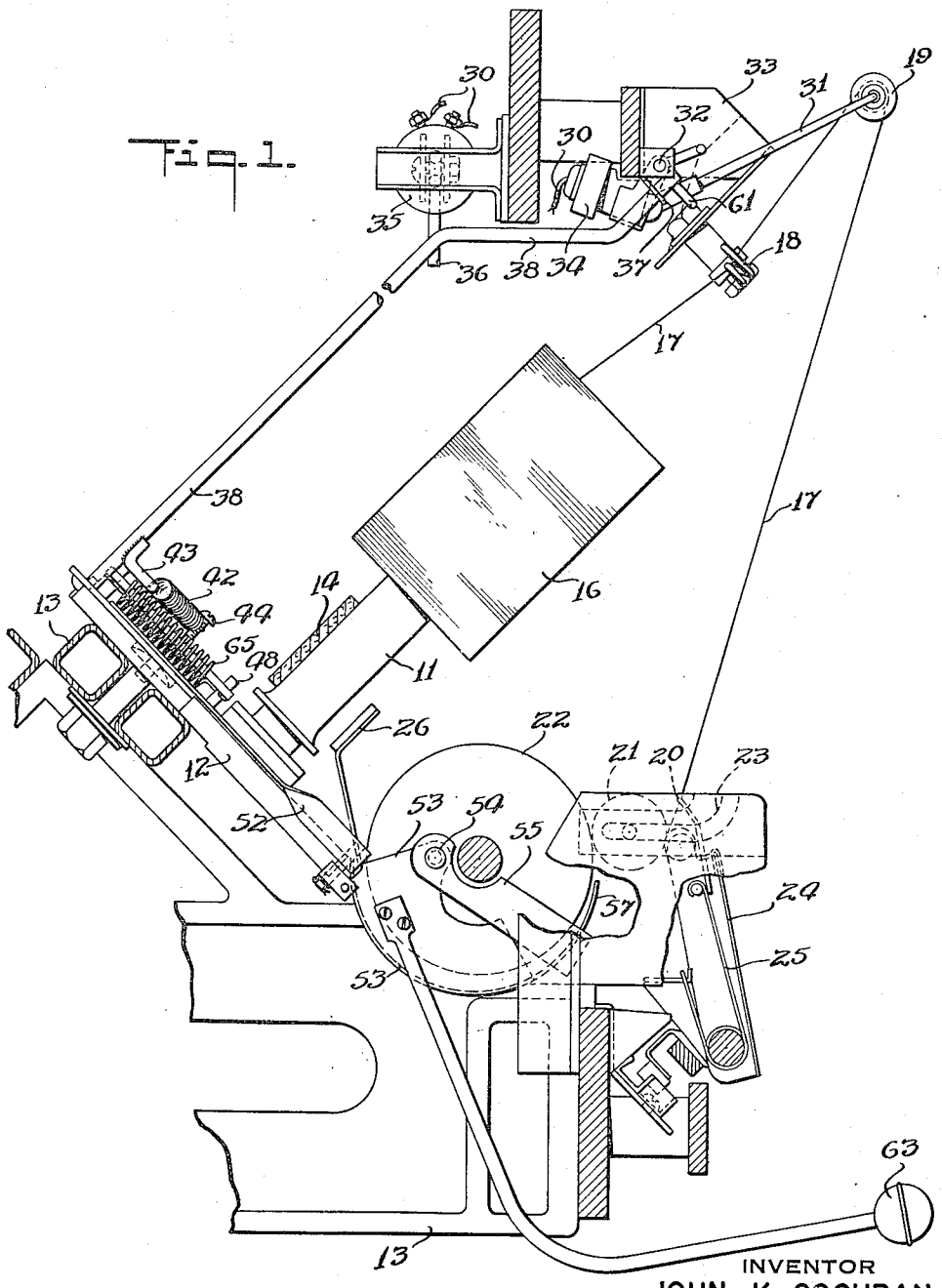
June 19, 1951 J. K. COCHRAN 2,557,783

STOP MECHANISM FOR YARN SPINNING MACHINES

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Fig. 1.



