April 29, 1958 W. M. FARLEY 2,832,303

STOP MEANS FOR SEWING MACHINE

Filed Sept. 9, 1954 2 Sheets-Sheet 1

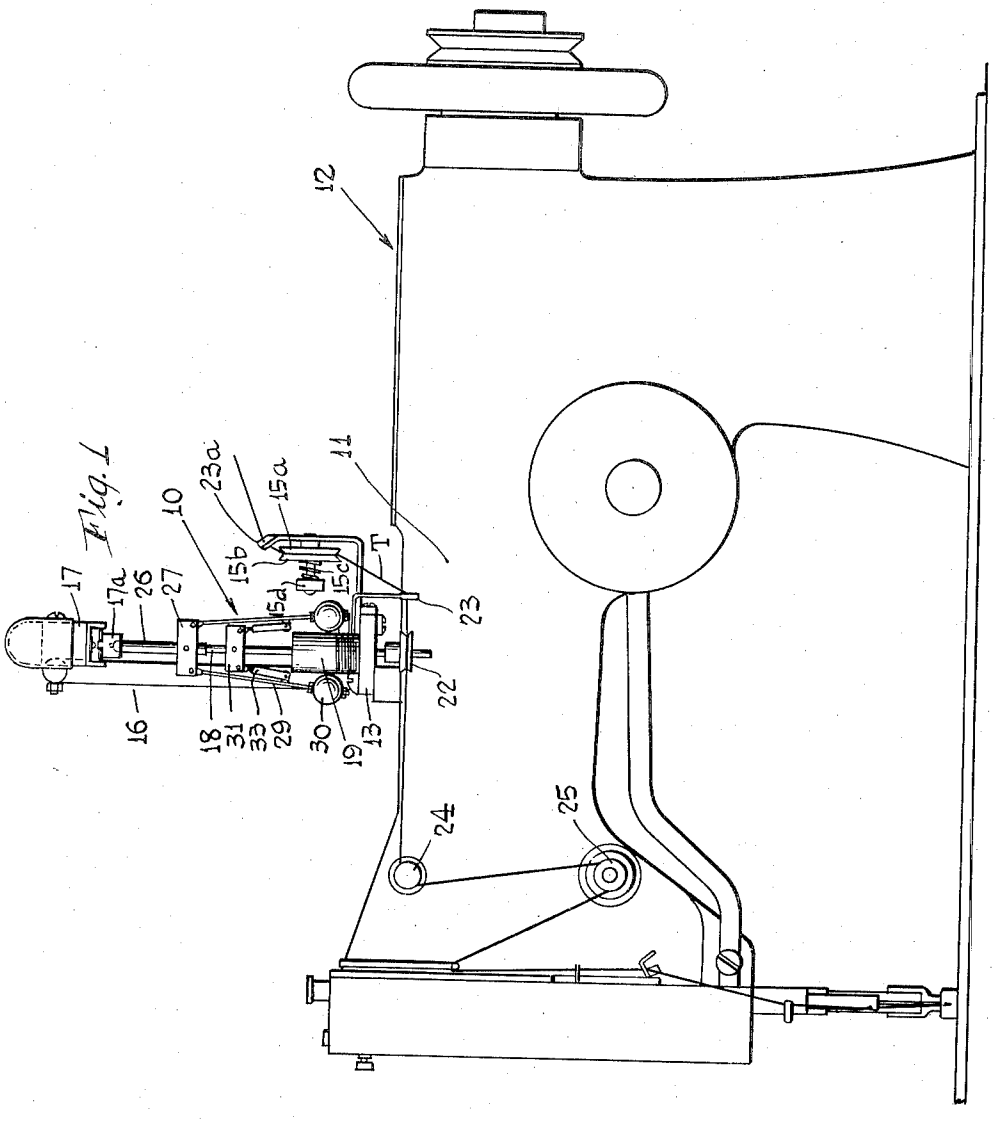



Fig. 1

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STOP MEANS FOR SEWING MACHINE

