

3,199,151

Filed June 14, 1962

2 Sheets-Sheet 1



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3,199,151

STOP MOTION FOR COTTON CARD

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Filed June 14, 1962, Ser. No. 202,617

4 Claims. (Cl. 19—25)

This invention comprises a novel and useful stop motion for a cotton card and more particularly pertains to a stop motion device adapted to be attached to a cotton carding machine for stopping the operation of the machine upon a break in the work end or cotton sliver being fed to the machine.

The primary object of this invention is to provide a stop motion mechanism which is specifically adapted for use with and may be readily applied to conventional cotton card machines and which will at once detect a breakage of a work end and in response to such detection will automatically stop the operation of the feed rollers, lick-in and doffer cylinders of the carding machine while permitting continuing rotation of the main or carding cylinder and will further energize a signal light adjacent the machine to call the operator's attention to the defective condition.

A further object of the invention is to provide a control device in accordance with the foregoing object which will reduce the chance of fires by employing a mercury switch to control the necessary electrical circuits thereby avoiding the open sparking of switch contacts which might set fire to the accumulation of cotton from a broken work end on the floor about the machine.

A further important object of the invention is to provide a stop motion which shall be substantially instantaneous in its action through the use of a solenoid to disconnect a vital driving belt of a carding machine, before a fire hazard can be created through the accumulation of cotton or other cotton or card sliver on the floor and adjacent machine from a broken work end.

A more specific object of the invention is to provide a stop motion conforming to the preceding objects which in the event of breakage of a work end will not stop the main drive of the machine but will immediately disconnect further operation of the feed rolls, lick-in and doffer cylinders, thus stopping the feed into and the delivery from the card and before the work gets into the cotton or card sliver stage. This allows the big cylinder to continue to run and merely stops the processing. The invention is therefore specifically adapted for use and limited for use with a cotton carding machine.

Yet another object of the invention is to provide a stop motion in conformity with the above set forth objects which may be conveniently and unobtrusively mounted on a carding machine of any desired character with the work end break detector mounted on the front and left end of the card.

Still another object of this invention is to provide a stop motion for cotton cards which will effectively disconnect the drive means for the feed and delivery rollers of the card and will not constitute a source of danger or hazard for the machine operator.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a fragmentary front elevational view of a portion of a conventional carding machine and showing the stop motion attachment of this invention applied thereto;

FIGURE 2 is a fragmentary side elevational view of

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the arrangement of FIGURE 1 but taken from the left end thereof;

FIGURE 3 is a detail view in vertical transverse section taken substantially upon a plane indicated by section line 3—3 of FIGURE 2;

FIGURE 4 is a somewhat diagrammatic view of the stop motion of the mechanism of this invention, with details of the carding machine omitted therefrom; and

FIGURE 5 is a perspective view diagrammatically disclosing the stop motion mechanism removed from the machine.

The invention hereinafter disclosed and claimed relates specifically to a cotton carding machine and is illustrated as applied to a conventional cotton card such as the well known Saco-Lowell Revolving Flat Card. For simplicity of illustration, portions of this machine have been omitted from the drawings.

In this type of cotton card, the cotton is fed into the rear of the machine, by means of feed rolls and a lick-in cylinder to the main or card cylinder, not shown, and from the latter is fed by the doffer cylinder to the calender rolls. At this point the work end passes through the stop motion of this invention and then goes to the coiling head, not shown.

Referring first to FIGURES 1 and 2, the numeral 10 designates a portion of a conventional cotton carding machine which is provided with a customary work feeding means consisting of feed rolls and a lick-in cylinder for supplying cotton to the main or card cylinder, not shown. A doffer cylinder also not shown cooperates with the card cylinder to deliver the work end or card slivers to a pair of calender rolls 12 and 14 on the apron 16 at the front of the carding machine. Indicated by the numeral 18 is the cotton sliver or work end which after being delivered from the calender rolls passes through the stop motion of this invention and into a coiling head, not shown. A conventional driving mechanism, not shown, is provided for effecting operation of both the feeding means consisting of the previously mentioned feed rolls and the lick-in cylinder and the card delivery means consisting of the doffer cylinder and the calender rolls 12, 14, this mechanism including as a part of the connecting means by which a power source, not shown, is operatively connected, a driving belt 20 which is entrained over a pair of pulleys, one of which is shown at 22. It suffices for an understanding of the principles of this invention to note that if the belt 20 is disengaged and shifted from the driven pulley 22 to an idler pulley 23 on the same shaft, the operating of both the feeding means and the delivery means is halted and the feeding of the cotton into the card and the delivery of cotton slivers from the latter to the calender rolls 12 and 14 will be halted even though the main or card cylinder continues its rotation by a mechanism and a driving means, not shown, but of any conventional design.

