Nov. 22, 1960 J. C. HOGG, JR., ET AL 2,960,731

STOP MOTION

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FIG. 1.

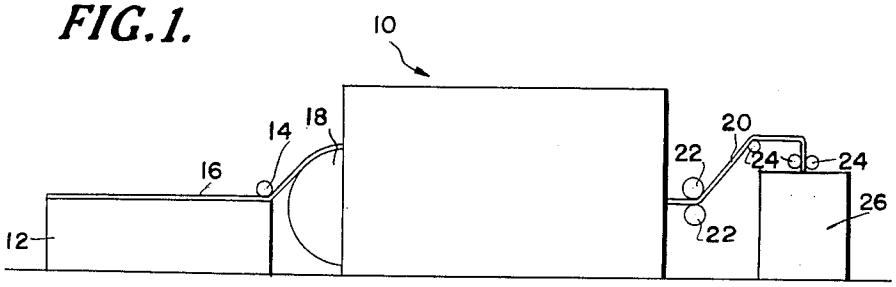


FIG. 2.

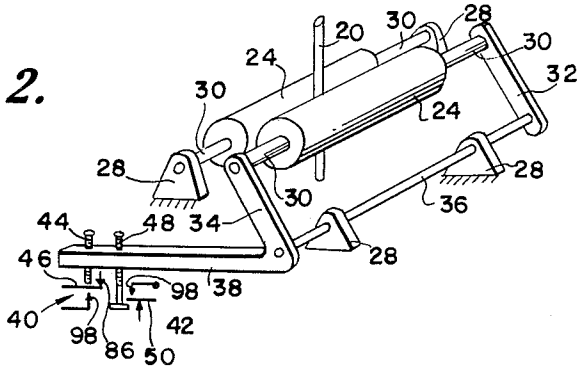
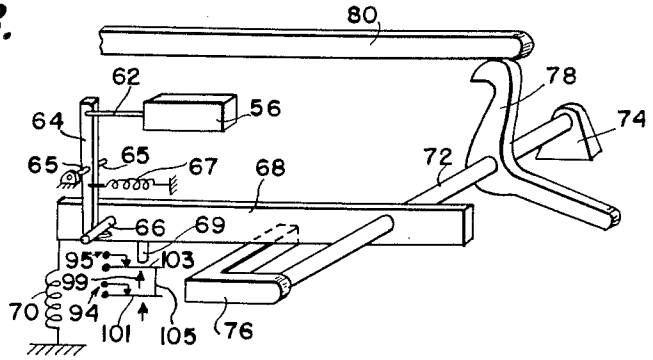


FIG. 3.



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FIG.4.

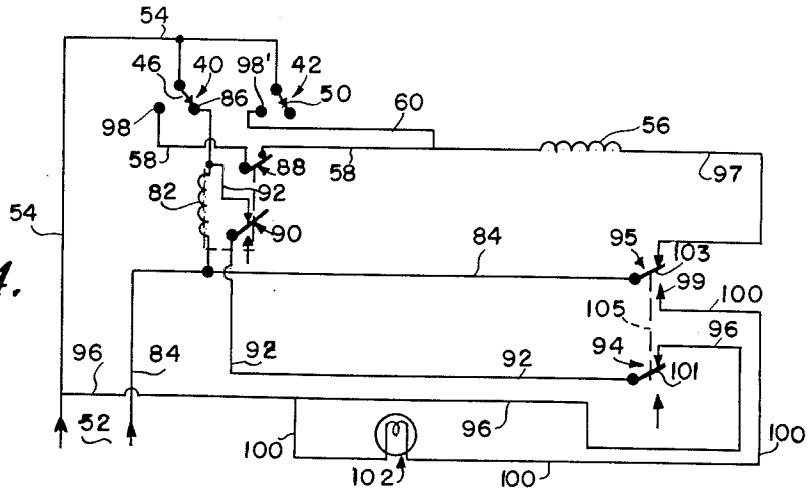


FIG.5.

