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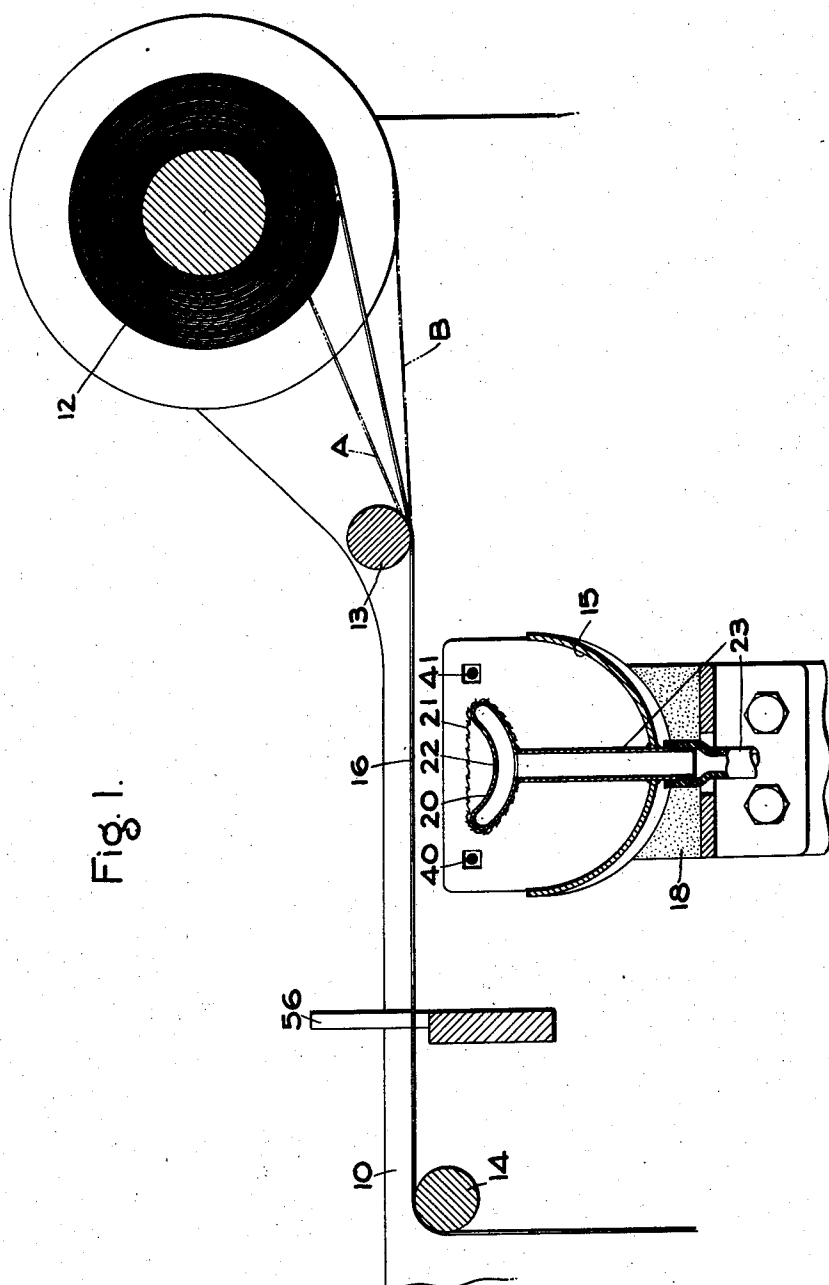
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2,362,956