The primary purpose of this invention is to provide an attachment useful in this environment and cooperating peculiarly therewith in such a manner that upon breakage of the work end or sliver 18 after its delivery from the calender rolls 12 and 14, the connecting means of the power source to the feeding means and the delivery means will be discontinued by shifting the belt 20 off of the driving pulley 22 to the idler pulley 23. As a desired adjunct with this function, the means by which the belt is caused to be shifted or disengaged from the driving pulley 22 is also utilized to actuate a signaling device to indicate to an attendant that the machine is in need of attention.

It is the construction, the operation and the location of a mechanism which will be responsive to the breakage of a work end 18 to effect the shifting of belt 20 from the driving pulley 22 to an idler pulley 23 and the energizing

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of a signal light that the present invention is concerned.

Referring now particularly to FIGURE 1 for an understanding of the mounting of the attachment upon the machine and to FIGURES 4 and 5 for a better understanding of its construction, it will be seen that the stop motion of this invention includes a stationary support bracket 30 in the form of an upstanding fulcrum post fixedly secured as by a fastener 32 to the apron 16 on the front face thereof. Rockably pivoted upon this fulcrum post as by a pivot pin 34 is the mid-portion of a lever 36 which at one extremity is provided with a laterally enlarged portion 38 comprising an eye through which passes the work end 18. The other end of the lever 36 has secured thereto a mercury switch capsule 40 having suitable electrical contacts therein for controlling two electrical circuits. This capsule for better protection against breakage is preferably enclosed in a light aluminum housing, not shown. One of these circuits, by means of the conductors 42, supplies current to a signal device in the form of a light 44 or other signaling instrument which is conveniently located with respect to the machine so that it may be readily visible or readily perceived by an attendant supervising the operations of a number of such carding machines. The second electrical circuit consists of the conductors 46 which energize an electric solenoid 48 likewise suitably carried by the apron 16 of the carding machine and which solenoid effects a substantially instantaneous operation of the stop motion mechanism as set forth hereinafter.

Electric current from any suitable source is supplied by conductors 50 to a manually operating control switch 52 suitably mounted adjacent the machine, and further conductors 54 convey this current from the control switch to the aforementioned mercury switch capsule 40 and the associated electrical circuits.

The lever 36 is normally so weighted, or spring biased if desired, as to cause its right end which carries the work end eye 38 to be heavier than the mercury switch capsule carrying end so that the lever will tend to rotate in a clockwise direction as viewed in FIGURES 1, 4 and 5. However, the normal tensioning action of the work end 18 passing through this eye from the calendar rolls 12 and 14 maintains the lever in the raised position shown in FIGURE 1 which is the normal operating position of the device when the machine is operating in a proper manner. When the work end or sliver 18 breaks, the eye end of the lever is now free to drop downwardly until it reaches its lowest position. When this condition occurs, the electrical circuits in the mercury switch 40 will be closed so as to energize the signaling device 44 and also energize the solenoid 48 and the signal 44.

To restore the electrical circuit to an operative position to permit resumption of the operation of the card and also to deenergize the signal 44, the stop bar 56, pivoted at 58 to the apron is pivoted in a clockwise direction from its normally inoperative position shown in FIGURES 1 and 4 to a vertical position in which it supports the switch lever in normal operation position. After the card is again in proper operation, the stop bar 56 is again moved to its idle position.