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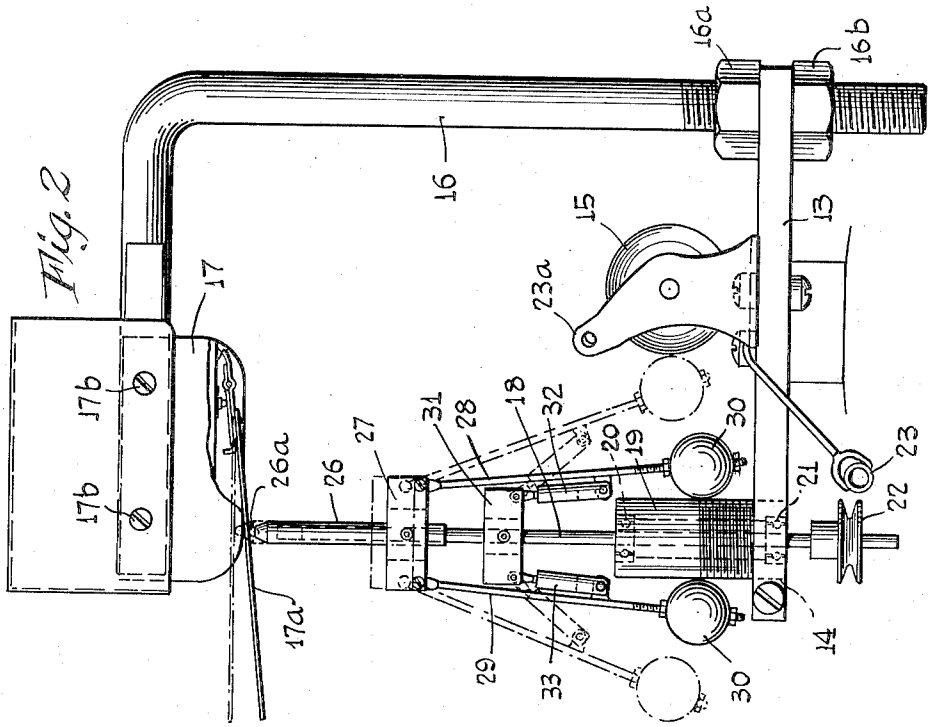



Fig. 2

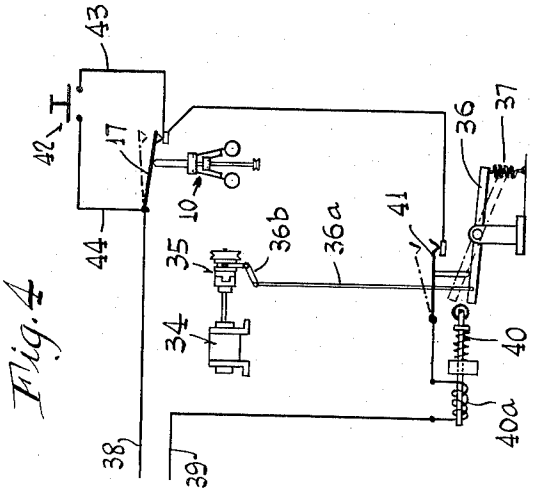



Fig. 4

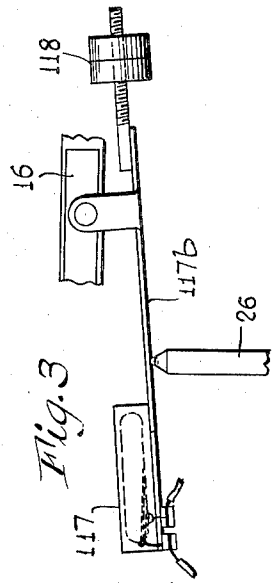



Fig. 3

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2,832,303

# STOP MEANS FOR SEWING MACHINE

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Application September 9, 1954, Serial No. 454,967

8 Claims. (Cl. 112—219)

This invention relates to a stop mechanism for a sewing machine to automatically stop the sewing machine whenever an improper sewing operation occurs at the sewing station and is of particular importance where a plurality of automatic sewing machines are tended by a single operator.

Heretofore, because the operator's attention has to be divided among the plurality of machines, it has been impossible for his attention to be directed immediately to that machine where an improper sewing operation occurs due to, for example, the needle or bobbin thread breaking or having improper tension therein, or exhaustion of the material being sewn. This results in the machine continuing to run and forming an imperfect stitch or no stitch at all if a thread is broken, thereby creating waste material and lost time.

The present invention overcomes these disadvantages by providing a stop mechanism which is responsive automatically to stop any of a plurality of stitching malfunctions which may develop. This is accomplished by detecting a variation in the linear speed of the needle thread when an improper sewing operation occurs. I have discovered that the rate of linear movement of the needle thread is indicative of the sewing operation being performed at the sewing station and whenever improper stitching is being performed at the sewing station due, for example, to a break therein, the failure of the needle thread to be drawn into a proper stitch formation because of improper tension or a break in the bobbin thread, or an exhaustion of the material being sewn the rate of linear movement of the needle thread is decreased.

