June 23, 1931. W. A. FEUGILL ET AL 1,811,352

TENSION FALLER BAR FOR SPINNING MULES

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Fig. 1

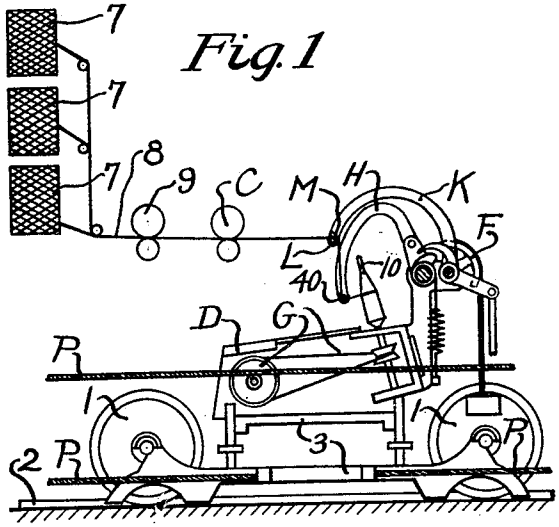
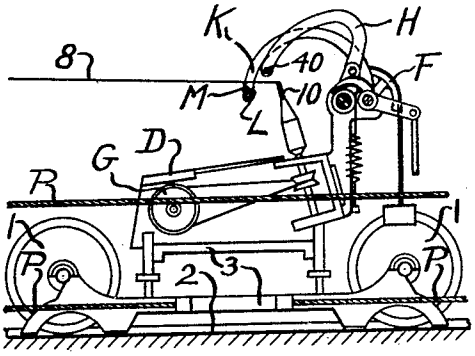


