March 10, 1959 J. TURNER 2,876,615

BROKEN STRAND INDICATOR

Filed April 3, 1953

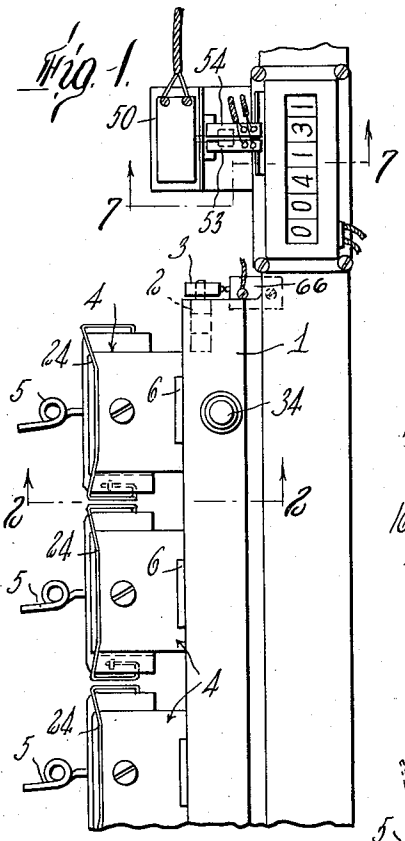


Fig. 1.

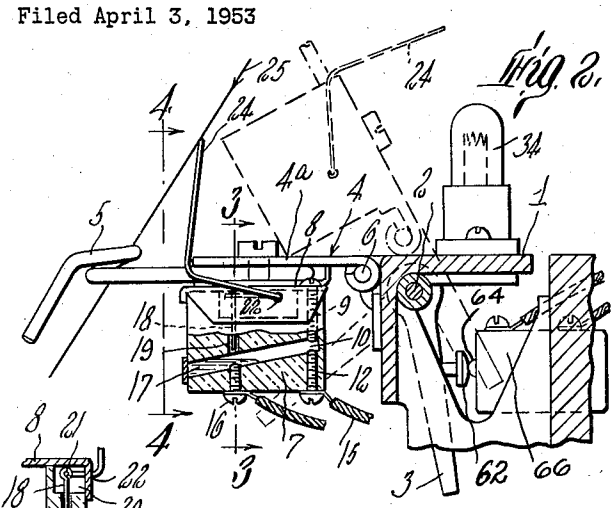


Fig. 2.

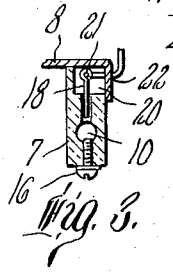


Fig. 3.

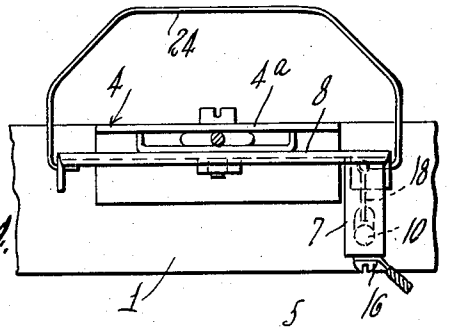


Fig. 4.

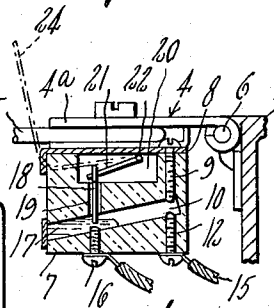


Fig. 5.

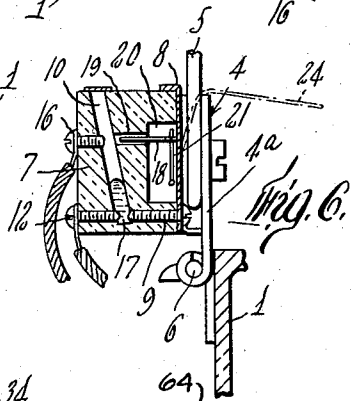


Fig. 6.

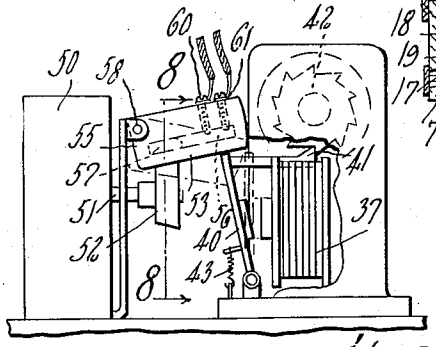


Fig. 7.