According to my invention I provide a novel governor which is positioned in the path of and driven by the needle thread so as to be responsive to the linear movement thereof and I control the driving means of the sewing machine by a control circuit having a self-contained switch means which is actuated by the governor. So long as the linear movement of the needle thread is at the established rate to carry out a proper stitching operation, the governor and switch controlled thereby maintain the control circuit in a driving position. Whenever the linear rate of movement of the needle thread is decreased for any reason indicating an improper sewing operation, the governor speed is decreased and said switch actuated to render the control circuit operative to immediately stop the sewing machine and automatically stop the improper sewing operation until the operator can correct the trouble thereby avoiding waste.

A feature of the invention resides in controlling the operation of the sewing machine in accordance with variations of the linear speed of the needle thread as may be occasioned by an improper sewing operation due to breakage or improper tension in the needle or bobbin threads or in the exhaustion of the material being sewn.

Another feature of the invention resides in the provision of a novel thread driven governor and self-contained switch means actuated thereby to control the machine.



Other features and advantages of the invention will be apparent from the specification and claims when considered in connection with the drawings in which:

Figure 1 shows a sewing machine with the stop means thereon.

Fig. 2 is a detailed view of the stop means.

Fig. 3 is a detailed view of another form of switch.

Fig. 4 is a diagrammatic circuit arangement showing the stop means in the control circuit for the sewing machine.

In accordance with the present invention a novel sewing machine stop mechanism is provided for automatically stopping the sewing operation whenever improper stitching resulting from a variety of common causes of malstitching occur at the sewing station so that spoilage and lost time are materially reduced. While the stop mechanism of my invention may be built in as part of the sewing machine, it is herein illustrated as an attachment which is adapted to be mounted on or fitted to existing machines.

As shown in Figs. 1 and 4, my invention is illustrated as being applied to a sewing machine **12** of usual construction having a drive motor **34** and clutch means **35** for driving the machine and a suitable controller such as a foot pedal **36** for engaging or disengaging the drive means for starting and stopping the operation of the sewing machine.

In the preferred form of the invention, a novel governor **10** is fixed to the arm portion **11** of the sewing machine **12** by means of a projecting frame member **13** which is provided with an aperture **14**. A tensioning device **15** and an adjustable bracket **16** for supporting a self-contained switch means **17** are mounted on the frame member. The tensioning device **15** consists of the usual disk members **15*a*** and **15*b*** and adjusting spring **15*c*** with thumb screw **15*d*** for adjusting the tension of the needle thread.

A spindle **18** forming the rotatable axis of the governor extends through the aperture **14** in the frame member **13** and is supported thereon in a vertical position by a bushing **19** having upper bearing members **20** and lower bearing members **21** secured therein for freely rotatably mounting the spindle **18** on the frame.

The lower end of the spindle **18** projects below the frame and is located in the path of movement of the needle thread T as it moves from a supply, not shown, to the needle of the sewing machine so as to be driven thereby as the thread moves during the sewing operation. If desired, a grooved pulley **22** may be mounted on the lower end of the spindle to be engaged by the thread to drive the spindle in accordance with the linear speed of the thread.

I have discovered that the linear speed of the thread during a normal sewing operation remains constant and I have also discovered that the linear speed of the thread decreases during malformation of stitches or other defects in the stitching operation. For example, the spindle stops when the needle thread breaks and is not pulled through by the sewing operation. Also, the speed of the needle thread drops when, due to exhaustion, breakage or lack of proper tension in the bobbin thread, the needle thread is not drawn into proper stitch formation. Also, the speed of the needle thread drops when the material being sewn becomes exhausted and the bobbin thread does not draw the same amount of needle thread for each stitching operation. These defects in the stitching operation are common occurrences and produce waste in the imperfectly stitched material unless quickly detected.

Suitable guide means **23**, **23***a* and **24** direct the needle thread from the supply (not shown) to and from the tension means **15**, to the pulley **22** and to the usual sewing machine tensioning means **25**. The thread is then threaded to the take-up arm and to the needle in the usual manner. With the thread thus positioned, the needle thread looped about the pulley **22** remains taut to rotate the spindle **18** in accordance with the linear speed of the thread whenever the sewing machine is performing a stitching operation.