STOP MEANS FOR TEXTILE MACHINES

Filed Jan. 26, 1944

2 Sheets-Sheet 1



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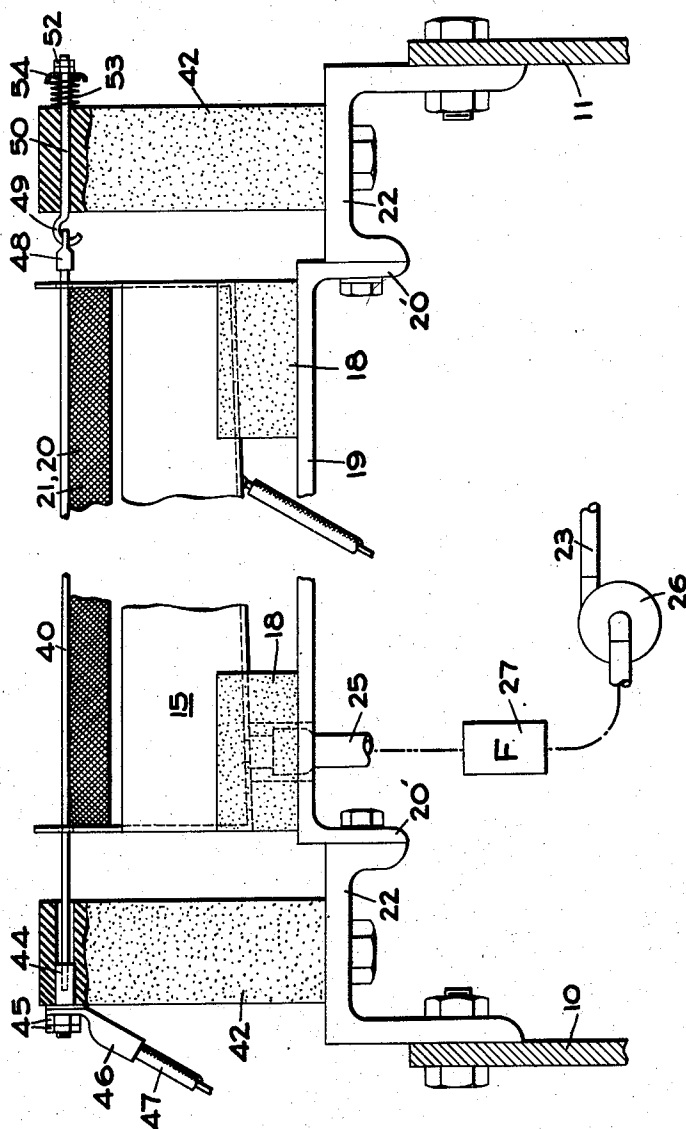
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Fig. 2.



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2,362,956

STOP MEANS FOR TEXTILE MACHINES

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Application January 26, 1944, Serial No. 519,755

16 Claims. (Cl. 66—163)

This invention relates to stop means for use in the textile arts and particularly to means for causing machine stoppage under abnormal conditions of thread or yarn passage.

In United States Letters Patent No. 2,330,202, dated September 28, 1943, granted to Clyde B. Hayes and Henry J. Czech there is disclosed a novel stop means for textile machines wherein the necessity for individual drop wires or heddles for each thread is obviated by the provision of a pair of spaced electrodes which are effective to close an electrical circuit when bridged by a thread having electrically conductive properties. In the aforesaid application a pair of spaced parallel rollers are provided and the rollers, which comprise a single electrode, rotate counter to the direction of thread movement. The second electrode is disposed between the pair of spaced rollers.

By my present invention I have devised an improved arrangement and means whereby all moving parts are eliminated. Apparatus is provided whereby thread or yarn which comes to the warp stop by reason of breakage, lack of proper tension, or for any other reason indicating abnormality, is rendered electrically conductive purely by capillary wetting out of the thread or yarn. I find that the provision of the means herein disclosed is adequate to wet thread or yarn for a sufficient distance and in a time short enough to permit the elimination of all such devices as rotating rolls and other moving parts.

Further, in pursuing the teachings of the present invention, a circulating liquid circuit is employed. This is found to avoid previous undesirabilities arising out of accumulation of lint and other foreign particles and a tendency of the liquid to stagnate and develop sludge. The circulation of liquid is also useful in maintaining the conductive agent, such as a bromate, in solution, and accordingly eliminates all tendencies of the conductive agent, which is generally present as a solute, to precipitate.

