composition.

It was discovered some years ago that if the back line of top rolls were made of a metallic fluted construction so that they would intermesh with the flutes of the bottom roll and thus be positively driven by the latter, such rolls, under some conditions, exerted an evening action on the strands of roving. In attempting to take advantage of this very desirable action, it was found that if the rovings were traversed axially of the rolls in the customary manner in order to distribute the wear on the top rolls having covers of leather or other yielding material, the evening action of the intermeshing back rolls disappeared and usually was replaced by a tendency to increase the initial irregularities in the roving. For this reason metallic feeding rolls or back rolls have never gone into commercial use to any substantial degree, so far as we have been able to learn, in drawing mechanisms of the type above referred to.

The present invention aims to overcome these difficulties and to utilize the advantages of intermeshing metallic back rolls in spinning and roving frames, both to effect an evening action on the sliver or roving and also to assist in producing a better control of the drafting operation, while at the same time traversing the fibrous strands axially of the rolls sufficiently to distribute wear to the desired degree.

The nature of the invention will be readily

understood from the following description when read in connection with the accompanying drawing, and the novel features will be particularly pointed out in the appended claims.

In the drawing:

Figure 1 is a diagrammatic view with some parts in elevation and some in vertical section showing a drawing mechanism for a cotton spinning or roving frame embodying features of this invention;

Fig. 2 is a fragmentary, sectional view on a large scale showing the relationship between the upper and lower rear rolls; and

Fig. 3 is a front elevation of an upper rear roll and the section of the lower roll cooperating therewith.

Referring first to Fig. 1, a drawing roll arrangement is there shown which is of a common type except for the fact that the rear rolls are of novel form. This arrangement includes upper and lower front or delivery rolls 2 and 3, middle rolls 4 and 5, and corresponding rear rolls or back rolls 6 and 7. The roving or sliver 8 is led from any suitable source of supply through a trumpet 9 to the late of the rear rolls and then passes forward through the other rolls of the set. Usually, the middle rolls are driven at a somewhat higher speed than the rear rolls and the delivery rolls 2 and 3 revolve at a considerably higher rate than the middle rolls. This is a common roll arrangement, but the number of pairs of rolls used vary with different types of mechanisms, and one or more of the intermediate rolls sometimes is replaced with an equivalent device, such as a belt or apron. So far as these features of general organization are concerned, the present invention requires no change in any of the drawing mechanisms customarily used in cotton spinning and roving frames except that the rear line of upper and lower rolls is replaced with fluted intermeshing rolls such as those shown in Fig. 3.

The lower of these rear rolls consists of a long shaft, similar to those in common use, provided with a series of fluted bosses spaced apart by suitable distances. In this instance the bosses are of a novel form. That is, they are grooved more deeply than is customary and each boss is divided into two sections, one section 10, Fig. 3, having teeth longer in radial dimensions than those in the adjoining section 12.

The top roll 6 also is similar in its general form to those customarily used but differs from them in being made of metal, provided with two bosses, and these bosses being fluted in the same general manner as the lower roll. Also, like the latter,

each boss is divided into two sections 13 and 14, the teeth in the latter section being shorter than those in the former.

As shown in Fig. 3, the teeth of each section 13 of the lower roll intermesh with those of the corresponding sections 13 of the upper roll. Since the former is positively driven, as above explained, this arrangement also positively drives the upper roll. These sections are utilized solely for driving purposes and they do not normally engage the sliver or roving. The sections 12 and 14 of these rolls, however, are provided for fiber feeding purposes, the sliver being fed between these areas by the engagement of the teeth with it, as shown in Fig. 1. In these areas, however, the teeth are so reduced in radial dimensions that they are never in contact with each other even when there is no fiber between them. In the particular construction shown this result is accomplished by grinding or machining the sections 12 and 14 down to approximately the pitch circle, preferably so that some clearance is left between the tops of the teeth at all times, even when the driving teeth of the two rolls bottom one in the other. Such clearance may be only very slight, say, in the neighborhood of three- or four-thousandths of an inch. This arrangement is illustrated on a considerably enlarged scale in Fig. 2, the pitch circles being shown in broken lines, the teeth in the fiber working sections 12 and 14 appearing in cross-section and the tops of the longer driving teeth of the sections 10 and 13 being shown in elevation.