The governor has a slideable sleeve **26** mounted on the upper end of the spindle to be rotatable therewith. Extending transversely of the slidable sleeve **26** and fixed thereto is a bar **27** having pivotally connected to its end portions a pair of depending links **28** and **29** having weights **30** at the lower ends thereof. The illustrated weights **30** on said depending links **28** and **29** are in the form of balls adjustably mounted at the ends of said links. Although only two such links are illustrated, it is understood, however, that the use of other than two links may be used if so desired. Located between said transversely extending bar **27** and the ends of the links **28**, **29** and fixed to the spindle at an intermediate portion thereof is a second transversely extending bar **31** having depending connecting links **32** and **33** pivotally connected by one end to the end portions of said second bar and at the other end to an intermediate portion of the weighted links **28**, **29** as shown in Fig. 2.

Thus, when the spindle **18** is rotated, the weighted links will move outwardly due to centrifugal force and, because of the location of the bar **31** and links **32**, **33**, will cause the bar **27** and sleeve **26** to move upwardly on the spindle in accordance with the speed of the spindle.

Cooperating with the governor to control the sewing machine is the self-contained switch means **17** which is secured to the bracket **16** mounted on the frame so as to coact with the sleeve **26**. As illustrated in Fig. 2, the switch is a microswitch and an actuator **17***a* for the switch extends over and is contacted by a ball-point portion **26***a* of the sleeve **26** in a substantially friction-free contact to move the actuator between the solid line position in which the switch is normally closed and the dotted line position in which the switch is open.

The position of the switch and the operative lever arm of the actuator **17***a* with relation to the sleeve **26** can be readily varied by adjusting the position of the bracket **16** by means of adjusting nuts **16***a*, **16***b* and by adjusting the switch on the bracket by means of screws **17***b* so that an accurate and versatile control of the sewing machine can be obtained.

In the form of the invention shown in Fig. 3, the control switch is a mercury switch **117** carried by an actuator lever **117***b* pivotally mounted on the bracket **16**. The actuated lever is provided with adjustable weights **118** at the other side of the pivot whereby operation of the switch can be adjusted.

The control of the sewing machine by the governor controlled switch is accomplished by connecting the switch in the drive control circuit therefor. While the sewing machine drive may take many forms, in the illustrated form of the invention the electric driving motor **34** and suitable clutch means **35** for connecting the same to the usual drive of a sewing machine are utilized.

The clutch is controlled by a controller or actuator in the form of a foot pedal **36** which is operatively connected to the clutch **35** by a linkage connection **36***a* and bell crank **36***b*. A spring **37** connected to one end of the lever normally holds the foot pedal raised and the connected clutch in the disengaged position.

The clutch is held in engaged position by a spring-urged detent **40** which engages the pedal when moved down to driving position. The detent is controlled by a solenoid **40***a* connected in the control circuit which includes a pair of leads **38** and **39** connecting to a source of energy, a normally open switch **41** controlled by the pedal **36**, and the normally closed switch **17** which are connected in series in the circuit. A normally open cut-off switch **42** is shunted around the normally closed switch **17** by conductors **43** and **44** so that an operator may manually actuate the control circuit to stop the sewing operation when necessary while the switch **17** is held open by the governor.



When it is desired to start a sewing operation the machine is threaded and the sewing operation set up. The pedal is then depressed causing the normally open switch **41** to close the circuit to the solenoid. The pedal is held closed until the sewing operation has started at which time the governor, operated by the thread passing to the sewing station, opens the switch **17**. When this switch opens, the solenoid is deenergized and the detent springs back into position to hold the pedal in driving position. Should the linear speed of the thread passing to the sewing station decrease because of any of the malfunctionings set forth above, the governor sleeve **26** will be lowered causing the switch **17** to close the circuit to the solenoid which will retract the detent and permit the pedal to move into its raised position. Movement of the pedal to raised position will not only release the clutch but also open the circuit at switch **41** and the drive for the machine cannot be initiated until the difficulty is corrected and the pedal again moved to driving position.