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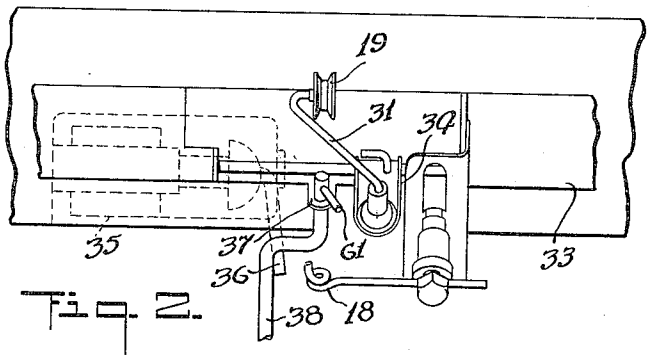


Fig. 2.

Fig. 3.

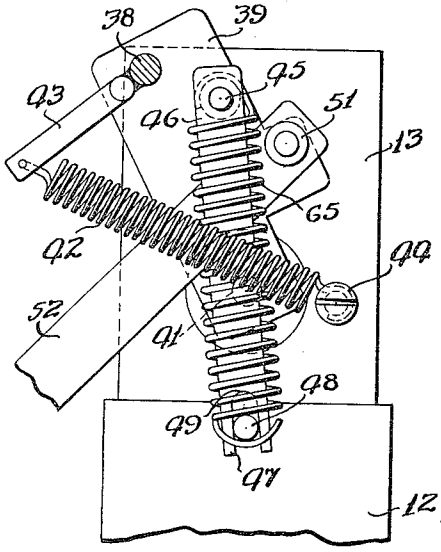
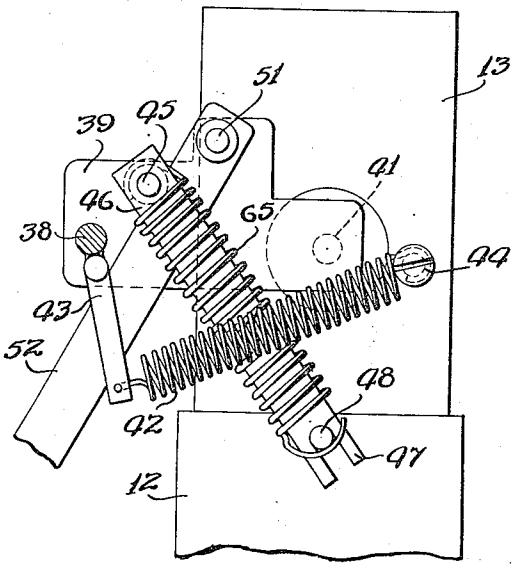


Fig. 4.



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Patented June 19, 1951 2,557,783

UNITED STATES PATENT OFFICE

2,557,783

STOP MECHANISM FOR YARN SPINNING MACHINES

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Application September 13, 1949, Serial No. 115,427

7 Claims. (Cl. 57—80)

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The present invention relates to the art of machines for spinning and twisting yarns and threads and is more particularly concerned with a stop mechanism for automatically stopping both the yarn spindle and the take-up tube upon breaking of the yarn or thread.

In customary yarn spinning machines, the yarn on a package is placed upon a spindle and is led therefrom to a take-up tube upon which it is wound, the relative motion between the spindle and the yarn package being such that a twisting or spinning action takes place, whereby the yarn is twisted or spun before being wound upon the take-up tube. Since this spinning and winding operation is done automatically at great speed, it is important to be able to stop both the yarn spindle and the yarn take-up tube immediately upon breaking of the yarn in order not to lose the broken end of the yarn and in order to prevent damage to yarn on take-up tube.