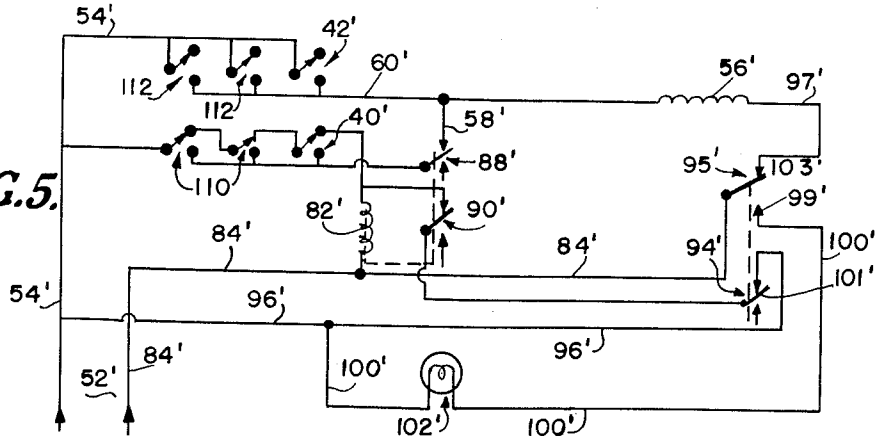
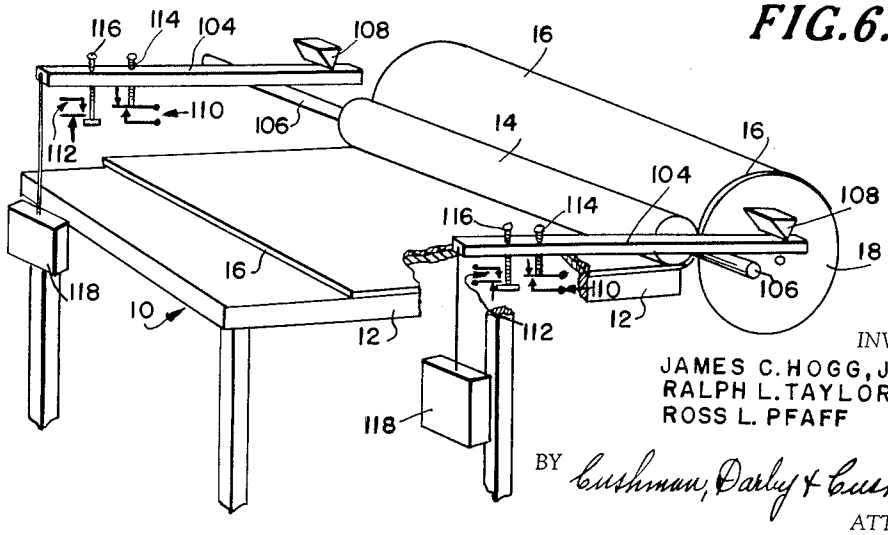


FIG.6.



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STOP MOTION

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This invention relates to stop motions for textile machines and more particularly to stop motions for carding machines.

As is understood, the carding operation is one of the most important in cotton manufacture. It is practically essential that this operation be performed properly since, among other things, the failure to do so may cause defects or abnormal conditions in the resulting sliver which subsequent manufacturing operations cannot correct. It has been heretofore suggested to provide carding machines with a stop motion operative in response to the presence of an abnormal condition in the resulting sliver to stop the machine. Such stop motions, for one reason or another, are not believed to be entirely satisfactory, particularly when it comes to restarting the machine after it has been stopped due to an abnormal condition in the sliver. These stop motions are so designed that the machines cannot be desirably and conveniently restarted while the defective sliver is being repaired. Instead, they would continue to operate to prevent the machine from restarting since the condition of the sliver has not yet returned to its normal or predetermined range. No known stop motion has been heretofore devised which will satisfactorily overcome this drawback, although some attempt has previously been made at providing a manually operable means for optionally rendering the stop motion ineffective.