From the foregoing it will be seen that the present invention provides an improved sewing machine stopping device embodying a novel governor responsive to the variation in the linear speed of the needle thread for stopping the sewing machine upon various defects in the stitching operation, thereby preventing waste of material and the saving of time and increasing production by the machine.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

I claim:

1. A stop mechanism for a sewing machine to automatically stop the sewing operation whenever improper stitching occurs comprising a governor having a rotatable spindle, a slidable sleeve on said spindle and rotatably mounted therewith, depending weighted links secured to said sleeve, a bar fixed to said spindle below said slidable sleeve having depending links connected at one end thereto and connected at the other end to an intermediate portion of said weighted links, means for mounting said governor on a sewing machine in the path of the needle thread to be engaged thereby and be responsive to the linear speed thereof, so that the centrifugal force imparted to the weighted links due to the rotation of the spindle by the needle thread causes the slidable sleeve to move upwardly on said spindle, and a control circuit having a separate self-contained switch means having enclosed circuit making and breaking means actuated by said slidable sleeve and rendered operative thereby to stop the sewing operation whenever the linear speed of the thread is decreased due to an improper stitching operation.

2. A stop mechanism for a sewing machine to automatically stop the sewing operation whenever improper stitching occurs comprising a frame means adapted to be mounted on a sewing machine, a bushing having upper and lower bearing members secured thereon, a rotatably mounted spindle extending through said bushing and supported by said bearings, a portion of said spindle extending below said frame and into the path of the needle thread to be driven thereby, tension means mounted on said frame for tensioning the needle thread passing to the spindle, control means positioned on the other end of said spindle and responsive to the speed thereof, and a circuit having a separate self-contained switch means having enclosed circuit making and breaking means actuated by

said control means and rendered operative thereby to stop the sewing operation whenever the linear speed of the thread and the spindle driven thereby is decreased due to an improper stitching operation.

3. A stop mechanism for a sewing machine to automatically stop the sewing operation whenever improper stitching occurs comprising a frame means mounted on a sewing machine, a bushing having upper and lower bearing members secured therein, a rotatably mounted spindle extending through said bushing and supported by said bearings, a portion of said spindle extending below said frame, drive means fixed to said portion and positioned in the path of the needle thread to be engaged and driven in response to the linear speed thereof, a sleeve slidably mounted on the upper end of said spindle and rotatable therewith, weighted links secured to said slidably mounted sleeve, a bar fixed to said spindle intermediate the ends thereof, depending link means having one end thereof pivotally connected adjacent the ends of said bar and having the other ends thereof pivotally connected to an intermediate portion of the weighted links so that the centrifugal force imparted to the weighted links due to the rotation imparted to the spindle by the linear movement of the needle thread passing the drive means causes the slidable sleeve to move upwardly on said spindle, and a circuit having a separate self-contained switch means having enclosed circuit making and breaking means actuated by said slidable sleeve and rendered operative thereby to stop the sewing operation whenever the linear speed of the thread is decreased due to an improper stitching operation.

4. A stop mechanism for a sewing machine to automatically stop the sewing operation whenever improper stitching occurs comprising a frame means mounted on a sewing machine, a bushing having upper and lower bearing members secured thereon, a rotatably mounted spindle extending through said bushing and supported by said bearings, a portion of said spindle extending below said frame, drive means fixed to said portion, tension means mounted on said frame for tensioning the needle thread passing to the drive means and said drive means positioned in the path of the needle thread and responsive to the linear speed thereof, a sleeve slidably mounted on the other end of said spindle and rotatable therewith, dependent weighted links secured to said slidably mounted sleeve, a bar fixed to said spindle intermediate the ends thereof, dependent link means having one end thereof pivotally connected adjacent the ends of said bar and having the other ends thereof pivotally connected to an intermediate portion of the weighted links so that the centrifugal force imparted to the weighted links due to the rotation imparted to the spindle by the linear movement of the needle thread on the drive means causes the slidable sleeve to move on said spindle, and a circuit having a separate self-contained switch means having enclosed circuit making and breaking means actuated by said slidable sleeve and rendered operative thereby to stop the sewing operation whenever the linear speed of the thread is decreased due to an improper stitching operation.

5. A stop mechanism for a sewing machine to automatically stop the sewing operation whenever improper stitching occurs comprising a frame adapted to be mounted to a sewing machine, a governor including a rotatable spindle mounted on said frame in the path of the needle thread and driven in response to the linear speed thereof, a rotatably and slidably mounted sleeve portion having a ball point positioned on one end of said spindle, depending weighted links secured to said sleeve portion, and a circuit having a separate self-contained switch means having enclosed circuit making and breaking means positioned adjacent said sleeve, said ball pointed sleeve contacting said switch in substantially friction free contact, said spindle, sleeve and weighted links thereon being driven at a predetermined rate by said thread during a proper



stitching operation so that the said sleeve may move in the direction of the switch due to centrifugal force of the weights rotating about the spindle and actuate the said switch enabling the sewing operation to continue so long as the proper stitching is performed at the predetermined rate and to stop the sewing operation whenever the linear speed of the thread is decreased due to an improper stitching operation.

