June 13, 1967 F. H. STAGG, JR 3,324,899

BAR CHECK DEVICE

Filed Sept. 13, 1965

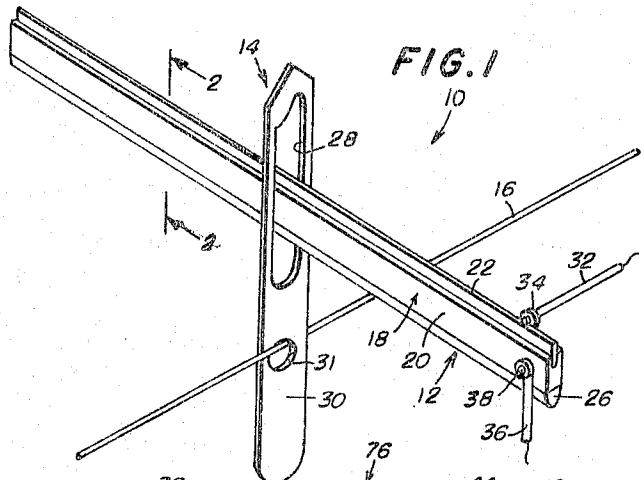


FIG. 1

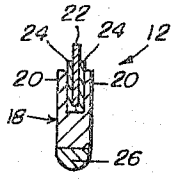


FIG. 2

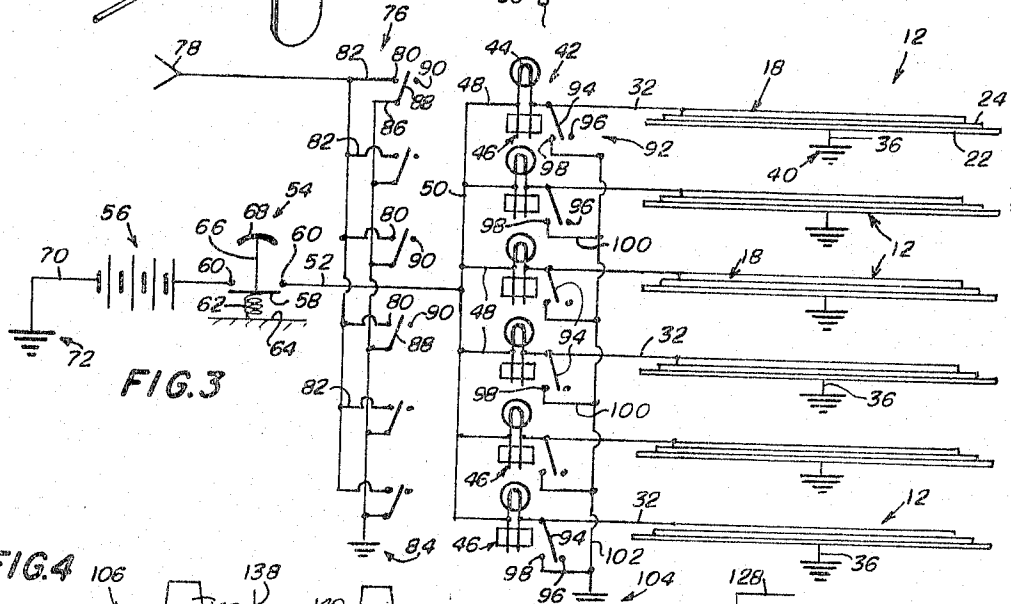


FIG. 3

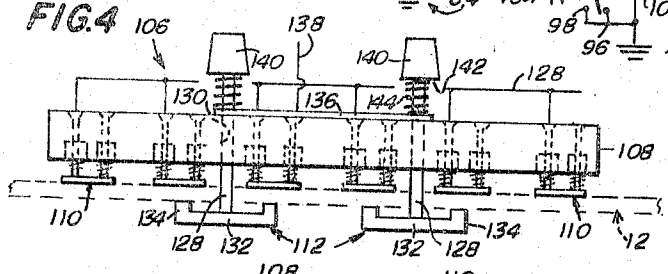


FIG. 4

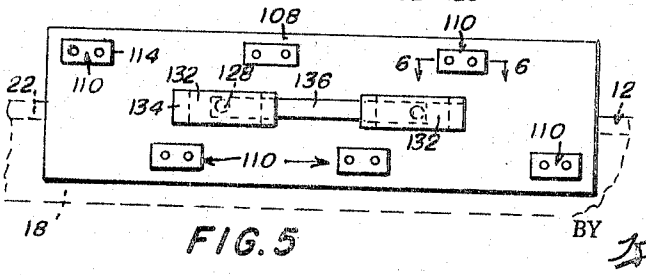


FIG. 5

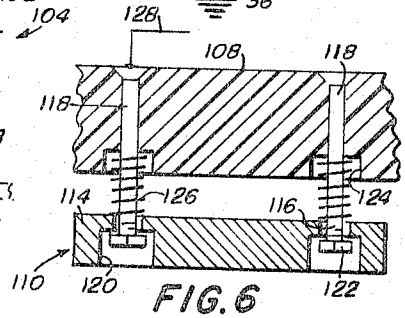


FIG. 6

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BAR CHECK DEVICE

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7 Claims. (Cl. 139—353)

This application is a continuation-in-part of application 384,862 filed July 24, 1964, now abandoned.

This invention relates to a bar check device, and more particularly to a device for simultaneously detecting a slack or broken warp thread and/or defective detector bar associated with a loom.

Devices are known to the prior art for detecting a slack warp thread and stopping the operation of a loom associated therewith, one such device being illustrated in United States Patent No. 2,556,332. In general, the prior art devices constitute a means for detecting a slack warp thread and a means for stopping the loom associated therewith.

Many disadvantages attend the loom stop mechanisms of the prior art, one being that the mechanism stops the loom without indicating the particular warp thread that is slack, thus necessitating an attendant inspecting each warp thread. Consequently, this is a time consuming task requiring expensive down time. Another disadvantage of the prior art mechanisms, which are generally electrical devices operated by the creation of a short circuit, is that short circuits may develop other than as a result of slack warp threads. Accordingly, the attendant who inspects the warp threads for slackness often finds that all of them appear suffiently taut.

It is an object of the instant invention to provide a device for indicating slackness in a particular warp thread with signalling means alerting an attendant to the particular warp thread involved.

Another object of the instant invention is to provide a device of the character described which acts to stop the loom when a warp thread becomes slack.