To cite a specific application of the device, in tricot knitting machines the stop means is disposed adjacent the warp somewhere between the warp beam and the knitting mechanism. The electrodes are preferably so disposed as to be engageable by any broken or slack warp thread. The present arrangement is such that machine stoppage will occur promptly whenever a warp thread breaks or ends between the warp beam and the stop means. Machine stoppage will likewise automatically occur whenever slack is developed by breakage of warp thread between the

stop means and the knitting mechanism or by failure of the knitting mechanism to continue to withdraw a warp thread.

In the preferred embodiment of the present invention a capillary wetting element extends transversely beneath a normal warp path and comprises one electrode of a primary machine stopping circuit. Spaced slightly therefrom in the direction of thread or yarn movement and extending parallel to the capillary element are a pair of wires or rods which jointly comprise the other electrode of the primary machine stopping circuit. Still referring to a tricot knitting machine, by way of example, one of the wires or rods is disposed at the warp beam side of the capillary element and the other is disposed at the knitting mechanism side.

While a complete and specific embodiment of my present invention is shown and described in the ensuing specification, it is to be understood that this embodiment is by way of example only and that the invention is not limited in spirit or scope otherwise than as defined in the appended claims.

In the drawings:

Fig. 1 is a fragmentary side elevational view of a portion of a tricot knitting machine with the form of stop means of the present invention shown in cross section, and;

Fig. 2 is a fragmentary front elevational view of the stop means of Fig. 1.

Throughout the several figures of the drawings like characters of reference denote like parts. In the accompanying drawings I have illustrated only the electrodes comprising the present novel arrangement. These electrodes are preferably associated with machine controlling electrical circuits in the manner clearly shown and described in Hayes et al., Patent No. 2,330,202, wherein the circuit containing the electrodes serves as the input of an audion amplifier whose output circuit directly controls machine operation by association with conventional relay operated switches. Since every detail of the electrical portion of the device of the present invention, beginning with the electrical conductors leading from the illustrated electrodes, may be identical with the electrical means shown and completely described in the prior application, the disclosure of that part of the present device will not be repeated here.

In Figs. 1 and 2 the numerals 10 and 11 designate a pair of side frame members of a textile machine which in the illustrated instance is a tricot knitting machine. A warp beam 12 is journaled between the side frames 10 and 11 and

Fig. 1 shows schematically a conventional whip roll 13 and a tension bar 14. The whip roll 13 and the tension bar 14 serve, in the illustrated instance, to cause the warp to move in a substantially horizontal direction for a portion of its travel between the warp and the knitting mechanism of the machine (not shown). It is contemplated that in conventional tricot machines employing a pair of warp beams, a separate set of electrodes will be provided for each of the warp beams.

In Fig. 1 the warp is shown coming off of the bottom of the beam 12 but this will be varied to suit the circumstances of particular machines and the warp beam supports will be so arranged that thread angles about the whip roll are not to acute for practical operation. In tricot machines employing two warp beams, one may feed warp from the bottom and the other from the top of the beam. In Fig. 1 the dot and dash showing A indicates the most acute thread angle, when the warp beam 12 is practically depleted, while the dot and dash showing B shows the thread path when the warp beam is full.

In the drawings the numeral 15 designates an elongate pan which extends from one side of the machine to the other beneath the entire warp, which is designated 16 in Fig. 1. The pan 15 may be attached to the machine in any convenient manner. In its illustrated form the pan 15, which is of arcuate transverse cross section, rests in a pair of insulating blocks 18 which in turn are secured to a base plate 19 whose opposite ends may be downwardly flanged as at 20', for securement to inverted U-shaped brackets 22 carried by the side frames 10 and 11.