As so far described, it will thus be apparent that the lever 36 and its eye 38 in view of its cooperation with the work end 18 constitutes a sensing means or sensing member which will detect and respond to breakage of the work end to allow the lever to drop thus closing the mercury switch. Further, the lever 36 and its associated elements together with the solenoid 48 constitutes a part of an actuating means whose ultimate purpose and function is to shift or disengage the driving belt 20 from the driving pulley 22 to an idle pulley 23 coaxially disposed and thus render the drive of the feeding and delivery means inoperative. A control means is provided operatively engaged with the belt 20 to effect the desired shifting operation of the latter in response to activation of the detecting or sensing means. This control means comprises a belt shifting fork or bifurcated lug or yoke 60 which is car-

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ried by a rocker shaft 62 which latter is journaled in suitable bearings as at 64 and 66 mounted in any convenient location upon the framework of or adjacent the framework of the card machine 10. The shifter fork 60 is disposed to straddle the driving belt 20 from below as shown more clearly in the detailed view of FIGURE 3 so that upon rocking motion of the shaft 62 as will be seen from a comparison of the full and dotted lines in FIGURE 3, the belt may be displaced laterally from an operative position engaging the driving pulley 22 to a coaxially disposed idler pulley 23.

The other end of the rocker shaft 62 from that which carries the shifting fork 60 is provided with an arm 68 by which a rocking motion is imparted to the shaft as desired. A vertically extending control rod 70 having a handle 72 at its upper end extends through suitable apertured guide and support brackets 74 on the frame of the machine and at its lower end is connected by a pivoted connecting link 76 to the above mentioned crank arm 68 on the rocker shaft 62. A tension spring 78 encircles the vertical shaft 70, engaging against the guide bracket 74 and against an adjustable collar 80 secured to the rod 70 to yieldingly urge the rod into a raised position. In the lowered position, the arrangement is such that the shifter fork will be in the full line position shown in FIGURE 3 which is the normal operating position for the machine. However, when the rod is in its raised position, the shifter fork will rotate to the dotted line position shown in FIGURE 3 and the belt will thus be shifted from the driving pulley 22 to the idler pulley 23 rendering the driving pulley 22 inoperative.

A latch means is provided to normally retain the rod 70 in its lowered position against the opposition of the spring 78. Withdrawal of this latch will allow the spring to move the rod to its highest or vertically erect position and thus operate the shifter fork to disengage the belt 20 from the driving pulley 22.

This latch consists of a horizontally extending two-piece latch bar 82 having a pointed latch nose 84 at one end thereof, the bar and nose being slidably received in a guide opening 86 formed in the bracket 74. The latch nose is adapted to releasably engage in a latching recess or notch 88 formed in the rod 70. The arrangement is such that when the rod 70 is in its lowered position the latch nose will engage in the recess 88 and thus retain the rod in the lowered or operative position, this being the position shown in FIGURE 1. However, when the latch bar is disengaged, as shown in FIGURE 4, the spring 78 will then be free to move the rod 70 upward and move the rocker shaft into the belt disengaging position of the latter.

A compression spring 90 is received in the barrel member 91 secured to suitable lugs or brackets, not shown. The latch plunger 93 has the previously mentioned pointed nose 84 and is urged outwardly of the barrel by the spring 90. A pin 94 on the plunger is slidably received in the barrel guide slot 95 which thus limits travel of the plunger. A connecting bar 97 is suitably apertured for connection to the plunger pin 94 and is pivotally connected at 98 to a solenoid plunger 100 which is slidably received in the solenoid 48. The arrangement is such that the spring 90 is effective to retain the plunger nose against the rod 70 so that when the latter is lowered the plunger nose 84 will engage the recess 88 and thus lock the rod 70 in its lowered position. At that time, the solenoid plunger or core 100 will be moved outwardly of the solenoid coil as shown in FIGURE 1. However, when the solenoid is actuated by the previously mentioned pivoting movement of the lever 36 in a clockwise direction, the solenoid will be energized and thus will instantaneously move the solenoid core 100 towards the right as shown in FIGURE 4, thereby withdrawing the latch bar and disengaging the latch nose from the locking recess 88 of the rod 70. This allows the spring 78 to operate the rocking shaft and thus cause the belt shifter to disengage the driving belt from the driving pulley.