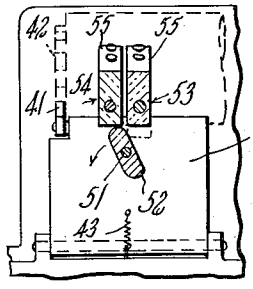


Fig. 8.

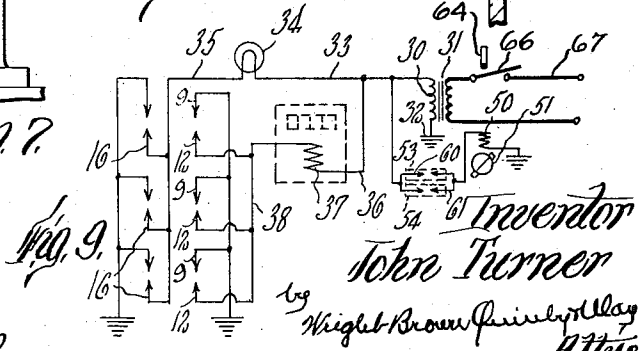


Fig. 9.

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BROKEN STRAND INDICATOR

John Turner, Newton, Mass.

Application April 3, 1953, Serial No. 346,601

8 Claims. (Cl. 57—81)

This invention relates to mechanism for indicating broken strands which is particularly suitable for use in connection with textile machines, and relates to improvements over the mechanism disclosed in my Patent No. 2,579,407, granted December 18, 1951.

One object of this invention is to provide an improved and simplified switch mechanism which is entirely out of the way of the operator.

It sometimes happens that the operator fails to make a proper knot after a strand has been broken, but in the meantime the thread guide has been thrown back to normal position. When this failure becomes apparent and the thread guide is thrown up, a second indication of break would be made in accordance with my patented structure. Occasionally, also, several attempts to tie are necessary before success is achieved. Under such circumstances there would be a count of each time the thread guide is thrown back for repair of the strand, and should this occur frequently, a false and misleading count of the breaks would occur.

A further object of the invention is to provide means by which such false indication may be minimized.

Still another object is to provide means by which doffing action may take place without producing a broken strand indication.

Further objects and advantages will appear from a description of an embodiment of the invention shown in the accompanying drawings, in which

Figure 1 is a fragmentary top plan view of a spinning frame to which the subject matter of this invention has been applied, the parts being in normal operative positions.

Figure 2 is a detail sectional view on line 2—2 of Figure 1 and showing in broken lines the positions of the parts during doffing.

Figures 3 and 4 are detail sectional views on lines 3—3 and 4—4, respectively, of Figure 2.

Figure 5 is a view similar to a portion of Figure 2, but showing the parts in broken strand relation.

Figure 6 is a view similar to Figure 5, but with the switch mechanism turned up to signal-making position.

Figure 7 is a detail sectional view on line 7—7 of Figure 1.

Figure 8 is a detail sectional view on line 8—8 of Figure 7.

Figure 9 is a wiring diagram of the mechanism.

Referring to the drawings, at 1 is indicated the thread board of a textile machine such as a drawing or spinning frame. This thread board 1, as shown best in Figure 2, is pivotally supported on a longitudinal axis 2 about which it may be turned from the full line position of Figure 2, which is the operative position, to an inclined position shown in broken lines in this figure, which is the doffing position, this being well understood in the art. The thread board may be turned from one to the other angular positions by any suitable means, a handle 3 secured thereto being shown for the purpose.

Along the forward edge of the thread board 1 when it

is in its normal operative position of Figures 1 and 2, there are pivoted a plurality of supports 4, each carrying a thread guide 5 projecting from its forward edge. Each of these supports has a platform member 4a pivoted to the board on the horizontal pivot 6. Each of these supports has secured thereto a switch mechanism which comprises a block 7 which may well be made of one of the high acetate plastics which is inert to mercury. This block is attached to a platform conductor plate 8 which covers its upper face and which may be secured thereto as by a screw 9, the inner end of which extends into a bore 10 which extends upwardly and rearwardly, as shown best in Figure 5, from the forward edge of the block. This screw 9 and the plate 8 provide a grounding connection between the screw and the frame of the machine. Substantially opposite to this screw 9, is a screw 12, the inner end of which also enters the bore 10 and which forms a live terminal for an electrical connection 15.