Thus, it is an important object of this invention to provide a novel textile machine stop motion with a disabling means automatically operative in response to the presence of an abnormal condition in the fiber body passing through the machine to cause a temporary disabling or deactivating of the stop motion after the latter has performed a machine stopping function. A related and somewhat more specific object is to design such disabling means so that it will keep the stop motion ineffective or inoperable until the abnormal condition in the fiber body is rectified, and then operate automatically to render the stop motion once again operable.

Another object resides in the provision of a carding machine stop motion having a novel arrangement of means at a plurality of stations in the machine for detecting deviations from a predetermined normal range of thickness in the fiber body passing through the machine, and independently operative to stop the machine in response to such deviations. It is also an object that this novel arrangement include a disabling means automatically operative to temporarily disable the stop motion while the machine is stopped and the thickness of the fiber body is being returned to its normal range.

Further objects of the invention reside in the provision of an effective carding machine stop motion adapted to achieve superior uniformity in the resulting sliver, and characterized by simplicity in construction, economy in manufacture and operation, and flexibility for installation in existing machinery.

Further objects and advantages of the invention will be in part obvious and in part pointed out hereinafter.

The novel features of the invention may be best made clear from the following description and accompanying drawings in which:

Figure 1 is a schematic elevational view of a carding machine;

Figure 2 is a perspective view of exemplary structure of the stop motion of the invention attached to the calendar rolls in the coiler head of the carding machine of Figure 1;

Figure 3 is a fragmentary perspective view of further exemplary structure of the stop motion of the invention associated with a displaceable member for stopping the machine;

Figure 4 is a schematic wiring diagram of one embodiment of electrical circuitry for the stop motion;

Figure 5 is a schematic wiring diagram of another embodiment of electrical circuitry for the stop motion; and

Figure 6 is a perspective view of exemplary structure in a modified version of the stop motion and attached to the licker-in of the carding machine of Figure 1.

Although the invention is most advantageously applicable to a carding machine, it will be appreciated that it is not necessarily to be limited to such an application, but may be usefully employed in other operations and machinery. For illustrative purposes, however, the invention will be shown and described as being applied to a carding machine. Such a machine is illustrated schematically in Figure 1 and indicated generally by numeral **10**. As is conventional, it comprises a feed table **12** and feed roll **14**, for feeding the lap **16** to the licker-in **18**, and the sliver **20** leaves the heavy calendar rolls **22** passing then through the coiler head calendar rolls **24**, which feed it into the can **26**, wherein it is coiled in the usual manner.

In one aspect, the invention contemplates the provision of a stop motion including means for detecting deviations in either direction from a predetermined normal condition of the fiber body passing through the machine and also means for automatically and temporarily disabling the stop motion after it has stopped the machine so that the machine can be started and run, if desired, while the defect or abnormality in the fiber body is being corrected. In one embodiment of the invention to be described hereinbelow, the detecting means is constructed and arranged to detect variation in the thickness of the sliver **20**. In another embodiment of the invention to be described hereinbelow, the detecting means is constructed and arranged to also detect variation in the thickness of the lap **16** whereby the stop motion will be operative in response to abnormal conditions either in the lap **16** or in the sliver **20** or both.

The means for detecting undersize sliver, in the illustrative embodiment thereof, is operatively engaged to one of the calendar rolls **24** of the coiler head. As is understood, rolls **24** are usually conveniently mounted in the coiler head (not shown) by any suitable structure which for the purpose of description may be regarded as the supports indicated schematically at **28** in Figure 2. Trunnions **30** on one of the rolls **24** may be journalled directly in the associated supports **28** while the trunnions **30** of the other roll preferably are joined by linkages **32**, **34** to a rod **36** extending through the associated supports **28**, all as shown. The connections among the linkages **32**, **34**, rod **36** and related supports **28** are such that the associated roll **24** is swingable or pivotable bodily relative to an axis defined by rod **36**, and the normal position of this roll will be such that its own weight will continuously operate to urge it toward the opposite roll **24**.

