Nov. 9, 1948. P. MATWEEFF 2,453,145

WHIP ROLL STOP MOTION

Original Filed Sept. 11, 1946 3 Sheets-Sheet 1

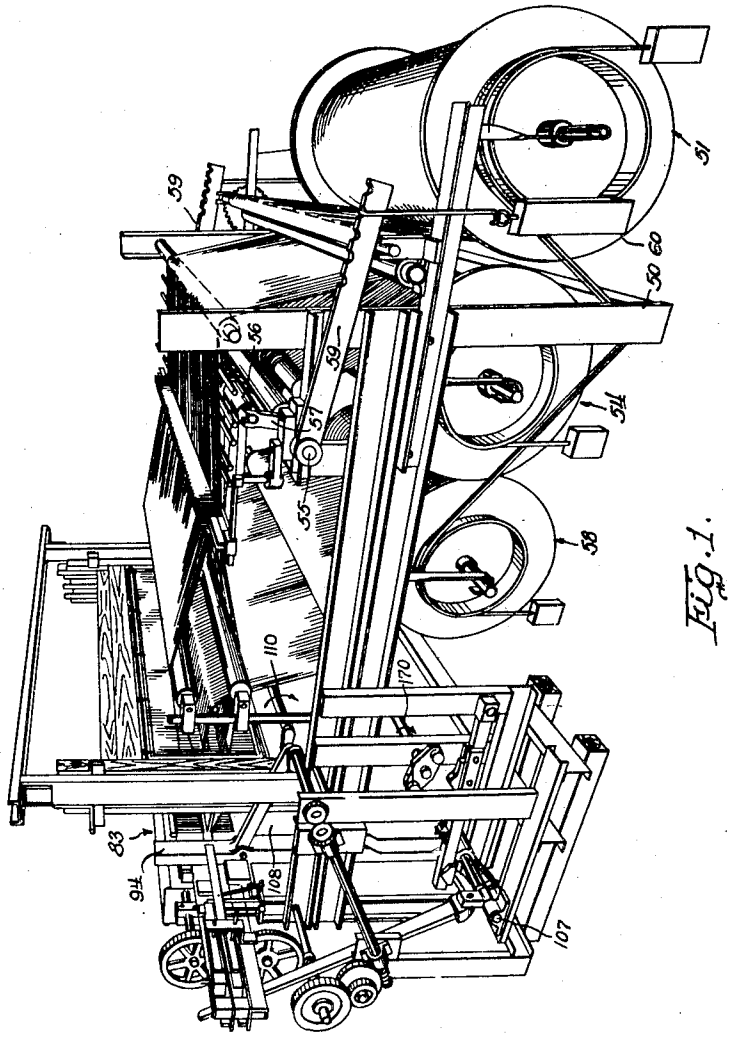


Fig. 1.

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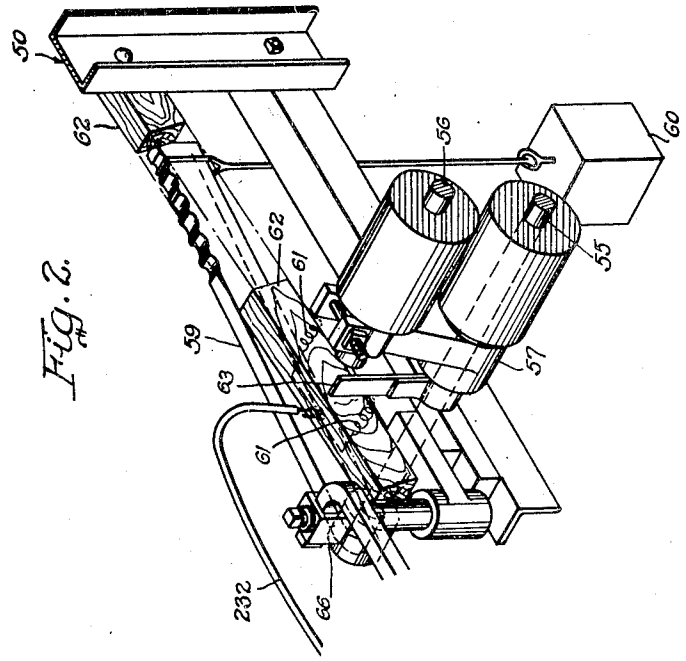


Fig. 2.

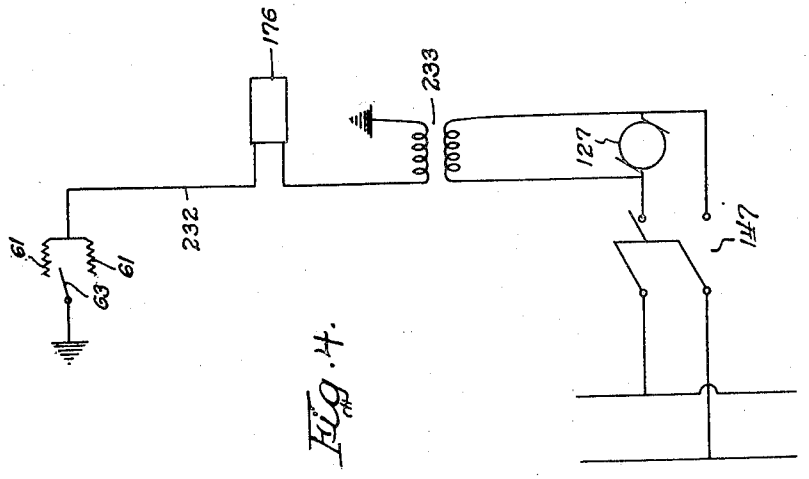


Fig. 4.