Fig. 2



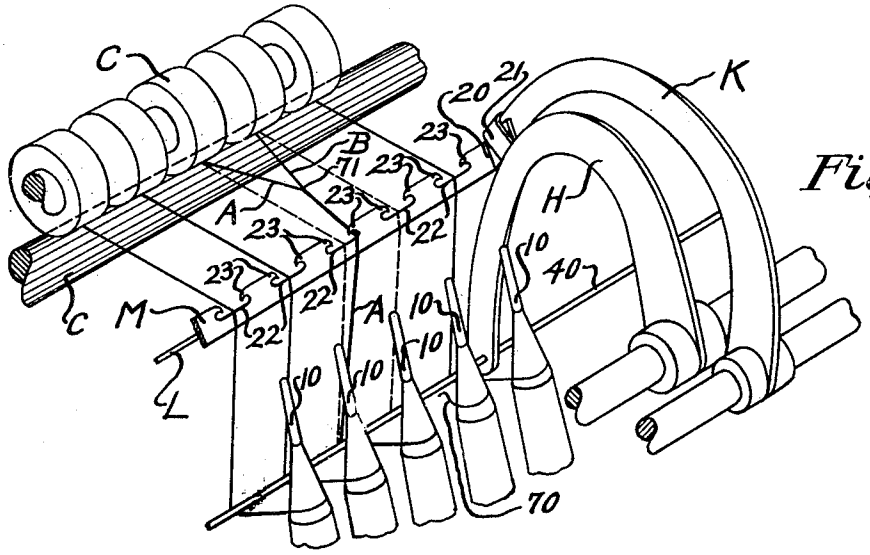


Fig. 3

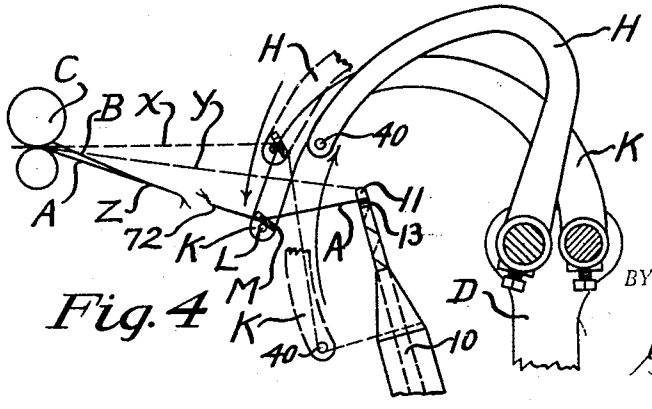


Fig. 4

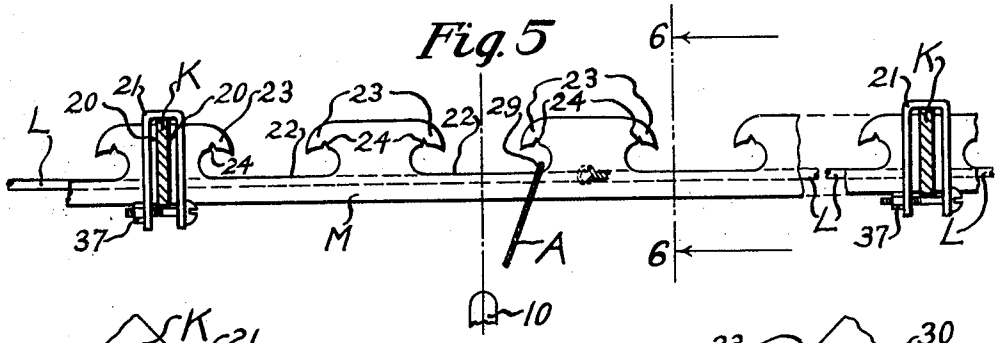
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Fig. 5



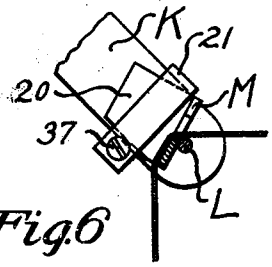


Fig. 6

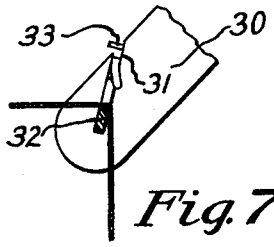


Fig. 7

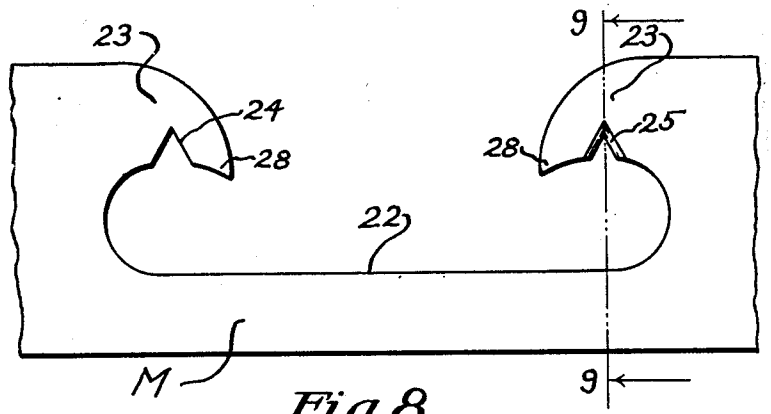


Fig. 8

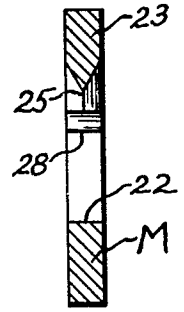


Fig. 9

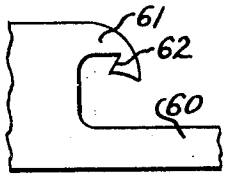


Fig. 10

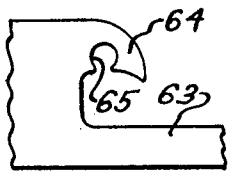


Fig. 11

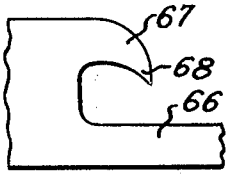


Fig. 12

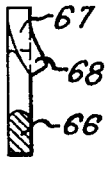


Fig. 13

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UNITED STATES PATENT OFFICE

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TENSION FALLER BAR FOR SPINNING MULES

Application filed January 23, 1930. Serial No. 422,793.