Toward the forward edge of the block 7 a live terminal screw 16 is threaded therethrough, its inner end entering the passage 10. A globule of mercury 17 is placed within the passage 10 and in the normal operative position of the thread guide, this mercury is in contact with the screw 16, and it may also at times be in contact with a conductor 18 which is mounted for free axial motion in a perforation 19 extending inwardly from a chamber 20 in the upper edge of the block 7 where it is looped over an arm 21. This arm is rockingly supported at 22 and has a looped extension 24 (see Figures 3 and 4) which normally engages against the inner face of a strand or thread 25, leading to the thread guide 5, the arrangement being such that when the strand or thread 25 is in normal position, the forward and top portion of the member 24 is pushed rearwardly, the tension on the strand or thread so retaining it, lifting the conductor 18 out of contact with the globule of mercury 17, thus breaking the electrical connection between the two. However, when a strand 25 is absent, or becomes broken, it no longer presses rearwardly on the member 24, which therefore drops by gravity, allowing the conductor 18 to drop into contact with the mercury, thus establishing an electric connection from the terminal 16 through the mercury, the conductor 18, and other metal parts to ground through the plate 4a, its pivot 6, and the thread board 1.

The perforation 19 may be only a few thousandths of an inch in diameter and the conductor 18 may be of stainless steel. The surface tension of the mercury prevents it from entering the small space in the perforation 19 outwardly of the conductor 18 so that it does not escape from the passage 10.

The forward end of the passage 10 is closed off by any suitable means, a small piece of adhesive tape, such as the well known "Scotch" tape extending across the opening and the opposite sides of the block being quite sufficient for the purpose. This passage 10 forms a pocket for the reception of the globule of mercury into which the conductor 18 may be dipped at suitable times to close an electric circuit.

The switch per se, including the mercury globules and the conductor 18, is not claimed herein but forms the subject matter of another application, Serial No. 577,395, filed April 10, 1956, which is a continuation-in-part of this application.

The electric circuits controlled by this switch may be arranged as shown in the diagram of Figure 9, deriving low voltage power from the secondary 30 of a transformer 31. One side of this is grounded as at 32 and the ungrounded side 33 leads to a signal, such as a lamp 34, and a conductor 35, the conductor 35 being connected to the terminal screws 16 of the several blocks 7 which may be desired to be employed together with a single signal. When the strand or thread leading to any of the thread

guides 5 of this bank is broken or is absent, a corresponding connection is made through the signal 34, this indicating to the operator that at least one of the strands of the group of thread guides has been broken or is missing. When the signal has thus called to the operator's attention a broke or absent strand, it is easy to determine which thread guide is not operating, whereupon the operator throws up that particular thread guide into the position of Figure 6 from the normal horizontal position of Figure 5. This removes the thread guide out of the way, whereupon the operator may tie the thread ends where they have been broken, after which the thread guide may be returned to its lowered position and the mended strand threaded therethrough.

When the thread guide is thrown back into the position of Figure 6, the mercury globule 17 drops to the rear end of the passage 10, as shown in Figure 6, and electrically connects the terminal screw 12 with the terminal screw 9, which thus establishes a circuit to ground from the branch conductor 36 (see Figure 9) through a solenoid 37 and through the conductor 38, the screw 12, and the screw 9 to ground. The energization of the solenoid 37 acts to attract the armature 40 of a counting mechanism (see Figure 7) and presses a dog 41 against the teeth of a ratchet wheel 42 of the counter, pushing this counter around by one count.

When the broken strand has been tied and the thread guide brought down to its normal position, the circuit is broken between the screws 12 and 9, whereupon a spring 43, when free to do so, pulls the ratchet dog 41 to its outer position. The machine then continues in its normal operation until such time as another strand parts or becomes exhausted, whereupon the signal is made as before noted, calling attention to the difficulty which may then be rectified by the operator.

