June 23, 1936. M. F. HAAS 2,045,079

EQUIPMENT FOR SPINNING MACHINERY

Filed June 20, 1934

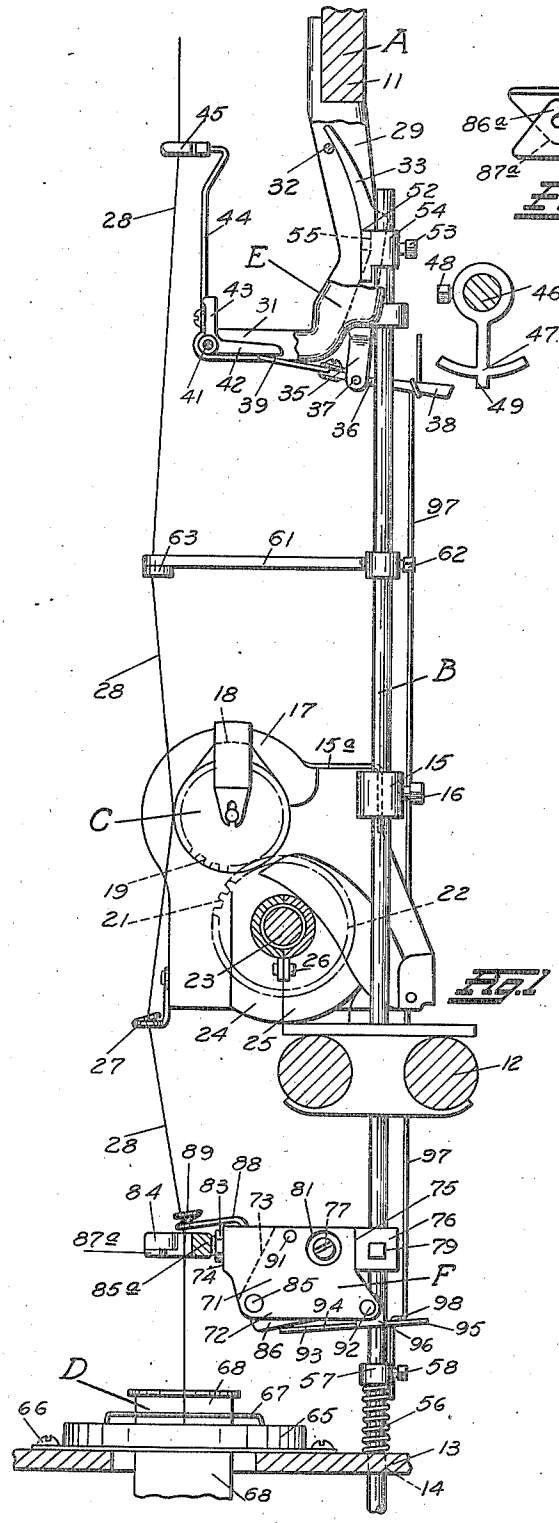


Fig. 1

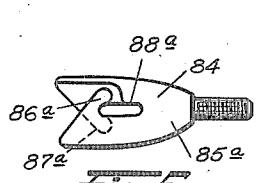


Fig. 6

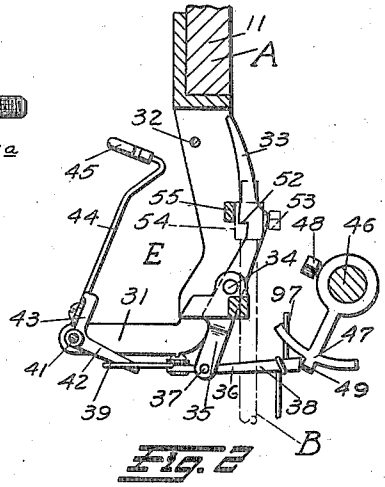


Fig. 2

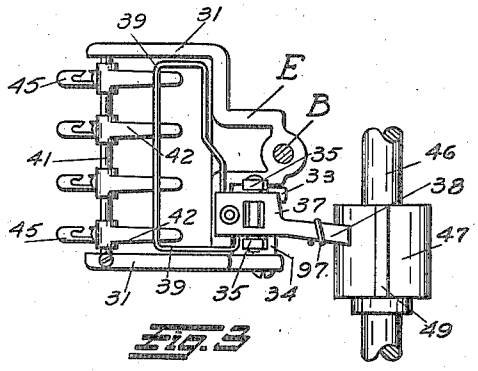


Fig. 3

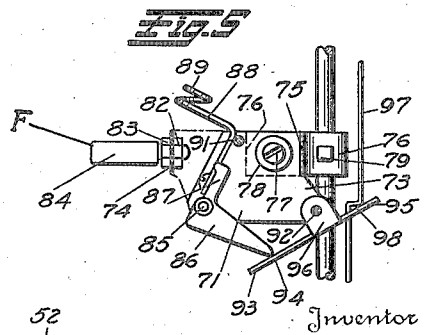


Fig. 5

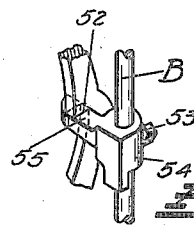


Fig. 4

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2,045,079

EQUIPMENT FOR SPINNING MACHINERY

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2 Claims. (Cl. 117—29)

This invention relates to thread doubling and twisting machines and particularly to those machines adapted for use in spinning silk.

In machines for spinning silk individual strands of thread are passed over feed rolls to the spinning element which performs the twisting operation. This spinning element commonly comprises a fixed ring and a light wire traveller which is adapted for circumferential sliding in the ring. Individual thread strands from the feed roll are twisted together in passing between the traveller and the edge of the ring prior to being wound on a bobbin. As the traveller carrying the thread strands slides around the circumference of the spinning ring, the threads are twisted and wound in rolls on the bobbin.

Serious trouble is often encountered due to breaking of the thread being fed to the feed roll. This results in loose thread ends which tangle up and fly around the feed rolls and bobbin causing built up roll laps and yarn tangles. This trouble has been partially overcome in the prior art by provision of an automatic trip mechanism on the spinning machine which stops the feed roll as soon as the thread breaks.

Another serious problem has been encountered, however, which thus far has not been successfully solved. The traveller wire in sliding around the spinning ring becomes worn or distorted in use and frequently flies out of the spinning ring. This leaves the thread strands free to tangle and build up roll laps on the feed rolls and bobbin. Further the threads become soiled with lubricant from the spinning ring in flying about and thus cause loss of considerable yarn from damage as well as loss of time for repairs and replacements.

The present invention eliminates this difficulty entirely by providing an automatic trip device of novel character for stopping the feed roll and bobbin upon separation of the traveller from the spinning ring as well as upon breaking of the thread strand.