As shown, the linkage **34** preferably is part of a bell crank lever having an arm **38**, adapted to swing or pivot about the axis of rod **36**. Thus, swinging movement of the pivotally mounted roll **24** in response to variations

in the thickness or size of the sliver 20 passing through the rolls will result in a corresponding swinging of the bell crank arm 38. Adjustable low 40 and high 42 limit switches are operatively connected to arm 38. In the illustrated embodiment, an adjustable actuator 44 is threadedly engaged to arm 38 for actuation of the movable arm 46 of switch 40 to close this switch when the thickness of the sliver falls below a predetermined minimum. Similarly, an adjustable actuator 48 is shown threadedly engaged to arm 38 for actuation of the movable arm 50 of switch 42 to close this switch when the thickness of the sliver rises above a predetermined maximum. Suitable means (not shown) will be provided for urging the movable arms 46, 50 to the positions thereof indicated in Figures 2 and 4. For example, these arms 46, 50 may be of leaf spring construction fixedly secured at one end and free at the end adjacent their respective actuators 44, 48. The arm 38 and/or the actuators 44, 48 may be made of suitable insulating material.

Switches 40, 42 are arranged in an electric circuit to stop the machine should the size of sliver 20 fall without the predetermined range thereof for which the adjustable actuators 44, 48 are set. A wiring diagram of an illustrative form of this circuit is shown in Figure 4. The power input is indicated at 52 with lead 54 extending to the movable arms 46, 50 of each of the switches, thereby disposing them in the circuit in parallel relationship for independent energization of a normally deenergized solenoid or electromagnet coil 56 through the separate leads 58, 60 running from the stationary contacts 98, 98' of the switches 40, 42, respectively, to the coil 56, all as shown.

An illustrative embodiment of structure for stopping the machine in response to energization of coil 56 by actuation of switch 40 or 42 as a result of an abnormal condition in sliver 20 is shown in Figure 3. The coil 56, shown schematically in that figure, operates a reciprocable armature 62 connected to pivot a latch 64 clockwise, as viewed in Figure 3, when the coil is energized. Latch 64 may be mounted by pivot pin 65, as shown, and it may be spring urged in a counterclockwise direction by tension spring 67. The clockwise movement of latch 64 resulting when coil 56 is energized disengages the latch from a pin 66 on a trip lever 68. This lever 68 is then moved or pivoted counterclockwise, as viewed in Figure 3, under the action of tension spring 70 and about the axis of a rod 72. Rod 72 preferably is journalled both in the lever 68 and in a support 74, extending through the former as shown, for fixed connection to an angle piece 76 which terminates underneath lever 68.

It should be evident that rotation of lever 68 by spring 70, after the latch 64 is released from pin 66, will cause similar rotation of rod 72 by reason of the displacement of angle piece 76 by the moving lever 68. Catch 78 fixed to rod 72, as shown, normally holds a lever 80 in drive or machine running position, and is swung downwardly or counterclocked by this rotation of rod 72 to let lever 80 fall, thereby stopping the machine. As is understood, lever 80 will be operatively engaged to any suitable arrangement (not shown) for starting the machine when disposed in the position shown in Figure 3, and for stopping the machine when it moves down, such as when catch 78 swings counterclockwise.

By virtue of the arrangement of rod 72, and angle piece 76 and lever 68, the catch 78 may be manually operated, if desired, to let the lever 80 fall to stop the machine independently of the stop motion. That is to say, the catch 78 can be operated to stop the machine even though lever 68 of the stop motion remains in the latched position thereof shown. It will be appreciated that the lever 80 and the associated structure may be arranged at any desirable location in the machine 10.

Thus, movement of the pivoted roll 24 due to a variation in sliver size outside the predetermined range thereof for which the adjustable actuators 44, 48 of switches 40, 42 are set will close the appropriate switch causing machine shutdown through the agency of the aforedescribed electric circuit and structure associated with lever 80. Once the machine has been so stopped, it may be desirable for the machine to be operable while the defect in the sliver is being corrected. With the arrangement this far described, it will be appreciated that the stop motion would continue to operate to stop the machine so long as the defect remains in the sliver, thus preventing the machine from being restarted and run, if desired, while correction of the defective sliver is taking place.