Still another object of the instant invention is a detecting and indicating means for looms whereby a slack warp thread stops the associated loom, the loom remaining stopped until the operator consciously restarts the same thus preventing an attendant from being injured as a result of the accidental restarting of the loom.

A further object of the instant invention is to provide a tensioning means which may be temporarily affixed on a detector bar of a warp stop mechanism to determine if a short circuit in the bar detector is causing the loom to be stopped rather than a slack warp thread causing the same.

Other objects and advantages of the invention reside in the combinations of elements, arrangements of parts, and features of construction and operation, all as will be more fully pointed out hereinafter and disclosed in the accompanying drawing wherein there is shown a preferred embodiment of this inventive concept.

In the drawing:

FIGURE 1 is an isometric view of a mechanical detector bar associated with a drop wire and a warp thread;

FIGURE 2 is a cross-sectional view of the detector bar of FIGURE 1 taken along line 2—2 thereof viewing in the direction of the arrows;

FIGURE 3 is a schematic view of an electrical control circuit of the instant invention;

FIGURE 4 is a top-plan view of a tensioning device temporarily affixed to a detector bar illustrated in dashed lines;

FIGURE 5 is a side-elevational view of a tensioning means of the instant invention associated with a detector bar illustrated in dashed lines; and

FIGURE 6 is a cross-sectional view of the tensioning means of FIGURE 5 taken along line 6—6 thereof viewing in the direction of the arrows.

Referring now to the drawing in detail, wherein like reference characters designate like elements throughout the several views thereof, there is indicated generally at 10 a warp stop mechanism including a detector bar designated generally at 12 spaced from a drop wire shown generally at 14 by the tension in a warp thread 16. Detector bar 12 includes a metal strip shown generally at 18 forming a pair of upstanding metallic ears 20 between which is placed a metallic strap 22 electrically separated from ears 20 by a pair of dielectric or insulating strips 24. A resilient bumper 26 may be placed on the lower end of metal strip 18 to cushion impacts imparted against detector bar 12.