A primary object of the present invention therefore resides in the provision of a trip mechanism for spinning machines to automatically stop the thread twisting operation upon damage to the twisting mechanism.

A further object of the invention resides in the provision of an attachment for spinning machines designed to prevent tangling and soiling of the yarn upon loss of thread tension adjacent the thread twisting mechanism.

A further object of this invention is to provide means in conjunction with the feed rolls and twisting device of a spinning machine, which will stop the feed rolls upon separation of the parts of the twisting device or breaking of the thread being fed to the twisting device.

Another object of the present invention is to provide an attachment for spinning machines to automatically stop the feed rolls upon separation of the traveller from the spinning ring.

A still further object of the present invention seeks to provide in a spinning machine combined elements for automatically cutting off the source of power from moving parts of the machine upon maladjustment of any of the parts or upon damage to the thread being spun.

With the above and other objects in view reference will be made for a complete disclosure to the accompanying drawing in which like reference characters are employed to denote like parts throughout and in which:

Figure 1 is a view mainly in elevation of a preferred embodiment of my invention illustrated in operative spinning position.

Figure 2 is a sectional view of one of the trip mechanisms forming a part of the combination of my invention and shown in tripped position.

Figure 3 is a bottom plan view of the trip mechanism disclosed in Figure 2 but shown in untripped position.

Figure 4 is a view in perspective of the latch device forming part of the trip mechanism shown in Figure 2.

Figure 5 is a sectional view of another trip mechanism forming part of my invention and shown in tripped position.

Figure 6 is a top plan view to an enlarged scale of the thread guide forming part of a trip mechanism disclosed in Figure 1.

The form of my invention disclosed in the drawing comprises in brief six main parts. Frame "A" of the spinning machine is adapted to accommodate, for vertical reciprocation, a rod "B". Supported on rod "B" is a feed roll "C" adapted to feed thread strands to a spinning element "D" supported on frame "A". A trip mechanism "E" supported on frame "A" is located above feed roll "C" and a second trip mechanism "F" supported on rod "B" is located between feed roll "C" and spinning element "D".