6. A stop mechanism for a sewing machine to automatically stop the sewing operation whenever improper stitching occurs comprising a frame adapted to be mounted to a sewing machine, a governor including a rotatable spindle mounted on said frame in the path of the needle thread and driven in response to the linear speed thereof, a rotatably and slidably mounted sleeve portion having a switch actuating ball point positioned on one end of said spindle, depending weighted links secured to said sleeve portion, a bar fixed to said spindle, connecting links pivoted to said bar at one end and pivoted to an intermediate portion of said weighted links, and a circuit having a microswitch means positioned adjacent said sleeve, said ball-pointed sleeve contacting said switch in substantially friction free contact and said spindle, sleeve and weighted links thereon being driven at a predetermined rate by said needle thread during a proper stitching operation, so that the said ball-pointed sleeve moves toward said microswitch means due to centrifugal force of the weights and actuates the said switch means to enable the sewing operation to continue so long as the proper stitching is performed at the predetermined rate and to stop the sewing operation whenever the linear speed of the thread is decreased due to an improper stitching operation.

7. A stop mechanism for a sewing machine to automatically stop the sewing operation whenever improper stitching occurs comprising a frame adapted to be mounted to a sewing machine, a governor including a rotatable spindle mounted on said frame in the path of the needle thread and responsive to the linear speed thereof, a rotatably and slidably mounted sleeve portion having a switch actuating ball point positioned on one end of said spindle, depending weighted links secured to said sleeve portion, a transverse bar fixed to said spindle, depending connecting links pivoted to said bar at one end and pivoted to an intermediate portion of said weighted links, a circuit having a mercury switch means therein, means carrying said switch pivotally mounted adjacent said sleeve to be engaged thereby, and adjusting means on said switch carrying means, said spindle, sleeve and weighted links thereon being driven at a predetermined rate by said needle thread during a proper stitching operation, so that the said sleeve may move in the direction of the switch due to centrifugal force of the weights and actuate the said switch carrying means and switch thereon to enable the sewing operation to continue so long as the proper stitching is performed at the predetermined rate and to stop the sewing operation whenever the linear speed of the thread is decreased due to an improper stitching operation.

8. In a sewing machine having a driving means and a controller therefor, the improvement wherein an automatic stop means is provided to automatically stop the drive means, thereby stopping the sewing operation whenever improper stitching occurs, said stop means including a solenoid cooperating with said controller to release the same from a driving position, a first normally open self-contained switch and second normally closed self-contained switch having enclosed circuit making and breaking means, actuation of said controller to driving position closing said first switch to establish a release circuit including said second switch and said solenoid, a governor mounted on said machine in the path of the needle thread and responsive to the linear movement of a thread, said governor having a rotatable spindle, a slidable sleeve on said spindle and rotatably mounted therewith, depending weighted links secured to said sleeve,

a bar fixed to said spindle below said slidable sleeve having depending links connected at one end thereto and connected at the other end to an intermediate portion of said weighted links so that the centrifugal force imparted to the weighted links due to the rotation of the spindle by the needle thread causes the slidable sleeve to move upwardly on said spindle, said governor actuating said second switch to open the release circuit upon reaching a predetermined thread speed, said second switch closing said solenoid circuit when the thread speed falls below said predetermined speed, due to an improper stitching operation, to cause said solenoid to be energized to release said controller and stop the drive means.



**References Cited** in the file of this patent

UNITED STATES PATENTS

| | | |
|---|---|---|
| 386,602 | Parsons et al. | July 24, 1888 |
| 1,052,955 | Poirier | Feb. 11, 1913 |
| 1,647,148 | Rosenman | Nov. 1, 1927 |
| 2,251,368 | Moser | Aug. 5, 1941 |
| 2,442,456 | Boyden et al. | June 1, 1948 |
| 2,461,764 | Olcott | Feb. 15, 1949 |
| 2,526,279 | Rosenman | Oct. 17, 1950 |
| 2,601,113 | Gilliam | June 17, 1952 |
| 2,639,101 | Hair | May 19, 1953 |
| 2,720,563 | Williams | Oct. 11, 1955 |