This problem is sucessfully solved by the present invention in which an improved mechanism is provided responding to the breaking of the yarn to stop both the spindle and the take-up tube. This is done, according to the preferred embodiment of the invention, by the use of a roller guide kept in a normal position by the yarn during spinning and winding. Upon breaking of the yarn this roller is caused to move to actuate a mercury switch to energize a solenoid whose armature energizes a mechanism which moves the spindle whorl from engagement with its driving belt and against a brake. Simultaneously a disengaging shield is interposed between the take-up tube and its driving roller whereby the take-up tube also is halted.

Further objects and advantages of the present invention will become more apparent from a consideration of the following description taken in conjunction with the appended drawings, in which—

Figure 1 is a side view of a spinning machine including the present invention;

Figure 2 is a front view of a portion of the apparatus of Figure 1;

Figure 3 is a top view of the actuating mechanism in the "on" position; and

Figure 4 is a top view of the same mechanism in the "off" position.

Referring to the figures, for ready understanding of the invention, there will first be described the spinning machine itself, whose details do not form any portion of the present invention. This machine comprises a spindle whorl 11 rotatably mounted on a slide bracket 12 which in

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turn is slidably mounted on the frame 13 of the machine. The spindle whorl 11 in the operating position is in frictional engagement with a suitably driven belt 14 and is rotated thereby. The spindle whorl 11 carries the yarn package 16 from which the yarn 17 passes to a gathering eye 18 then over a roller 19 to a thread guide 20 cooperating with a take-up tube 21 upon which the thread 17 is to be wound. The take-up tube 21 is normally in frictional engagement with a cork drive roller 22 which is constantly rotated by a suitable source of motive power. The take-up tube 21 is rotatably mounted in a pair of tracks 23 secured to frame 13, a hinge bracket 24 which is normally urged by a spring 25 so that take-up tube 21 bears against the roller 22 and is driven thereby.

It will readily be appreciated that, in a machine of this type, if the thread breaks, it is important to stop both the take-up tube 21 and the spindle whorl 11 carrying the yarn package 16. This is accomplished by the mechanism of the present invention.

The roller 19 is mounted at the end of a lever 31 which is pivoted as at 32 to a mounting bracket 33. Also mounted on the lever 31 at the end opposite from roller 19 is a mercury switch 34 which is normally retained in the "off" or over position by the tension of the yarn 17 against the roller 19. Mercury switch 34 is connected by wires 30 in series with a solenoid 35 and is adapted to energize the solenoid 35 upon closing of the switch 34. Upon breaking of the yarn, the weight of the mercury switch 34 (which may be supplemented by other weight if desired) swings the lever 31 around the pivot 32 into a position whereby the mercury switch 34 closes its contacts and energizes solenoid 35. This in turn pulls the armature of the solenoid and an arm 36 connected thereto in a direction out of the plane of the drawing in Figure 1 and to the left in Figure 2.

Pivotally mounted on the bracket 33 within a yoke 37 is one end of the knock-off rod 38 which is normally in close juxtaposition to the solenoid armature arm 36 and is adapted to be moved by armature arm 36 upon energization of the solenoid 35. At its opposite end, as shown most clearly in Figures 3 and 4 the knock-off rod 38 is pivotally mounted in a pivot plate 39 which in turn is pivotally mounted on the frame 13 as shown at 41. A knock-off tension spring 42 is fastened at one end to a bracket 43 secured to the knock-off rod 38 and at the other end to the frame 13 at 44. Spring 42 and bracket 43 are arranged so that in the "on" position shown in

Figure 3 (with the machine running) the axis of spring 42 extends above the pivot 41. However, the actuation of the knock-off rod 38 by the solenoid armature 36 in response to switch 34 rotates the knock-off rod 38 and its bracket 43 about pivot 41 so that the axis of spring 42 crosses over the pivot axis 41 of the pivot plate 39. When this happens the force exerted by the knock-off spring 42 moves the knock-off rod 38 and pivot plate 39 further in the same direction. In effect, the solenoid 35 merely initiates the action and releases the spring 42, which constitutes the primary motivating force for the rotation of the pivot plate 39.