Frame "A" as shown in Figure 1 comprises three horizontal portions 11, 12, and 13. Portion 13, provided with an aperture 14, is adapted to receive rod "B" and guide the same in vertical displacement. Portion 12 of frame "A" is adapt-

ed to support feed roll "C" in a manner now to be set forth.

A collar 15 surrounds shaft "B" and is fixedly secured thereto by means of a set screw 16. Collar 15 carries an extension 15a of a housing 17 designed as a cover for feed roll "C" and as a bearing support for separator 18 of the feed roll. Formed on the periphery of the feed roll are teeth 19 which are adapted under normal condition to mesh with teeth 21 on a driving roll 22 mounted on extension 12 of frame "A".

It will now be seen, since feed roll "C" through its housing 17 is mounted on rod "B" and drive roll 22 through extension 12 is mounted on frame "A", that separation of the feed roll and driving roll may be effected by relative movement of rod "B" with respect to frame "A".

Driving roll 22 is rotated by means of hub 23 connected to any suitable source of power. A housing comprising dual sections 24 and 25 encloses roll 22 and is secured together by rivets 26 or the like.

To the lower part of feed roll housing 17 is secured a loop guide 27 designed to guide thread strands 28. Strands 28 are led to the feed roll "C" and in passing therearound are led over the thread separator 18 and thence down through guide 27 to the trip device "F".

The feed roll mechanism just described forms the major subject matter of an earlier invention of mine embodied in Patent 1,777,612 issued October 7, 1930 and for further details reference should be had to the complete disclosure contained therein.

The thread strands 28 while being led to the feed rolls occasionally break and in order to avoid tangles and roll laps it is necessary to immediately stop rotation of the feed roll. As previously explained this end may be attained by causing reciprocation of rod "B" in frame "A" and consequent separation of the feed roll "C" from its driving roll 22. To cause such reciprocation of shaft "B" is the function of the trip mechanism "E".

Trip mechanism "E" is not of novel structure but will be described at some length because it preferably is utilized as part of the new combination of the present invention. This trip mechanism comprises a frame formed of vertical arms 29 and horizontal arms 31. Vertical arms 29 are secured to frame "A" and accommodate a horizontal pin 32 which acts as a stop for a vertical lever 33 pivoted to arms 29 at 34. Lever 33 at its lower extremity develops into a yoke 35 which carries a horizontal lever 36 by means of a pin 37. Lever 36 at its rear end is provided with a tail 38 and at its forward extremity accommodates in locked relation a wire frame 39.

Horizontal frame arms 31 of the trip device accommodate a stationary pin 41 upon which pivot a plurality of counterweights 42. Integral with each counterweight 42 and extending vertically therefrom is an arm 43 to which is secured a wire guide holder 44. To the upper end of each holder 44 is secured a thread guide 45 in the form of an eye or clip adapted to encircle a strand 28 of the thread.

Supported in frame "A" near the trip device "E" is a rocker shaft 46 to which is secured a rocker arm 47 by means of a set screw 48 or the like. At its lower extremity rocker arm 47 is provided with a shoulder 49 which under certain conditions is adapted to contact tail 38 of lever 36.

The operation of the trip mechanism thus far described will now be set forth. As shown in Figure 1 the trip mechanism is in the untripped position assumed under operating conditions. Under these conditions thread strands 28 are under tension and in passing through the guides 45 restrain the holders 44, arms 43, and counterweights 42 against clockwise rotation about pivot 41. Wire frame 39 of lever 36 is adapted to bear against the under face of counterweights 42 and in this manner lever 36 is restrained against rotation about its pivot 37.

With the parts of the trip mechanism in the operative position being described and as seen from Figure 1, rocker arm 47 is free to be rotated about rocker shaft 46 without contacting arm 36, as shoulder 49 of the rocker arm, in describing an arcuate path about shaft 46, entirely clears tail 38.

If, now, a strand of thread 28 should break while being led to the feed roll C, there will no longer be tension in the thread strand passing through clip 45 and in consequence no restraint will be offered against rotation of clip holder 44 and arm 43. Counterweight 42 therefore acts immediately to cause clockwise rotation of itself and the clip and holder assembly about pivot 41, and in so doing bears against wire frame 39 forcing the same downwardly.