This invention relates to mules used for spinning in textile mills.

It is particularly useful on mules for spinning or twisting worsted according to the so-called French system, but it may be used on any mule for spinning or twisting any textile fibre.

In the process of mule spinning, a substantially untwisted strand of roving is delivered by suitable rolls and may be drawn out more or less between the rolls and the spindle and may be twisted or spun more or less between the same points. The material between the rolls and the spindles is called an end.

The special purpose of this device is to prevent or reduce what is known as double spinning. Double spinning is caused when an end running to a spindle A breaks and floats over to the end running to an adjoining spindle such as B. As the spindles are only one to two inches apart this often happens.

When the loose end strikes the unbroken roving going to the other spindle it is twisted in and instead of yarn of the same weight as that on the other spindles, this particular yarn is double.

Moreover, if the part of one of these ends breaks between their junction and the delivery rollers, the other rollers continue to deliver and the result is a section of double yarn wound in on the spindle unknown to the spinner.

It is the purpose of this device to provide a counter or tension bar so called with a series of slots in the top, the centre of each of which slots is opposite a spindle, each slot having on each side at the top an overhang or hook in the bottom of which preferably is a nick.

These bars are fastened to and move up and down with and between counter or tension sickle arms and if there is no break, when they come up, they merely assist the faller wire to create the desired tension on the yarn, but if a double has formed, the pull of the yarn and of the spindle draws the two strands towards each other so that they travel a new path between their previous paths. When the tension bar again descends, the two united strands are caught under one of the hooks and particularly in the nick therein and is carried down below the top of the spindle. Therefore when the carriage starts to move away and the spindle to turn, the end instead of being twisted is wound on the spindle and quickly breaks between the rolls and the spindle.

The broken end being wound in a compact spiral near the tip of the spindle is very convenient for the spinner as he can easily slip it off and remove all of the double yarn.

We are aware that there are devices for breaking the yarn by cutting and by putting a tension on it while it is being wound on the body of the spindle or yarn package, but this has a tendency to bury the end in the mass of yarn thus upsetting the correct winding and also making it difficult for the spinner to find the end for piecing.

As our device is on the counter or tension faller instead of the winding or builder faller and catches the roving or yarn on the down stroke, whatever pull there is, is against the bare end of the spindle thus avoiding the above objections.

One of the advantages of our device is that it is very simple occupying no more space than the usual faller wires.

As it moves with the carriage and the tension faller sickle arms are constantly moving up and down, it does not collect dirt and dust or fly waste.

Our device substantially comprises a series of yarn guide bars attached between the ends of the counter sickle arms, each bar having in its upper edge a plurality of recesses the center of each of which is opposite a spindle. There is at each end of each recess an overhanging finger and preferably each of such fingers has in it a V shaped nick or nick of some sort whereby if there is not a double, the bar acts merely as an auxiliary to the faller wire. We prefer to retain also the regular faller wire.

When there is a double and one end gets twisted with an adjoining end, the course of the end is changed and at the commencement of the winding period, this double end continues to run in the groove or recess. As the carriage runs in towards the head, the double end being off the regular course works over

towards the side of the recess under a finger where it stays until the completion of the stretch.

At the end of the stretch when the fallers change, the double end being in a trap catches under a finger and slides into a nick therein, if a nick is used, and remains there while the bar which carries the hooks and which is carried by the end of the tension arms carries it down below the top of the spindle.

We utilize the fact that if the yarn or roving extends from the top of the spindle at a greater angle than 90°, spinning takes place but when it is forced into a lesser angle than 90°, winding takes place.

As is well known, after the end or the newly made yarn is wound or built on the cop or spindle, and the winding faller moves up and tension faller down, the slack is wound around the tip of the spindle and when this slack is taken up, ordinarily the winding and tension fallers are clear and the continued revolution of the spindle does not wind any more yarn but spins, or in some mules, the spindles may remain stationary and the roving is drawn out to the desired point when spinning begins.

In any case, however, our device forces the roving or the yarn down out of a straight line and so that as it is wound on the tip of the spindle it breaks near the guide bar.