In the particular construction shown a novel fluting has been used. The teeth of the bottom roll are of involute form while those of the top roll are of a more rounded formation. In this construction a typical radius for the groove between the teeth of the bottom roll is .0375" and the total tooth height or radial dimension from root to tip is in the neighborhood of .062". Such a roll usually is about an inch and an eighth in outside diameter in the section 10. In the top roll the tooth height is somewhat shorter, say .051" and the radius of the groove separating adjacent teeth is about .042". Usually the number of flutes per roll is between 30 and 40. While this construction is one that has worked well, it has been found that the shape of the teeth may vary considerably while producing entirely satisfactory results. In fact, the common form of fluting gives good results if deepened slightly and suitable clearances are provided. A form of tooth more like that shown in the drawing is preferred, however.

These rolls are mounted in the usual manner, the lower roll being supported in the bearing sockets provided for it in a roll stand, and the upper rolls being held in the proper relationship to each other and to the bottom rolls by means of the usual cap bars. Also, the top rolls are weighted in some suitable or customary manner as, for example, by means of weight hooks, each equipped with a saddle element bearing on the neck portion of the top roll. Such a hook and saddle are indicated at 15 and 16, respectively, Fig. 1, and the saddle is shown at 16 in Fig. 3.

With this arrangement the top roll rides on the two strands of sliver being fed between the sections 14-14 and the bottom roll, and it rises and falls to accommodate variations in the thickness of successive portions of the strands. However, it is so weighted that the flutes of the top roll force the sliver more or less into the grooves

of the bottom roll. The amount of cotton so pressed into the flutes appears to be nearly constant regardless of variations in the thickness of the sliver, provided the weight on the strand is maintained constant. Consequently, the percentage of fiber in a heavy section of the sliver held in the flutes is less than the percentage when the sliver is light or thin. Thus a heavy sliver feeds more slowly than a light sliver. Or, to state the matter somewhat differently, a thick section of a sliver is not crimped so much or forced into the flutes as deeply as a thin section. This fact causes the rolls to exert an evening or leveling action on the sliver so that they feed to the rolls in front of them a more uniform weight of cotton per revolution of the bottom roll than they receive. Such a reduction in yard for yard variation in the product is an important advantage.

The drive from the lower to the upper roll normally takes place through the cotton but if any slip tends to occur it is stopped almost instantly by the action of the driving teeth. Consequently, the feed is positive and the fiber feeding teeth of the two rolls can never get materially out of correct angular relationship to each other. While this relationship is not one of actual intermeshing because the teeth are not long enough to mesh, or at least not to any substantial degree, still that relationship is of advantage from an operating standpoint. It will be observed that the long teeth of the two rolls provide, in effect, a geared connection between the rolls and that the limited clearance between the teeth affords a certain differential or come-and-go in the driving connection necessary to enable the rolls either to drive or to hold, as may be necessary.

Closely related to this operation is the fact that the engagement of the two sets of teeth with the sliver at the feeding point effectively holds the fibers against any material degree of slip. When a cushion top roll cooperating with a fluted bottom roll is used in the back line of the drawing mechanism and the draft between the middle and back rolls is of substantial value, then it is necessary to weight the top roll very heavily in order to prevent some slip. The arrangement here provided, however, prevents such an action even with a relatively light weighting and produces a positive feed. Since an evening action is coupled with this positive feed, as above described, the operation of the entire assembly is improved and a yarn having a higher average breaking strength is produced.

A typical weighting applied to the neck of the roll 6 is in the neighborhood of ten or twelve pounds. In some cases it may be reduced as low as five or six pounds and it practically never runs above twenty pounds.

Such an arrangement as that above described works well with the ordinary traverse mechanisms in which both strands running under a given top roll are simultaneously moved axially of the rolls first in one direction and then in the other. With the old arrangements such a traverse set up a leverage condition which resulted in a very substantial variation in the weight applied to any strand at different points in its stroke. That is, the strand nearest to the neck of the roll always was under a greater weight than the strand farther away. This leverage condition is minimized in the arrangement above described because the outer ends of the top roll are in driving engagement with the

bottom roll, and the approach of either end of the top roll to the corresponding portion of its companion lower roll is limited by the driving teeth of the lower roll bottoming in the grooves of the driving teeth of the top roll. Thus the greater part of the difficulty which has been experienced heretofore in using intermeshing metal rear rolls in a drawing mechanism of this type together with a traverse motion is obviated.