However, the present invention contemplates the provision of novel means for automatically and conveniently disabling the stop motion after the machine has been stopped and while the defective sliver is being corrected. Preferably, operation of this means depends on actuation of the low limit switch 40. Normally, when a defect occurs in the sliver 20 and the stop motion thereafter shuts down the machine, the operator removes the sliver from between the rolls 24 and then repairs it. Such removal results in a swinging of the movable roll 24 against the stationary roll, thereby closing low limit switch 40. Thus, whether the machine is stopped due to undersized or oversized sliver, the low limit switch normally will eventually be closed, and actuation of that switch is relied on to automatically result in a temporary disabling of the stop motion.

In the form of the invention illustrated in Figure 4, this automatic disabling means is shown as including a holding coil 82 in the stop motion circuit connected at one end to lead 84 and at the other end to a stationary terminal 86 normally engaged by movable arm 46 of low limit switch 40 so long as the sliver size is above the predetermined minimum value thereof. This coil 82 will be normally energized, as indicated, to keep switches 88, 90 closed, which switches are suitably operatively connected thereto. Switch 88 is in the line 58, and switch 90 is in a line 92 connected to one side of coil 82 and extending to a switch 94. Switch 94 normally closes a holding circuit for coil 82, which holding circuit includes the power input 52, lead 84, coil 82, lead 92, the switches 90, 94 and the lead 96 going from switch 94 to lead 54. Another holding circuit for coil 82 includes lead 54, switch 40, the coil 82, and lead 84.

As seen in Figure 3, switch 94 preferably is arranged underneath the trip lever 68 for actuation to an opened position by movement of this lever in response to the release of latch 64 by energization of coil 56. Another switch 95 may also be arranged, as shown, for actuation by lever 68. This latter switch normally connects lead 84 to lead 97 connected to coil 56 (see Figure 4), and when actuated, it will engage contact 99 establishing a circuit through line 100 and signal 102 and opening the circuit through coil 56 to deenergize it. Signal 102 may be in the form of a lamp to indicate machine shut down. Lever 68 may be provided with a button 69 or other suitable structure for actuating the movable arms 101, 103 respectively of switches 94, 95. For this purpose, the arms 101, 103 may be connected for simultaneous movement by a suitable connector 105, and they will be normally urged to the positions thereof indicated in Figures 3 and 4 by suitable means (not shown).

By virtue of this arrangement, the holding circuit for coil 82 through switch 94 will be broken when the machine is stopped either by actuation of the low 40 or high 42 limit switches causing lever 68 to drop and open switch 94. If the machine is stopped in response to closure of the high limit switch 42 by oversized sliver, the holding circuit for coil 82 through switch 40 will still be closed, but the subsequent removal of the defective sliver from between rolls 24 for repair will effect actuation or closure of switch 40 as a result of the

return swing of the movable roll **24** against the stationary one. When arm **46** thus moves into engagement with the other contact **98**, this latter holding circuit will be opened deenergizing the coil **82** which thereby opens the switches **88, 90**. These latter switches will remain opened until the swingable roll **24** returns to a position indicating the presence of normal sized sliver between the rolls **24**, and then the arm **46** of switch **40** will be engaged to contact **86**, thereby energizing coil **82** which once again closes switches **88, 90**. As is evident, all the time that rolls **24** are in contact with no sliver therebetween the switch **88** is opened and the stop motion will be disabled or ineffective. Therefore, it cannot prevent restarting and running of the machine, even though arm **46** of switch **40** is in its actuated position engaging the contact **98** and indicating the absence of normal sized sliver.

On the other hand, if the machine is stopped due to undersized sliver, switch **40** will be actuated with the result that coil **82** will be deenergized when switch **94** is opened or actuated by the release and fall of trip lever **68**. Switches **88, 90** will now be opened to disable the stop motion and they will remain in this condition while the defective sliver is removed and repaired. Once again, as is evident, they will close when normal sized sliver is present between the rolls **24**.