Downward movement of wire frame 39 causes counterclockwise rotation of the wire frame and lever assembly 36 about pivot 37 and upward movement of tail 38 formed on lever 36. Such upward movement of tail 38 positions the same in the arcuate travel path of shoulder 49 formed on rocker arm 47 so that, upon clockwise rotation of the rocker shaft 46, contact between ridge 49 and tail 38 will occur. Further clockwise rotation of the rocker arm causes tail 38 and lever 36 to be displaced in a substantially horizontal direction to the position indicated in Figure 2 of the drawing.

As previously set forth, lever 36 is carried by a yoke 35 formed on a substantially vertical lever 33. Obviously then, horizontal displacement of lever 36 as just described will cause rotation of lever 33 in a clockwise direction about its pivotal axis 34.

Lever 33, about midway between the upper end thereof and its pivot 34 is provided with a notch 52. Secured to shaft "B" adjacent the lever 33 by a set screw 53 is a collar 54 as clearly seen from Figure 4. Collar 54 is provided with a laterally extending finger 55 designed to fit into the notch 52. The lower part of shaft "B" adjacent spinning ring "D" is encircled by a coil spring 56 one end of which reacts against part 13 of frame "A" and the other end of which acts against a collar 57 secured to the shaft by a set screw 58 or the like, shaft "B" thus being constantly urged upwardly with respect to frame "A" due to the expansive action of spring 56.

As seen in Figures 1 and 4, however, when trip device "E" is in untripped position due to tension in thread strands 28, shaft "B" is prevented from upward displacement relative to frame "A" since finger 55 on shaft "B" cooperates with the notched portion of the lever 33 of frame "A". This condition prevails so long as tail 38 of lever 36 is positioned outside the arcuate path of shoulder 49 on rocker arm 47.

As previously described, when a thread 28 breaks, tail 38 of lever 36 is elevated with ensuing contact between shoulder 49 and the tail and consequent clockwise rotation of notch lever

33. Rotation of lever 33 in this manner, however, causes notch 52 in the lever to be withdrawn from finger 55 with the result that spring 56, acting against collar 57, immediately projects shaft "B" vertically upward, as illustrated in Figure 2. This reciprocation of shaft "B" relative to frame "A" is effective to cause separation of feed roll "C" and drive roll 22.

Reciprocation of shaft "B" as just described is preferably further effective to stop rotation of bobbin 68, thus preventing roll laps and tangles therein.

Above feed roll "C" is an arm 61 secured to shaft "B" by a set screw 62 and designed through a guide 63 to ensure tension in thread 28 for proper operation of trip mechanism "E".

The spinning element "D" comprises in brief a spinning ring 65 secured to frame "A" by means of bolts 66 or the like and adapted to accommodate a wire traveller 67 for circumferential sliding. Spinning ring 65 receives in its center a bobbin 68 on which is wound the twisted yarn which passes between the traveller and ring as the former rotates. This spinning element "D" is of a form well known in the art and one embodiment thereof is disclosed in Patent 1,631,973 to G. F. Macfarlane which issued on June 14, 1927 and to which reference may be made for more specific details.

The spinning machine thus far described parallels certain devices in the prior art by providing means for stopping the feed roll upon breaking of the thread strand being led to the feed roll. It is however, equally important that provision be made for stopping the feed roll upon breaking of the thread strand between the feed roll and spinning element or upon misfunction of the spinning element. Prior devices have failed completely to afford such provision and in consequence much loss of materials through damage and loss of time through repair has resulted. The present invention by providing a trip device between the feed roll and spinning element overcomes the difficulties pointed out and thus marks a distinct advance over prior devices in the art.

Mounted upon rod "B" between feed roll "C" and spinning element "D" is a trip mechanism "F" of novel construction and designed for a new and novel function in the spinning machine. Trip device "F", as seen in Figures 1 and 5, is provided with a base frame 71 comprising sides 72 and 73, and ends 74 and 75. Frame 71 is mounted on rod "B" by means of a collar assembly 76, one part of which is secured to frame side 73 by means of bolt 77 and washer 78 and the other collar end of which is secured to shaft "B" by means of set screw 79. Frame side 72 is provided with an aperture 81 through which access may be had to bolt 77 with a screw driver or the like.

Secured to end 74 of the frame by means of lock nuts 82 and 83 is a thread guide 84 adapted to receive thread strands 28 and position the same with respect to spinning element "D".

Guide 84 as seen in Figure 6, comprises a stem portion 85*a* and upper and lower wing portions 86*a* and 87*a* respectively. The stem and wing portions are so designed as to form a slot 88*a* adapted to accommodate thread strand 28 and guide the same toward spinning element "D".