In addition to the particular arrangement above described, it should be understood that good results can be obtained with slightly different relationships of the fluted rolls to each other and some variation in this relationship will be found desirable in operating on different weights and compositions of sliver. For a cotton sliver of the common staple lengths and weighing from fifty to sixty grains per yard, the spacing of the rolls 6 and 7 may vary from a clearance of .006 inch to an intermesh of .010 inch while still producing good results.

It will be obvious to those skilled in this art that Fig. 3 shows merely a short section of the lower roll 7, that roll usually running the entire length of the frame. Also, that a series of top rolls like that shown at 6 is provided to cooperate with each pair of bosses of the lower roll.

While we have herein shown and described a typical embodiment of our invention, it will be evident that the invention may be embodied in other forms without departing from the spirit or scope thereof.

Having thus described our invention, what we desire to claim as new is:

1. In a drawing mechanism for roving and spinning frames, the combination with a set of drawing rolls, of a pair of fluted upper and lower rolls meshing with each other and positioned behind the drawing rolls where they serve to feed the roving to the drawing rolls, said fluted rolls having intermeshing teeth to drive the top roll from the bottom roll and also having fluted fiber feeding areas in which the teeth are shorter in radial dimensions than said driving teeth and are positioned in angular relationship suitable for intermeshing with each other but are held at all times out of direct contact with each other, the teeth in said fiber feeding areas having sufficient clearance so that the top roll is normally driven through the intervening roving, but any substantial slip between the two rolls is prevented by said intermeshing driving teeth.

2. In a drawing mechanism for roving and spinning frames, the combination with a set of drawing rolls, of a pair of intermeshing fluted upper and lower rolls, the lower of which is driven, positioned behind the drawing rolls where they serve to feed the roving to the drawing rolls, said fluted rolls having intermeshing teeth to drive the top roll from the bottom roll and

both also having cooperating fluted fiber feeding areas in which the teeth are spaced circumferentially to intermesh but are so reduced in height that they are always held out of intermeshing relationship by the driving teeth of the two rolls, said teeth in the fiber feeding areas of the rolls being high enough so that those of one roll force the roving into the grooves of the other roll during the feeding action of the two rolls.

3. In a drawing mechanism for roving and spinning frames, the combination with a set of drawing rolls, of a pair of inter-meshing fluted upper and lower rolls, the lower of which is driven, positioned behind the drawing rolls where they serve to feed the roving to the drawing rolls, said fluted rolls having inter-meshing teeth to drive the top roll from the bottom roll and both also having cooperating fluted fiber feeding areas in which the teeth have the same pitch as the driving teeth but have their tops cut down to approximately the pitch circle, whereby the roving is crimped and gripped by the flutes of said fiber feeding areas of the rolls.

4. In a drawing mechanism for roving and spinning frames, the combination with a set of drawing rolls, of a pair of fluted upper and lower rolls, the lower of which is driven, positioned behind the drawing rolls where they serve to feed the roving to the drawing rolls, said fluted rolls having intermeshing teeth to drive the top roll from the bottom roll and both also having cooperating fluted fiber feeding areas in which the teeth are cut down to approximately the pitch circle and having sufficient clearance so that the top roll is normally driven through the intervening roving, and weighting means for said top roll for applying a pressure thereto of between five and twenty pounds.

5. In a drawing mechanism for roving and spinning frames, the combination with a set of drawing rolls, of a pair of fluted upper and lower rolls, the lower roll of which is driven, positioned behind the drawing rolls where they serve to feed the roving to the drawing rolls, said fluted rolls having intermeshing teeth to drive the top roll from the bottom roll and both also having cooperating fluted fiber feeding areas in which the teeth are cut down to approximately the pitch circle but are so spaced circumferentially that they would intermesh if they were of sufficient length to do so, whereby they crimp the roving fed through them, means supporting said top roll for vertical movement toward and from its companion lower roll, and means for pressing the top roll yieldingly toward the bottom roll with sufficient pressure to grip and feed strands of roving but yielding vertically with changes in the thickness of successive portions of the roving.

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