Accordingly, after the machine has been shut down by the stop motion and the defective sliver removed for repair, the machine can be restarted by appropriately moving the catch **78** to cause the lever **80** to move up. The machine will now run continuously, if desired, while the sliver is being repaired even though switches **94, 95** will be moved to their Figure 4 positions when the catch **78** is operated. The fact that switches **88, 90** remain opened keeps the stop motion from being effective while the removed sliver is being repaired.

In another embodiment of the invention, previously alluded to, the stop motion is provided with detecting means arranged adjacent the feed roll **14** and licker-in **18**. This embodiment is illustrated schematically in Figure 6. As there shown, a lever **104** is arranged on each projecting trunnion **106** of feed roll **14**, being suitably fulcrummed as at **108**. The feed roll **14** is suitably mounted for vertical displacement in accordance with the thickness of the lap **16** passing between the table **12** and roll **14** and onto the licker-in **18**. A low **110** and high **112** switch are operatively associated with each lever **104**, in a manner similar to the aforedescribed association of switches **40, 42** with arm **38**. Adjustable actuators **114, 116** are threadedly connected in levers **104** for respective actuation of the switches **110, 112** in accordance with variations in the thickness of the lap **16**. As indicated, if lap thickness is too thin, switch **110** will be closed; if it is too great, switch **112** will be closed. Either levers **104** or actuators **114, 116** or both, may be made of insulating material. Suitable means, such as weights **118** preferably are provided for continuously urging the levers **104** to pivot downwardly, or counterclockwise, as shown.

The electrical circuitry for switches **110, 112** may be similar to that described for switches **40, 42** and as indicated in the illustrative wiring diagram of Figure 5, all of these switches may be arranged in the same circuit for independent operation. In that exemplary circuit wherein like reference numerals have been used to designate like parts of the circuit shown in Figure 4, all of the high limit switches **42'**, **112** are arranged in parallel in one parallel branch, while all of the low limit switches **40'**, **110** are also arranged in parallel but in another parallel branch of the circuit. As should be evident, the actuation of any one of these high and low limit switches in response to an abnormal condition in the fiber body passing through the machine will cause energization of coil **56'** which once again may be connected to operate structure such as that shown in Figure **3** for stopping the machine.

Due to the parallel arrangement of the high and low limit switches, the automatic stop motion disabling means including the holding coil **82'** and switches **88'**, **90'**, **94'** will be operable in the same manner as that described in connection with the circuitry of Figure 4.

It will thus be seen that the objects of this invention have been fully and effectively accomplished. It will be realized, however, that the foregoing specific embodiment has been shown and described only for the purpose of illustrating the principles of the invention and are subject to extensive change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the appended claims.

We claim:

1. In a textile machine, a stop motion including: an element movable in opposite directions to indicate deviations from a normal range of machine operation; first and second switches individually operable when actuated to cause machine shut down, said switches being operatively associated with said element to be selectively actuated upon movement of said element out of said normal range in either direction; a third switch movable between a first position and a second position, said third switch when in its first poistion enabling actuation of said first switch to cause machine shutdown; and means for automatically moving said third switch to its second position in response to actuation of said first switch; said first switch being ineffective to cause machine shutdown while said third switch is in its second position, and said means operating automatically to return said third switch to its first position in response to return of said first switch to its normal running position.

2. In a textile machine, a stop motion including: a member operative upon displacement to stop the machine; a control device movable in accordance with a fiber body passing through the machine; a first switch arranged for actuation by movement of said device out of a predetermined range in one direction; a second switch arranged for actuation by movement of said device out of said predetermined range in the opposite direction; mechanism operative upon the actuation of either of said switches to displace said member to stop the machine; means automatically operative in response to actuation of said first switch to temporarily disable said first switch so that it will be temporarily ineffective to stop the machine, said last named means including an electric circuit; said switches being arranged in parallel in said circuit; a third switch and a holding coil therefor, said holding coil being arranged in said circuit to be in an energized state holding said third switch closed when the machine is running and said first switch is in normal running position, and to be deenergized opening said third switch only when said first switch is actuated.

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