In the alternative, the pan 15 may be secured directly to the machine frame and thus constitute a ground electrode. A tube 20 is shown supported at its opposite ends by the end walls of pan 15. The preferred cross sectional form of tube 20 is shown in Fig. 1 and it has disposed thereabout a sleeve 21 of relatively closely knit fabric which fits snugly about the tube so that the fabric stretches tautly across the convex upper side of the tube. Such convex upper side is provided with a series of apertures 22 which extends substantially the entire length of tube 20.

The interior of tube 20 is fed with liquid which may be a water solution of a suitable salt or other agent calculated to render thread or yarn electrically conductive when it is wet with the liquid. While any conductive liquid may be employed, an example of a satisfactory liquid is a water solution of chromate. The liquid is introduced through a conduit 23 which communicates with the bottom of tube 20 substantially at its center. The liquid is fed to tube 20 at moderate pressure so that liquid emerges from the apertures 22 to keep the fabric stretched across the top of tube 20 thoroughly wet. Excess liquid spilling over the edges of tube 20 or dropping from the bottom of fabric sleeve 21 is caught by pan 15 which, in the illustrated form, is pitched lengthwise so that liquid caught thereby is drained off through a conduit 25.

As indicated schematically in Fig. 2, the drain conduit 25 leads to the inlet side of a pump 26 whose outlet communicates with the conduit 27 leading to tube 20. In Fig. 2 the numeral 21 schematically indicates the presence of a filter unit in conduit 25. The filter may be of any suitable form and may comprise merely a screen sufficiently fine to intercept lint and other undesirable foreign particles. It will be under-

stood that circulation of the liquid promotes uniformity of concentration of the solution and militates against any tendency toward precipitation. It is contemplated that a single pump may supply a battery of machines and that a single machine may employ a plurality of warp stops. The provision of suitable means for maintaining a desired supply of liquid and correct concentration of the solution are within the province of those skilled in the art.

The assembly, including the pan 15, tube 20 and wetted fabric 21, comprises one electrode of the primary machine stopping circuit. The opposite electrode comprises a pair of wires 40 and 41 which are stretched between insulating blocks 42 and carried thereby. The wires 40 and 41 extend parallel to tube 20 at opposite sides thereof and are preferably disposed so that their top surfaces are substantially co-planar with the top surface of tube 20 and sleeve 21 as shown in Fig. 1. The degree of spacing of tube 20 relative to the normal path of the warp and the disposition of wires 40 and 41 with respect to both the warp and tube 20 will vary between certain limits, according to whether the warp being handled is nylon, cotton, rayon, silk, wool or other material.

In the illustrated instance tensioning means for the wires 40 and 41 are provided. One end of each of the wires 40 and 41 may be welded to a square rod 44 disposed in a square hole formed in one of the insulating blocks 42. The outer end of each of the square rods 44 may be threaded to receive nuts 45 for connecting a terminal 46 of a conductor 47 which is common to both of the wires 40 and 41. The other ends of the wires 40 and 41 are provided with eyelets 48 which are engaged by hooked ends 49 of rods 50 which extend through the other insulating block 42 and are secured against displacement by nuts 52. In the illustrated instance sufficient tension to hold each of the wires 40 and 41 taut and straight may be imparted by interposing a coil spring 53 between the block 44 and a washer 54 retained by the nuts 55. In Fig. 1 a sley bar is shown at 56, between the stop means and the tension bar 14, for retaining proper spacing of the individual threads of the warp.

A critical factor in the warp stop set forth herein is the provision of an abundance of moisture at the upper surface of fabric sleeve 21, so that threads engaging it wet out rapidly and the liquid taken up in wetting out is immediately replaced so that the wetting out process may continue until either of the electrodes 40 or 41 is encountered, whereupon machine stoppage occurs instantaneously. In the apparatus herein disclosed, such abundance of liquid supply is insured without possibility of escape of liquid from the warp stop proper. This latter is particularly important since some of the electrically conductive liquids contemplated are corrosive in nature and would deteriorate knitting or other textile machine parts with which they came into contact.