Drop wire 14 is positioned substantially perpendicular to detector bar 12 by a longitudinal slot 28 in a strip of electrically conductive material 30. Drop wire 14 includes an opening 31 in conductive strip 30 positioned below slot 28 in which resides warp thread 16. It will be seen that a taut warp thread will position drop wire 14 such that detector bar 12 is located intermediate slot 28. When warp thread 16 becomes slack, drop wire 14 will gravitate downwardly until the upper end of slot 28 contacts metal strap 22 of detector bar 12.

Since slot 28 closely receives metal strip 18 of detector bar 12, an electrically conductive path including metal strip 18, electrically conductive strip 30 and metallic strip 22 is completed. A first electrical conduit 32 is secured by any conventional means 34 such as a metallic pivot pin, to metal strap 22 with a second electrical conduit 36 secured to metal strip 18 by a pivot pin 38. The preceding discussion of warp stop mechanism 10 is well known in the art as may be seen in FIGURES 4 and 5 of United States Patent 2,556,332, and is but one embodiment of a warp stop mechanism which may be used with the control circuit of the instant invention as more fully explained hereinafter.

A plurality of detector bars 12 are shown schematically in the right hand portion of FIGURE 3 with second electrical conduit 36 connected to a ground shown generally at 40. First electrical conduit 32 connects detector bar 12 to an electrical indicating circuit denominated generally at 42 including a signalling means 44, which is illustrated as a lamp, but which may be a buzzer, bell, or any other suitable signalling device. Electrical indicating circuit 42 also includes a switch operating means indicated generally at 46 in parallel with signalling means 44, although signalling means 44 and switch operating means 46 may be in series.

Switch operating means 46 may be of any desirable type, its only necessary requirement being the ability to open or close a switch positioned adjacent thereto. It has been found preferable, however, to make switch operating means 46 of the type that includes a magnetizable element such as a solenoid for attracting a pivotally mounted switch as more fully explained hereinafter.

A branch line 48 connects each of signalling means 44 and switch operating means 46 to an electrical conduit 50 in electrical communication with a wire 52 in series with a normally closed operating button shown generally at 54 and a power source shown generally at 56. Operating button 54 may be of any desirable type, but may be of the type including an electrically conductive plate 58 spanning the distance between a pair of electrical connections 60 with a spring 62 biasing plate 58 away from a stationary support 64 toward connections 60. A button handle 66 provided with an enlarged head 68 is positioned on the other side of connections 60 from support 64. It will be seen that an attendant may press head 68 of button 54 to compress spring 62 thus moving conductive plate 58 out of

contact with connections **60** and breaking electrical indicating circuit **42**. Although FIGURE 3 illustrates power source **56** as being a direct current power source connected by a wire **70** to a ground shown generally at **72**, it should be understood that an alternating current indicating circuit may be utilized with equal facility.

In the operation of electrical indicating circuit **42**, detector bar **12** will be mounted on a conventional loom by an insulated mounting such that the only element preventing completion of circuit **42** is dielectric strip **24** of detector bar **12**. When warp thread **16** becomes slack, drop wire **14** will descend until the upper end of slot **28** contacts metal strap **22** thus short-circuiting dielectric strip **24** and completing indicating circuit **42**. The occurrence of a slack warp associated with any one of detector bars **12**, lamp **44** associated with this particular detector bar will be lit thus indicating to an attendant or operator that a slack thread is present. Signalling means **44** are preferably mounted at a central control station such that a single operator may attend several looms.

In order to automatically stop a loom having a slack warp thread, an electrical cut off circuit shown generally at **76** is provided having a connection **78**, such as an alligator clip or permanent connection, secured to a conventional stop coil (not shown) on the loom. Connector **78** is in electrical communication with a plurality of contacts **80** through a plurality of branch lines **82**. A ground shown generally at **84** connects through a plurality of branch lines **86** to a pivotally mounted switch **88** positioned adjacent contact **80**. Switch **88** is preferably spring biased away from contact **80** with a stop **90** being provided to prevent overshifting thereof.

Each of switches **88** is positioned adjacent switch operating means **46** such that the activation of any one of operating means **46** will magnetically force the associated switch **88** into contact with connection **80** thus completing cutoff circuit **76** and grounding the energized stop coil of the associated loom. Cutoff circuit **76** is shown in FIGURE 3 to be displaced from switch operating means **46**, but it should be understood that this separation is primarily for purposes of clarity since switch **88** is preferably closely adjacent operating means **46**. Cutoff circuit **76** may be of the normally closed type, rather than the normally open type illustrated, provided that the stop coil of an associated loom requires energization to cease movement thereof.