Pivotally mounted on the pivot plate 39 at 45 is an arm 46 which has a slot 47 formed at its opposite end and engaging a pin 48 fixed to the slide bracket 12. The slot 47 is formed in relation to the pin 48 so that when in the position shown in Figure 3 there is normally a clearance between the pin 48 and the closed end 49 of slot 47. However, when the pivot plate 39 rotates about its pivot 41 in response to the action of solenoid 35 and spring 42, the corresponding movement of the pivot point 45 between arm 46 and pivot plate 39 causes the arm 46 to slide down so that the pin 48 is engaged by the slot end 49 and, by continued rotation of the pivot plate 39, the arm 46 forces the pin 48 and the slide bracket 12 on which it is mounted in a downward direction as shown in Figure 3 or 4 to the final position shown in Figure 4. In so doing, the slide bracket 12 bearing spindle whorl 11 has been moved so that the spindle whorl 11 disengages the belt 14 and instead engages the brake 26, to stop it, as desired.

Also, pivotally secured to the pivot plate 39 at 51 is a connecting rod 52 which is linked to a disengaging shield 53 (in Figure 1) having a substantially cylindrical portion slightly eccentrically mounted with respect to the roller 22. Shield 53 is pivoted at 54 in a mounting bracket 55 secured to the frame 13. Upon rotation of the pivot plate 39, upon breaking of the yarn, the connecting rod 52 is moved forward and thereby pushes the disengaging shield 53, causing it to pivot at 54 so that the end 57 of the disengaging shield 53 is interposed between the cork drive roller 22 and the take-up tube 21. It will be understood that the resilient engagement between the take-up tube 21 and the drive roller 22 by virtue of the mounting of the take-up tube 21 in frame 13 readily permits the interposition of the disengaging shield end 57. This shield end 57 thereby prevents the drive roller 22 from having any effect on the take-up tube 21 and also serves as a brake for the take-up tube causing it to stop almost immediately.

The upper end of the knock-off rod 38 also carries a pin 61 projecting therefrom. In the ordinary position of the mechanism, with the spindle rotating, the pin 61 is in a free and clear position. However, upon rotation of the pivot plate 39, the pin 61 also swings around and operates to raise the lever 31 to at least partially restore it toward its original position, enough so that the mercury switch 34 is tilted to open the solenoid circuit. In this way, the solenoid is kept from constant energization which might unduly heat it and even cause it to burn out, while permitting its momentary energization to initiate the stopping action. It will be understood that continued energization of solenoid 35 is unnecessary, since once pivot plate 39 rotates enough to pass the axis of spring 42 over pivot 41, the spring 42 keeps the mechanism in the "off" position.

For the purpose of re-engaging the mechanism to the "on" condition, an engaging handle 63 is provided which is rigidly fixed to the disengaging shield 53. By actuation of the handle 63 in a downward and forward direction (leftward in Figure 1), the disengaging shield 53 is pivoted about 54 to retract its end 57 from between the roller 22 and the take-up tube 21. The spring 25 thereby urges the hinged bracket 24 toward the drive roller 22 and presses the take-up tube 21 against the drive roller 22 to restore its driving action.

At the same time, movement of the disengaging shield 53 in response to actuation of the handle 63 moves the connecting rod 52 and pivots the pivot plate 39 about its pivot 41 in a clockwise direction as shown in Figures 3 and 4. As soon as the axis of spring 42 crosses the pivot axis 41, the tension of spring 42 immediately restores the pivot plate 39 to the position shown in Figure 3 and at the same time restores knock-off rod 38 to the position in which its pin 61 no longer engages the lever 31. When the pivot plate 39 is thus restored to the "on" position the arm 46 no longer engages the pin 48. A tension spring 65 surrounding the arm 46 is connected between the pin 48 and the pivot 45 of the arm 46 and this tension spring then withdraws the slide bracket 12 from the brake 26 into engagement with the drive belt 14, whereby spinning and winding upon the take-up tube are simultaneously re-started.