Mounted on a pivot shaft 85 carried by frame sides 72 and 73 is a counterweight 86 carrying an integral arm 87 to which is fastened a wire 88 bent into the form of a pigtail and ending in a loop 89. A stop pin 91 is provided on frame 71 against which pigtail 88 may rest when the trip mechanism is disposed in tripped position.

Frame sides 72 and 73 accommodate a second pivot shaft 92 in a position removed from pivot shaft 85. Adapted for rotation about pivot 92 is a lever 93 comprising arms 94 and 95, and ears 96 by means of which the lever is mounted upon its pivot 92.

Arm 94 of lever 93 is adapted to underlie counterweight 86 and to be thereby actuated.

Accommodated in an aperture in arm 95 of lever 93 is a wire 97 bent to form a shoulder 98 which bears against the upper face of lever arm 95. Wire 97 extends vertically upward in substantial parallelism to rod "B" and at its upper end is looped around tail 38 of lever 36. It will thus be appreciated that wire 97 is in effect a link between lever 93 and lever 36 and adapted to cause actuation of the latter upon rotation of the former.

The operation of trip device "F" is in general similar to that of trip device "E" and will now be described in detail. As seen in Figure 1, when the trip device is in its unlatched position during the spinning operation, loop 89 of pigtail 88 encircles thread 28 which is placed under tension by guide 27 prior to passage through guide 84. Under these circumstances wire 88 and counterweight 86 are restrained against rotation about pivot 85. Lever 93 is held in contact with the lower face of counterweight 86 by wire 97 and is thus also restrained against rotation about its pivot 92.

In the event that traveller 67 should separate from spinning ring 65, or that thread 28 should break between the feed roll and spinning element, tension in thread 28 will no longer exist and pigtail 88 together with loop 89 thereof will no longer be restrained against rotation about pivot 85. Consequently counterweight 86 will initiate clockwise rotation of itself, arm 87, and pigtail 88 about pivot 85 to the position indicated in Figure 5 of the drawing. Such movement of the counterweight, by virtue of its contacting relation with lever arm 94, causes downward motion of the latter and counterclockwise rotation of lever 93. This in turn causes upward motion of lever arm 95 and upward displacement of wire 97 through shoulder 98 thereof which bears against arm 95. As already pointed out, wire 97 at its upper end is looped about tail 38 of lever 36 and vertical displacement of wire 97 therefore causes tail 38 to be lifted into the arcuate travel path of shoulder 49 on rocker arm 47.

It will now be readily appreciated that upsetting of lower trip device "F" is effective to rotate lever 36 of the upper trip device into position preparatory to upsetting. As previously explained, rocker arm 47 under such conditions will contact lever 36 and cause the latter to move the lever 33 out of latching engagement with the finger 55, in this manner allowing reciprocation of rod "B" in frame "A", separation of the feed roll "C" and the drive roll 22, and stopping of the feed roll.

It will thus be seen that my invention provides for automatic stopping of the feed roll and bobbin in the emergency of thread breaking while being fed over the feed roll, or upon separation of the traveller and spinning ring.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present

embodiment is therefore to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are therefore intended to be embraced therein.

What is claimed and desired to be secured by United States Letters Patent is:—

1. In a spinning machine, a frame; a twisting element mounted on said frame; mechanism for feeding thread to said twisting element; a power source; a rod designed for reciprocation in said frame and normally positioned to effect delivery of power from said power source to said feeding mechanism and said twisting element; a latching device mounted on said frame and retaining said rod in normal position; a trip device actuated upon relief of tension in the thread being guided to said feeding mechanism and arranged to trip said latching device to allow reciprocation of said rod and interruption of the delivery of power to said feeding mechanism and said twisting element; and a second tripping device mounted on said rod and designed to trip said latching device upon relief of tension in the thread being fed from said feeding mechanism to said twisting element.

2. In a spinning machine in combination a frame; a twisting element; mechanism for feeding thread to said twisting element; a power source for delivering power to said twisting element and said feeding mechanism; a trip mechanism mounted on said frame including means actuated upon loss of tension in the thread being led to said feeding mechanism, and a latching means designed for operation upon actuation of said first named means for interrupting delivery of power to said feeding mechanism and twisting element; a rod designed for reciprocation in said frame; a second trip mechanism mounted on said rod and adapted for actuation upon relief of tension in the thread being fed from said feeding mechanism to said twisting element; and a link member designed to operate said latching means upon actuation of said second trip mechanism.

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