Preferably, we use a V shaped nick which tends to hold back the yarn or roving and prevent it from slipping through and we may have the edges of this V shaped nick sharpened to assist the wedging action and the breaking of the yarn.

In the drawings, Fig. 1 is a diagrammatic side elevation of a mule carriage and part of the delivery mechanism showing the fallers in the winding position.

Fig. 2 is a side elevation similar to Fig. 1 showing the fallers in the spinning position.

Fig. 3 is a perspective showing the delivery rolls and fallers in the winding position with one broken end.

Fig. 4 is a detailed side elevation showing the different positions of the fallers and the different positions of the ends in the various processes of spinning and winding.

Fig. 5 is an elevation of one of our preferred type of tension bars.

Fig. 6 is a sectional view looking from the right on line 6—6 of Fig. 5 showing our preferred method of attaching a tension bar to a tension sickle arm.

Fig. 7 is an elevation similar to Fig. 6 showing another method of attaching our tension bar to a tension arm.

Fig. 8 is an enlarged elevation showing a recess and two overhanging fingers with our preferred type of tension bar.

Fig. 9 is a section looking from the right on line 9—9 of Fig. 8.

Figs. 10, 11 and 12 are elevations showing different types of overhanging fingers.

Fig. 13 is an elevation from the right of Fig. 12.

In the drawings, 7 indicates spools or other packages from which roving, indicated by 8, is drawn by means of rolls such as 9 and delivery rolls C.

D represents a common type of carriage supported by a frame 3 on wheels 1—1 which travel back and forth as on tracks 2 in a well known manner.

10—10 represent spindles of the usual inclined type shown as being revoluble as by pulleys and bands all indicated by the letter G. This revolving mechanism G is of the usual type for spinning, winding, backing off and stopping, any or all of them in any well known manner and through any of the well known devices which it is not necessary to show.

H represents one of the winding sickle arms which carry a faller wire 40.

K, K represents tension faller sickle arms of any well known type and F represents means to suitably move the winding arms and the tension arms at the appropriate time for drawing, spinning, backing off and winding.

P, P represent ropes of any well known type for giving motion to the carriage D and for transmitting motion to the spindles through mechanism indicated by G and to the faller arms indicated by H and K.

L represents a faller wire which may be of hardened steel carried in the usual position at the ends of the tension arms K, K.

M represents what is the novel feature of our device which we will call a yarn guide bar.

Preferably there are a plurality of such bars attached between adjoining tension arms K, K, as shown in Figs. 3, 5 and 6.

Each is made of flat metal and preferably is bent at each end 20 as shown in Fig. 5 each bar being fastened to an arm such as K as by means of a yoke 21 and bolt 37 shown in detail in Fig. 6.

Each bar M has in its upper edge a plurality of recesses or grooves 22 the center of each of which is opposite a spindle such as 10. At each end of each recess 22 is an overhanging finger such as 23 and preferably extending up into the lower edge of each finger inside its tip 28 is a nick which is preferably of inverted V shape 24 or 25. As shown in Fig. 8 at 25 the edges of this nick may be sharpened or as shown at 24 the edges may be dull.

In Fig. 3, we show how two ends A and B which are being spun into yarn may come together as a double. As shown, B has broken leaving an end 70 wound on one spindle while at 71 the two have come together as a V and the pull has shifted the paths of the

ends from the two dotted lines to the full lines.

The strand A is drawn under the overhanging finger 23 as shown more clearly at 29 in Fig. 5. Double strand A will now be caught by finger 23 and caused to be broken by the downward movement of the tension sickle arm K as shown in Fig. 4.

In Fig. 4, the dotted line Y indicates the spinning course of the yarn while X indicates the winding course and Z represents the course assumed by the double yarn such as A when the faller arms H and K shift from the dotted to the full line position.

The double yarn, being carried down below tip 11 and at about a right angle with the spindle 10, is wound and pulled apart near our guide bar M and the end such as 72 is quickly wound up into a small spiral at 13.