Frequently in the operation of warp stop mechanism **10** as previously described, one of lamps **44** will be actuated with cutoff circuit **76** stopping an associated loom with the operator or attendant proceeding to inspect the warp threads and finding nothing apparently wrong. If the control circuit is of the type which will automatically start the associated loom, a dangerous and unsafe condition arises since the operator may be astride or leaning upon the loom when it is reactivated. It has been found advantageous, therefore, to provide a means of maintaining the loom in the stopped condition until the operator is prepared to restart the same.

A holding circuit indicated generally at **92** includes a plurality of spring biased switches **94** in connection with each of wires **32** of indicating circuit **42**, a stop **96** precluding the overshifting of switch **94**, and a series of electrical connections **98** leading through a plurality of branch lines **100** to a central holding circuit conduit **102** in communication with a ground shown generally at **104**. Each of switches **94** is located in operative relation with one of switch operating means **46** such that the energization thereof will pivot switch **94** into contact with connection **98** thus closing an electrical path including switch **94**, contact **98**, branch line **100**, central wire **102** and ground **104**.

It will be seen that the shorting out of insulation **24** will complete indicating circuit **42**, shut off the associated loom through cutoff circuit **76**, and close holding circuit **92** by the actuation of solenoid **46**. If the feature causing the operational difficulty is corrected while the attendant is at the loom location, the circuit including detector bar **12** will be severed with current flowing only through control circuit **42** and holding circuit **92**. Since electricity is flowing through circuit **42**, solenoid **46** will remain activated thus maintaining switch **88** in a closed position holding the associated loom inactive. The attendant or operator may then return to a central control location and press operating button **54**, which de-energizes solenoid **46** and allows switches **88**, **94** to return to their open positions. A loom starting lever (not shown) may then be manipulated to start the associated loom. It should be apparent that button **54** and the loom starting lever must be manipulated to start the associated loom.

A frequent occurrence in the operation of a loom and stop mechanism is for the loom to be deactivated with no apparent slack warp threads. This may occur in the warp stop mechanism of the instant invention by the breakdown of insulation **24** of detector bar **12** which completes indicating circuit **42** and activates one of signalling means **44**. The attendant will inspect the loom and find that warp thread **16** is sufficiently taut to position drop wire **14** above detector bar **12**. After a time consuming inspection, the attendant will return to a central control location and depress actuating button **54** to restart the associated loom.

If the break in insulation **24** is of a temporary nature, the associated loom will restart and continue weaving for a length of time. Because of the movement of detector bar **12**, a break in insulation **24** will again occur completing indicating circuit **42** and deactivating the associated loom through cutoff circuit **76**. In order to obviate periodic fruitless inspections of warp thread **16** following the shut off of the associated loom, a detector bar tensioning means shown generally at **106** is provided to check the effectiveness of insulating strip **24**.

Tensioning means **106** includes a body **108**, which is shown as rectangular, but which may be of any desired shape, made of a dielectric material, such as plastic or hard rubber providing a plurality of first compressing means indicated generally at **110** exerting a force away from body **108** and a plurality of second compressing means designated generally at **112** creating a force toward body **108**. As shown in FIGURES 4 and 5, compressing means **112** are positioned in the center of body **108** with first compressing means **110** being positioned laterally of second compressing means **112** for purposes more fully explained hereinafter.

First compressing means **110** includes a metallic plate **114** which may be of any desired shape, but which is illustrated as rectangular slidably receiving in a pair of openings **116** a pair of threaded screws **118** extending through and secured to body **108**. Each of screws **118** extends into an enlarged opening **120** with a nut **122** secured on the end of screw **118** providing a limit means for the reciprocable movement of plate **114** on screws **118**.

Body **108** forms an enlarged opening **124** concentric with screw **118** receiving a spring **126** biasing plate **114** outwardly from body **108**. A wire **128** is in electrical communication with screw **118** to complete an electric path including plate **114**, screw **116** and wire **128**. It will be seen that plate **114** may reciprocate with respect to body **108** with the contact of plate **114** with body **108** limiting reciprocable movement in one direction and with nut **122** and plate **114** limiting reciprocable movement in the other direction.