What is claimed is:

1. Means for controlling textile machinery in response to thread failure, said means comprising an element disposed beneath a normal thread path, said element comprising a capillary upper surface adapted to be readily wet, means for continuously directing electrically conductive fluent liquid against said capillary surface element from its under side, trough means beneath said surface element to receive liquid discharging therefrom, said surface element comprising a terminal of an

electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said surface element, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to said second terminal to close the machine stopping circuit.

2. Means for controlling textile machinery in response to thread failure, said means comprising an element disposed adjacent a normal thread path, said element comprising a capillary surface directed toward the thread path and adapted to be readily wet, means for continuously directing electrically conductive fluent liquid against said capillary surface element from the side opposite said thread path, trough means beneath said surface element to receive liquid discharging therefrom, said surface element comprising a terminal of an electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said surface element, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to said second terminal to close the machine stopping circuit.

3. Means for controlling textile machinery in response to thread failure, said means comprising a liquid-pervious surface element disposed beneath a normal thread path, means for substantially continuously directing electrically conductive fluent liquid against said surface element from the under side thereof, trough means beneath said surface element to receive liquid discharging therefrom, said surface element comprising a terminal of an electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said surface element, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to said second terminal to close the machine stopping circuit.

4. Means for controlling textile machinery in response to thread failure, said means comprising a liquid-pervious surface element disposed adjacent a normal thread path, means for substantially continuously directing electrically conductive fluent liquid against said pervious surface means from the side opposite said thread path, trough means beneath said capillary means to receive liquid discharging therefrom, said surface element comprising a terminal of an electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said surface element, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to said second terminal to close the machine stopping circuit.

5. Means for controlling textile machinery in response to thread failure, said means comprising an element disposed adjacent a normal thread path, said element comprising a surface adapted to be readily maintained in a wet condition, means for continuously directing electrically conductive fluent liquid across said surface element, trough means beneath said surface element to receive liquid dropping therefrom, said surface element comprising a terminal of an electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said surface element in a direction, whereby a displaced thread contacting said surface element is wet by capillarity beyond

said surface element and to said second terminal to close the machine stopping circuit.

6. Means for controlling textile machinery in response to thread failure, said means comprising an element disposed adjacent a normal thread path, said element comprising a surface adapted to be readily maintained in a wet condition, means for continuously directing electrically conductive fluent liquid across said surface element, trough means beneath said surface element to receive liquid discharging therefrom, said surface element comprising a terminal of an electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said surface element, said surface element having a substantial extent lengthwise of the thread path, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to said second terminal to close the machine stopping circuit.

7. Means for controlling textile machinery in response to thread failure, said means comprising an element disposed adjacent a normal thread path, said element comprising a surface adapted to be readily maintained in a wet condition, means for continuously directing electrically conductive fluent liquid across said surface element, said surface element comprising a terminal of an electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said surface element in a direction, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to said second terminal to close the machine stopping circuit.

8. Means for controlling textile machinery in response to thread failure, said means comprising an element disposed adjacent a normal thread path, said element comprising a surface adapted to be readily maintained in a wet condition, means for continuously directing electrically conductive fluent liquid across said surface element, said surface element comprising a terminal of an electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said surface element, said surface element having a substantial extent lengthwise of the thread path whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to said second terminal to close the machine stopping circuit.

9. Means for controlling textile machinery in response to thread failure, said means comprising an element disposed adjacent a normal thread path, said element comprising a surface adapted to be readily maintained in a wet condition, means for continuously directing electrically conductive fluent liquid across said surface element, trough means beneath said surface element to receive liquid falling therefrom, said surface element comprising a terminal of an electric machine stopping circuit, and a second terminal of said circuit, said second terminal comprising a pair of conductors, one adjacent but spaced lengthwise of the thread path from said surface element at each side thereof, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to either of the conductors comprising said second terminal to close the machine stopping circuit.