This spiral is in a convenient place where it can quickly be slipped off by the spinner.

Instead of bending each end of bar M, as shown in Fig. 7, we can use one continuous bar such as 32 which sets in a slot 31 in a tension arm 30 being held in place as by a pin 33.

The shape of the fingers and nicks can be greatly changed, if desired, as for instance in Fig. 10 where on the bar 60, the nick 62 in finger 61 is a V which slopes up and in.

In Fig. 11 the nick 65 in finger 64 on bar 63 is circular while in Fig. 12 there is no nick in the finger 67 on the bar 66.

The end such as 68 of a finger or hook such as 67 can be bent out if desired for certain classes of work.

We claim:

1. The combination with a spinning mule having a fixed frame and a plurality of delivery rolls revoluble therein, a carriage on which are a plurality of inclined revoluble spindles, said carriage being movable to and from said rolls, and means to move the carriage, together with means to cause such spindles to revolve for spinning, for winding, for backing off and to cause them to stop, winding faller sickle arms pivoted on the carriage and a faller wire carried thereby, tension faller sickle arms pivoted on the carriage and a faller wire carried thereby, and means to move said arms for drawing, spinning, backing off and winding; of a series of yarn guide bars each of flat metal bent at the ends and fixed between adjoining tension arms, each bar having in its upper edge a plurality of recesses the centre of each of which is opposite a spindle, there being an overhanging finger at each end of each recess, each of such fingers having in its lower edge an inverted V shaped nick having sharp cutting edges.

2. The combination with a spinning mule having a fixed frame and a plurality of delivery rolls revoluble therein, a carriage on which are a plurality of inclined revoluble spindles, said carriage being movable to and from said rolls, and means to move the carriage, together with means to cause such spindles to revolve for spinning, for winding, for backing off, and to cause them to stop, winding faller sickle arms pivoted on the carriage and a faller wire carried thereby, tension faller sickle arms pivoted on the carriage and a faller wire carried thereby, and means to move said arms for drawing, spinning, backing off and winding, of a series of yarn guide bars each of flat metal bent at the ends and fixed between adjoining tension arms, each bar having in its upper edge a plurality of recesses the centre of each of which is opposite a spindle, there being an overhanging finger at each end of each recess, each of such fingers having in its lower edge a V shaped nick.

3. The combination with a spinning mule having a fixed frame and a plurality of delivery rolls revoluble therein, a carriage on which are a plurality of inclined revoluble spindles, said carriage being movable to and from said rolls, and means to move the carriage, together with means to cause such spindles to revolve for spinning, for winding, for backing off and to cause them to stop, winding faller sickle arms pivoted on the carriage and a faller wire carried thereby, tension faller sickle arms pivoted on the carriage, and means to move said arms for drawing, spinning, backing off and winding; of a guide bar carried by the tension arms, such bar having in its upper edge a plurality of recesses the center of each of which is opposite a spindle, there being an overhanging finger at each end of each recess, each of such fingers having in its lower edge a nick.

4. In a worsted mule having a carriage on which are a plurality of alined spindles together with a set of winding faller sickle arms and a set of tension faller sickle arms; a plurality of guide bars, each bar being bent at an angle at each end and being attached thereby to a tension faller sickle arm, each bar being of substantially rectangular cross section and of greater height than thickness and having in its upper edge a series of recesses the center of each recess being opposite a spindle, each recess having on each side an overhanging finger in the lower edge of which is a nick.

5. In a worsted mule having a carriage on which are a plurality of alined spindles together with a set of winding faller sickle arms and a set of tension faller sickle arms; a guide bar carried near the free ends of the tension faller sickle arms said bar having in its upper edge a series of recesses the center of each recess being opposite a spindle, each recess having on each side an overhanging finger in the lower edge of which is a nick.

6. In a spinning mule having a carriage on which are a plurality of alined spindles together with a set of winding faller sickle

arms and a set of tension faller sickle arms; a guide bar carried near the free ends of the tension faller sickle arms said bar having in its upper edge a series of recesses the center of each being opposite a spindle, each recess having on each side an overhanging finger.

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