Second compressing means **112** includes a metallic shank **128** slidably mounted in an aperture **130** in body **108**. Shank **128** carries a transverse electrically conductive member **132** on the outer end thereof adjacent plates **114** having a pair of inwardly extending metallic arms **134**. A metallic connector **136** is positioned on the other side of body **108** from transverse member **132** and is in electrical communication with each of shanks

128. An electrical wire 138 leads from connector 136 for engagement with the electrical circuit of FIGURE 3 as more fully explained hereinafter. An enlarged boss 140 is fixedly secured on shank 128 on the opposite side of body 108 from transverse member 132 and provides a shoulder 142 against which a spring 144 abuts. Spring 144 surrounds shank 128 and provides the forces necessary for urging ears 134 toward body 108.

When the attendant inspects the loom associated with warp stop mechanism 10 and discovers that the indicated warp thread is sufficiently taut to position drop wire 14 above detector bar 12, it will be apparent that the cause of the shut down resides elsewhere than a slack warp thread. A common difficulty is a break down of insulating strip 24 as previously mentioned. Tensioning means 106 may then be placed on the presumably defective detector bar 12 with plates 114 contacting metal strip 18 with second compressing means 112 contacting metallic strap 22. It will be seen that a defective insulating strip 24 will result in the completion of an electric path including electric wire 128, screws 108, and plate 114 of first compressing means 110, metal strap 18, insulating strip 24 and metallic strap 22 of detector bar 12, ears 134, transverse bar 132, shank 128, electrical conductor 136 and wire 138 of second compressing means 112.

It will be seen that wires 128, 138 may be connected to a portable indicating pack including a power source to detect current flow through detector bar 112. In the alternative, wire 138 of second compressing means 112 may be connected as by a releasable clamp, such as an alligator clamp, to a ground such as any of branch lines 86 of cutoff circuit 76 or branch lines 100 of holding circuit 92. In such an event wire 128 will be connected to wire 32 of indicating circuit 42 such that an electric circuit including power source 56, indicating circuit 42, first compressing means 110, metal strip 18, insulator 24, metal strap 22, second compressing 112 and a ground conection will be completed. If insulator strip 24 is defective, the actuation of operating button 54 will again activate solenoid 46 and shut off the associated loom.

Tensioning means 106 aids in the detecting of a defective insulator in two distinct manners. In the utilization of a portable indicating means, such as previously indicated, the only possible source of current flow will include insulator 24 thus pinpointing the difficulty. In either of the above modes of connecting tensioning means 106, the effect of springs 126, 144 will tend to flex bar 12 and accentuate any insulation break.

It is now seen that there is herein provided an improved bar check device having all of the objects of this invention and others, including many advantages of great practical utility and commercial importance.

Since many embodiments may be made of the instant inventive concept, and since many modifications may be made in the embodiments hereinbefore shown and described, it is to be understood that the foregoing should be interpreted merely as illustrative and not in a limiting sense.

I claim:

1. A warp stop mechanism for a multi-warp thread loom comprising

a plurality of detector bars having at least two electrically conductive surfaces electrically separated by an insulating surface,

means positioned adjacent each of said detector bars for engagement with a warp thread for short circuiting said insulated surface when said warp thread is slack,

an electrical indicating circuit including a circuit for each of said detector bars providing an electrical conduit connected to each of said electrically conductive surfaces of said detector bars, one of said conduits including a signalling means, one of said conduits including means for operating a switch and

an electrical control circuit for stopping a loom including a switch positioned in operative relation to said switch operating means.

2. The structure of claim 1 including a holding circuit for said switch operating means including a normally open holding switch positioned in operative relation to said switch operating means in electrical communication with said one electrical conduit.

3. The structure of claim 1 including means for independently checking the effectiveness of said insulating surface.

4. The structure of claim 1 including means releasably attachable to said detector bar for imparting stresses to test the effectiveness of said insulating surface.

5. The structure of claim 1 including tensioning means releasably attached to said detector bars including a dielectric body carrying a first compressing means on one side of said body creating a force away from said body and a second compressing means on said one side of said body creating a force toward said body, detector bar being positioned between said first and second compressing means.

6. The structure of claim 5 wherein said first compressing means includes a metallic plate in contact with one of said conductive surfaces of said detector bar, said second compressing means, including a metallic element in contact with said other conductive surfaces of said detector bar.

7. The structure of claim 6 including an electrical path leading from said first compressing means, and another electric path leading from said second compressing means, said paths being connected to a power source and a signalling means for determining the existence of electrical flow through said detector bar.

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