Occasionally the operator does not succeed in making a correct knot when a strand is broken and will return the thread guide to a normal position, and then discovering the fact that the knot is improper, may throw the thread eye to its inoperative position and try again. Occasionally it will be found necessary to attempt to make the knot two or three times before it is successful. If, under such circumstances, the thread guide when thrown back would result in an actuation of the counter at each such time, even though the thread break to be corrected was the same break previously recorded, this would give a false indication of the number of breaks made during a predetermined time and thus give a false indication of the operation of the machine. It is therefore desirable to eliminate these false counts where actually one break might otherwise be registered as two or more. Means for eliminating false counts have therefore been provided in accordance with this invention.

This means comprises a timing device comprisng an electric clock motor 50, the armature 51 of which carries a cam 52. Above the cam 52 are two electric switches 53 and 54 each comprising a block 55 which may be of plastic similar to the block 7, and which has a passage 56 therein for the reception of a mercury globule 57. The switches 53 and 54 are pivoted at 58 and when in upwardly tilted positions, the mercury is out of contact with their contact screws 60 and 61 so that the switches are open. They may be held in this position by the upper end of the armature 40 when the armature is retracted. When this armature is pulled by energization of the solenoid 37, it passes out from under the switches, and as the cam 52 in its stopped angular position of Figure 8 has passed from under the right hand switch 53, this switch is free to drop to the dotted line position on energization of the solenoid 37, where its mercury globule contacts its screws 60 and 61 and closes a circuit from lead 33 through the clock motor to ground. This starts the clock motor, which turns the cam 52 as shown by the arrow, permitting the left hand switch 54 to drop and closing the parallel connection through its screws 60 and 61. Both

switches 53 and 54 now obstruct the retraction of the armature 40 so that operation of the counter is prevented for a predetermined time. Near the end of this time, which may, for example, be 30 seconds, the cam 52 first raises the right hand switch 53, opening its circuit to the timing motor, which however continues to run until the left hand switch 54 has also been lifted. At this time the right hand switch 53 is free from the cam and is supported only by the armature 40 which is retracted beneath it by the spring 43 as soon as both switches have been lifted. The counter is now in condition for actuation and after a period of time determined by the timing device from its previous actuation.

It is also desirable that no signal or counting be made during the doffing operation. To this end a master switch shown at 66 in one of the high voltage lines 67 and carried by the support to which the thread board 1 is pivoted, is arranged to be opened by removal of a button 62 carried by the handle 3 from contact with a closing pin 64 of the normally open master switch 66 when the thread board is rocked from the full-line position shown in Figure 2 to the doffing position. This acts to electrically disconnect both the indicator and the counter so that they are inoperative when the machine is in doffing condition.

From the foregoing description of an embodiment of this invention, it should be evident to those skilled in the art that various further changes and modifications may be made without departing from its spirit or scope.

I claim:

1. A textile machine having a thread board, a thread guide hinged to said board, said guide being swingable about its hinge between operative and inoperative positions, a counter, means responsive to the swinging of said guide to inoperative position to actuate said counter by one count, a timing device, and means controlled by said timing device to render said counter unresponsive to repeated such swings of said guide after an actuation thereof within a predetermined time.

2. A textile machine having a thread board, a plurality of thread guides arranged along said board and each having a hinged connection thereto and swingable about its hinge between an operative and an inoperative position, a counter, means responsive to the swinging of any of said guides from operative to inoperative position to actuate said counter by one count, a timing device, and means controlled by said timing device to render said counter unresponsive to repeated such swings of each guide after an actuation thereof within a predetermined time.

3. A textile machine having a thread board, a plurality of thread guide members arranged along said board and each having a hinged connection thereto and swingable about its hinge connection between an operative and an inoperative position, each of said members comprising a platform substantially horizontal when said member is in operative angular position and having a thread guide projecting from the free forward edge of said platform, an electric switch secured to the under face of said platform, a strand-engaging element carried by said member and normally pressed against a strand extending to said thread guide, said element being operatively related to said switch to close said switch in the absence of such strand, a signal operatively connected to said switch to be actuated when said switch is closed, a counter, and means controlled by the motion of said member to inoperative angular position to actuate said counter by a single count.