It will be observed that there is thus provided a connecting means between the sensing and detecting means consisting of the eye 33 and the shaft 36 and the control means through whose agency the belt is shifted from the driving pulley. This actuating means includes the latch bar and the mechanism for withdrawing the latter together with the manually operated rod 70 which is manually lowered to effect resetting of the device in order that the machine may be in condition to resume normal operation.

It will be apparent that this stop motion is extremely sensitive in its operation and performs the very important advantageous function of instantaneously stopping the operation of the feeding and delivery means so that no further feeding of the cotton into the card cylinder or of delivery of cotton from the latter to the calendar rolls is possible while allowing the rest of the carding machine to continue its operation to discharge the cotton therein and to complete its carding operation thereon. Thus the hazards of fire arising from accumulation of cotton at the base of the machine as a result of a broken work end is completely obviated while the undesirable immediate cessation of the movement of the main cylinder and other instrumentalities of the carding machine is avoided.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A stop motion for cotton carding machines of the type having means for delivering a cotton sliver from a carding machine, driving means including a driving pulley operatively connected by a driving belt to and operating said delivering means; said stop motion comprising an idler pulley, a control means including a belt shifter operatively engaging said driving belt and selectively shifting the latter to and from said driving pulley to said idler pulley, a movable control rod connected to said belt shifter and effecting movement of the latter, resilient means operatively connected to said control rod for yieldingly urging said control rod and said belt shifter into position to disengage said driving belt from said driving pulley, a latch mechanism releasably engaging said control rod and retaining it in a position in which said driving belt is drivingly engaged with said driving pulley, an electric actuator connected to said latch mechanism and operable to disengage the latter from said control rod whereby said resilient means will cause said belt shifter to disengage said driving belt from said driving pulley, a detector having a switch controlling an energizing electric circuit for said electric actuator and also having a sensing element engaging cotton sliver of a carding machine after the sliver emerges from said delivering means, said sensing element being operable in response to breakage of said sliver for closing said switch and energizing said electric actuator, said belt shifter including a rocker shaft journaled for rocking movement and a shifter element secured to said rocker shaft and projecting therefrom and embracing a portion of said driving belt, said control rod being mounted for reciprocation and having a pivotal connection to said rocker shaft, said control rod having a latch recess therein, said latch mechanism including a barrel, a latch plunger being

slidably received in said barrel and being connected to said electric actuator and having a nose projectable therefrom, said nose being releasably and slidably engageable in said recess, and a spring in said barrel yieldingly urging said nose therefrom and yieldingly retaining said nose in said latch recess.

2. The combination of claim 1 including a guide slot in said barrel, and a guide member on said plunger slidably guided and retained in said guide slot.

3. A stop motion for cotton carding machines of the type having means for delivering a cotton sliver from a carding machine, driving means including a driving pulley operatively connected by a driving belt to and operating said delivery means; said stop motion comprising an idler pulley, a control means including a belt shifter operatively engaging said driving belt and selectively shifting the latter to and from said driving pulley to said idler pulley, a movable control rod connected to said belt shifter and effecting movement of the latter, resilient means operatively connected to said control rod for yieldingly urging said control rod and said belt shifter into position to disengage the driving belt from said driving pulley, a latch mechanism releasably engaging said control rod and retaining it in a position in which the driving belt is drivingly engaged with said driving pulley, an electric actuator connected to said latch mechanism and operable to disengage the latter from said control rod whereby said resilient means will cause said belt shifter to disengage said driving belt from said driving pulley, a detector having a switch controlling an energizing electric circuit for said electric actuator and also having a sensing element engaging cotton sliver of a carding machine after the sliver emerges from said delivering means, said sensing element being operable in response to breakage of said sliver for closing said switch and energizing said electric actuator, said control rod having a latch recess therein, said latch mechanism including a barrel, a latch plunger being slidably received in said barrel and being connected to said electric actuator and having a nose projectable therefrom, said nose being releasably and slidably engageable in said recess, and a spring in said barrel yieldingly urging said nose therefrom and yieldingly retaining said nose in said latch recess.

4. The combination of claim 3 including a guide slot in said barrel, and a guide member on said plunger slidably guided and retained in said guide slot.

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