10. Means for controlling textile machinery in

response to thread failure, said means comprising an element disposed adjacent a normal thread path, said element comprising a surface adapted to be readily maintained in a wet condition, means for continuously directing electrically conductive fluent liquid across said surface element, said surface element comprising a terminal of an electric machine stopping circuit, and a second terminal of said circuit, said second terminal comprising a pair of conductors, one adjacent but spaced lengthwise of the thread path from said surface element at each side thereof, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to either of the conductors comprising said second terminal to close the machine stopping circuit.

11. Means for controlling textile machinery in response to thread failure, said means comprising an element disposed adjacent a normal thread path, said element comprising a surface adapted to be readily maintained in a wet condition, means for continuously directing electrically conductive fluent liquid across said surface element, trough means beneath said surface element to receive liquid dropping therefrom, said surface element comprising a terminal of an electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said surface element in a direction, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to said second terminal to close the machine stopping circuit, a liquid conduit having said liquid directing means and said trough means as its discharge and intake passages, respectively, and fluid displacement means in said conduit for directing electrical conducting liquid to said surface element under pressure.

12. Means for controlling textile machinery in response to thread failure, said means comprising an element disposed adjacent a normal thread path, said element comprising a surface adapted to be readily maintained in a wet condition, means for continuously directing electrically conductive fluent liquid across said surface element, trough means beneath said surface element to receive liquid dropping therefrom, said surface element comprising a terminal of an electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said surface element in a direction, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to said second terminal to close the machine stopping circuit, a liquid conduit having said liquid directing means and said trough means as its discharge and intake passages, respectively, fluid displacement means in said conduit for directing electrical conducting liquid to said surface element under pressure, and filter means in said conduit for freeing the liquid of foreign matter.

13. Means for controlling textile machinery in response to thread failure, said means comprising a tube extending transversely beneath a thread path, a capillary surface element disposed above said tube, means for directing a forced flow of electrically conductive liquid into said tube, and openings in said tube directed toward said surface element whereby the latter is main-

tained in a wet condition, said tube and surface element comprising one terminal of an electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said tube and surface element, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to said second terminal to close the machine stopping circuit.

14. Means for controlling textile machinery in response to thread failure, said means comprising a tube extending transversely beneath a thread path, a liquid-pervious surface element disposed above said tube, means for directing a forced flow of electrically conductive liquid into said tube, and openings in said tube directed toward said surface element whereby the latter is maintained in a wet condition, said tube and surface element comprising one terminal of an electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said tube and surface element, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to said second terminal to close the machine stopping circuit.

15. Means for controlling textile machinery in response to thread failure, said means comprising a tube extending transversely beneath a thread path, a liquid-pervious surface element disposed above said tube, means for directing a forced flow of electrically conductive liquid into said tube, and openings in said tube directed toward said surface element whereby the latter is maintained in a wet condition, said tube and surface element comprising one terminal of an electric machine stopping circuit, and a second terminal of said circuit adjacent but spaced lengthwise of the thread path from said tube and surface element, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to said second terminal to close the machine stopping circuit, a receiver beneath said tube and surface element for catching liquid falling therefrom, a liquid conduit having said liquid directing means and said receiver as its discharge and intake passages, and fluid displacement means in said conduit for directing electrically conductive liquid into said tube under pressure.

16. Means for controlling textile machinery in response to thread failure, said means comprising a tube extending transversely beneath a thread path, a capillary surface element disposed above said tube, means for directing a forced flow of electrically conductive liquid into said tube, and openings in said tube directed toward said surface element whereby the latter is maintained in a wet condition, said tube and surface element comprising one terminal of an electric machine stopping circuit, and a second terminal of said circuit, said second circuit comprising a pair of conductors, one adjacent but spaced lengthwise of the thread path from said tube and surface element at each side thereof, whereby a displaced thread contacting said surface element is wet by capillarity beyond said surface element and to either of the conductors comprising said second terminal to close the machine stopping circuit.

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