Accordingly, the present invention has provided an extremely effective and relatively simple arrangement for automatically stopping both the spindle whorl and the take-up tube of a spinning machine immediately and automatically upon breaking of the yarn. In addition, the machine may be readily re-engaged by the simple actuation of a single engaging handle.

It will be understood that many modifications may be readily conceived, coming within the spirit of the present invention. It is therefore intended that the above description be considered as illustrative only and not in a limiting sense, the present invention being defined solely by the appended claims.

What is claimed is:

1. A stop motion mechanism for spinning machines having a rotatable spindle having drive means and a rotatable take-up element also having drive means, comprising a roller adapted to be kept in a predetermined position by the thread or yarn being spun, and to move to a different position upon breaking of said thread or yarn, a switch coupled to said roller to be closed thereby when in said different position, a slide member upon which said spindle is mounted, a brake for said spindle, a solenoid responsive to closing of said switch upon movement of said roller from said predetermined position to said different position for moving said slide member to disengage said spindle from its drive means and to engage said brake, and further means also responsive to said roller movement for simultaneously disengaging said take-up element from its drive means, whereby both said spindle and said take-up element are stopped simultaneously.

2. A mechanism as in claim 1 wherein said last means also serves to brake said take-up element after disengagement from its drive means.

3. A stop motion mechanism for thread spinning machines having a slide bracket, a spindle whorl rotatably mounted on said bracket and

adapted to rotate a thread holder, a take-up tube adapted to wind up said thread after spinning thereof, and a drive roller for said take-up tube, comprising a roller engaged by said thread and retained in a predetermined position by said thread when unbroken, a lever fixed to said roller and weighted to move said roller and lever to another position upon breaking said thread, a switch fixed to said lever, and adapted to close its circuit upon said lever movement, a solenoid adapted to be energized upon closing of said switch, said solenoid having an armature adapted to move upon energization of said solenoid and means for moving said slide bracket in response to movement of said solenoid armature, said means comprising a pivotally mounted element, a tension spring normally urging said element rotatably in one sense, means actuated by said armature for rotating said element until said spring passes over the pivot of said element, whereby said spring thereupon urges said element rotatably in opposite sense, a lost-motion connection between said element and said slide bracket adapted upon said rotation of element to push said slide bracket in one direction, and a tension spring coupling said element and bracket for moving said bracket in opposite direction upon rotation of said element in opposite sense.

4. A stop motion mechanism for thread spinning machines having a slide bracket, a spindle whorl rotatably mounted on said bracket and adapted to rotate a thread holder, a take-up tube adapted to wind up said thread after spinning thereof, and a drive roller for said take-up tube, comprising a pivotally mounted element, means including a toggle-mounted tension spring for rotating said element in response to breaking of said thread, a lost-motion connection between said element and said slide bracket adapted upon said rotation of said element to push said slide bracket in one direction, and a tension spring urging said slide bracket in the opposite direction.

5. A stop motion mechanism as in claim 4, wherein said lost-motion connection comprises an arm pivoted to said element and engaging said slide bracket, and said last-named tension spring is coaxial with said arm.

6. A stop motion mechanism for thread spinning machines having a spindle rotatably mounted on a slide bracket, drive means for said spindle, a helical tension spring normally urging said spindle in engagement with said drive means, and means operated by breaking of said thread for moving said slide bracket in a direction disengaging said spindle from said drive means in opposition to said spring, said means including an element coaxially within said spring.

7. A stop mechanism as in claim 6, wherein said thread-operated-means comprises a pivoted element adapted to be rotated upon breaking of said thread, said tension spring being fastened at one end to said pivoted element and at the other end to said slide bracket, and said coaxial element being adapted to only push on said slide bracket, whereby said latter element does not interfere with the restoring action of said spring.

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