4. A textile machine having a thread board, a pivotal support for said board about which it may be rocked between a normal and a doffing position, a plurality of thread guide supports carried by said board along one edge thereof, a thread guide on each said support, an electrically actuated signal, mechanism engaging a strand leading to each guide and responsive to the absence of

such strand to actuate said signal, and means responsive to the motion of said board to doffing position to cut off electrical power to said mechanism.

5. A textile machine having a thread board, a pivotal support for said board about which it may be rocked between a normal and a doffing position, a plurality of thread guide supports each pivoted to said board for motion between an operative angular position and an inoperative angular position, a thread guide on each said support, a signal, mechanism engaging a strand leading to each thread guide in operative angular position and responsive to the absence of such strand to actuate said signal, a counter, means responsive to motion of any of said supports to inoperative angular position to actuate said counter by one count, and means responsive to motion of said thread board to doffing position to render said counter and signal inoperative.

6. In combination with the thread board of a textile machine, a thread guide support pivoted to said board for substantially horizontal operative position and an inoperative angular position, a thread guide projecting forwardly from said support when said support is in operative position, a block fixed to said support and having a bore extending upwardly and rearwardly therein when said support is in operative position, a pair of electric terminals extending into said bore from beneath, a globule of mercury in said bore and when said support is in operative angular position in contact with one of said terminals only and when in inoperative angular position in contact with the other of said terminals only, said block having a perforation leading into said bore, a conductor freely slidable axially in said perforation into and out of contact with said globule when said globule is in contact with said one terminal only, a member connected to said conductor normally engaging a strand leading to said thread guide and when in such engagement holding said conductor out of contact with said globule and responsive to absence of such strand to cause said conductor to engage said globule and close contact with said one terminal, a signal in circuit with said one contact and conductor to be operated when said contact engages said globule, a counter, and an electric circuit including said counter, said other terminal and a third terminal entering said bore and bridged to said other terminal by said globule when said support is in said inoperative angular position to thereby cause an actuation of said counter.

7. A textile machine having a thread board, a plurality of thread guide members arranged along said board and each having a hinged connection thereto and swingable about its hinge connection between an operative and an inoperative position, each of said members comprising a platform substantially horizontal when said member is in operative angular position and having a thread guide projecting from the free forward edge of said platform, an electric switch secured to the under face of said platform, a strand-engaging element carried by said member and normally pressed against a strand extending to said thread guide, said member being operatively related to said switch to close said switch in the absence of such strand, a signal operatively connected to said member to be actuated when said switch is closed, a counter, means controlled by the motion of said member to inoperative angular position to establish electrical connection through said switch to actuate said counter by a single count, a timing device, and means controlled by said timing device to prevent actuation of said counter for a predetermined time after an actuation of said counter whereby closing of said switch within a predetermined time after a previous closing of said switch is inoperative to actuate said counter.

8. A textile machine having a thread board, a thread guide member hinged to said board, said guide member swingable about its hinge connection between operative and inoperative positions, an electrically actuated signal, a circuit for actuating said signal having a controlling switch closed by the swinging of said guide member from operative to inoperative position, a counter, a solenoid in said circuit and an armature for said solenoid for actuating said counter when said armature moves in one direction with respect to said solenoid, a clock motor having an actuating circuit, a pair of normally closed switches in parallel controlling said clock circuit, said armature when spaced from said solenoid holding one of said clock circuit switches open, both of said clock circuit switches when closed being positioned to prevent retraction of said armature, a cam rotated by said clock motor and positioned to open said pair of switches successively and when stopped holding the other of said clock switches last opened thereby open, whereby when said solenoid is thereafter energized by closing of said signal controlling switch said armature is closed to said solenoid allowing said one of said clock switches to close and starting said clock motor thereby moving said cam to permit said other clock motor switch to close, thereby continuing the rotation of said cam until both clock switches are again opened and during which rotation said counter is held inoperative.

References Cited in the file of this patent

UNITED STATES PATENTS

886,638	Prest	May 5, 1908
2,417,993	Porter	Mar. 25, 1947
2,524,340	Bolin	Oct. 3, 1950
2,569,728	Melin et al.	Oct. 2, 1951
2,579,407	Turner	Dec. 18, 1951
2,704,430	Harris	Mar. 22, 1955

FOREIGN PATENTS

798,361	France	Mar. 10, 1936