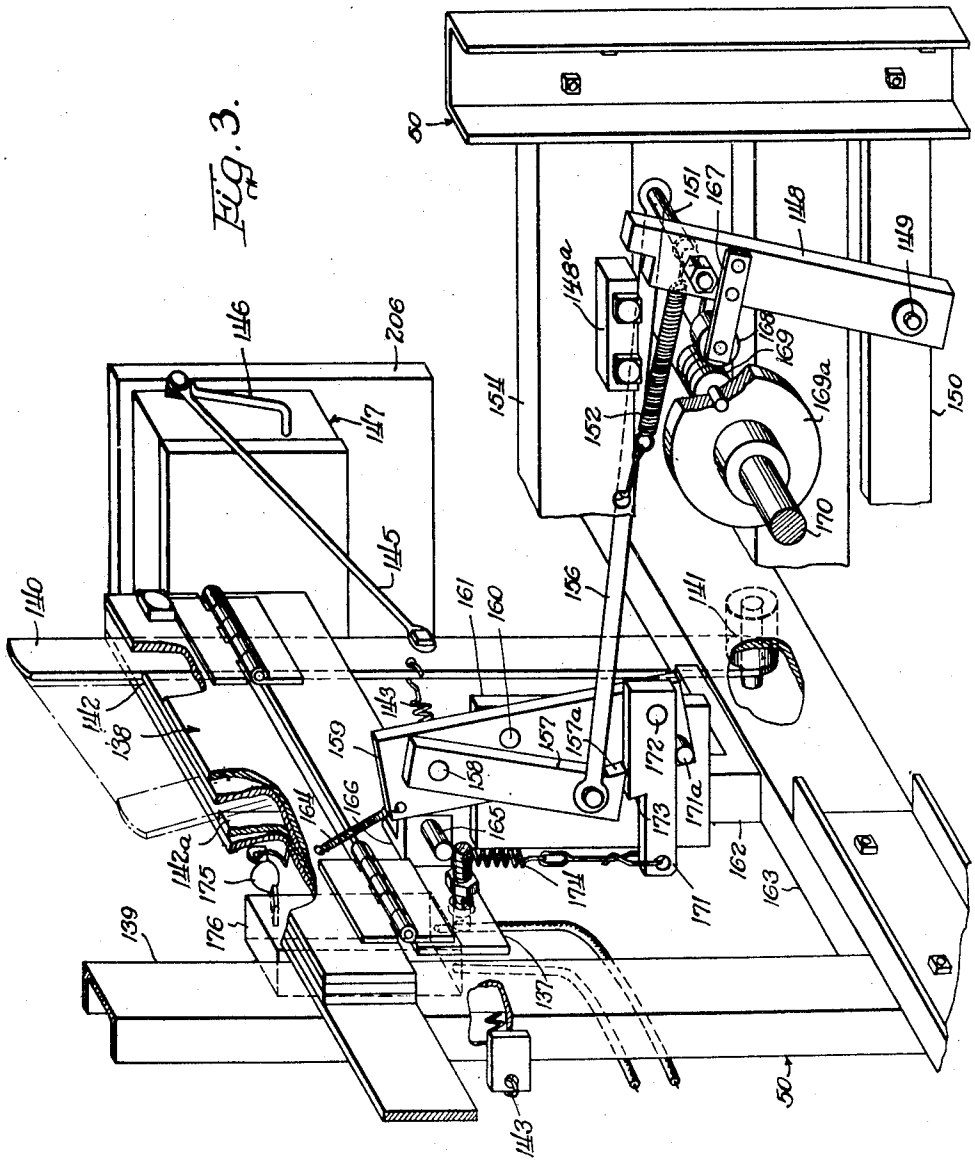
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Fig. 3.



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UNITED STATES PATENT OFFICE

2,453,145

WHIP ROLL STOP MOTION

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Original application September 11, 1946, Serial No. 696,089. Divided and this application July 22, 1947, Serial No. 762,739.

8 Claims. (Cl. 139—352)

1

This invention relates to power looms for weaving either plain or pile fabrics, and has to do with a whip roll stop motion for such looms.

It is important that the warp ends be maintained under uniform tension during the weaving operation, to avoid defects in the cloth and assure maximum production. If the warp ends become slack defects in the cloth will occur, and if the tension of the warp ends becomes excessive there is risk of tearing of the warp ends or of the cloth. It is important, therefore, that the loom be stopped immediately when the tension of the warp ends tends to vary to an objectionable extent in either direction from the desired optimum tension. Numerous let-off motions have been devised with a view to assuring desired uniform tension of the warp ends. Such let-off motions, to my knowledge, are in general rather complicated and expensive, are apt to get out of order, and have not proved to be entirely satisfactory.

My invention is directed to means whereby assurance is had that the loom will be stopped in response to objectionably low or high tension of the warp ends and before damage to either the warp ends or to the cloth can occur. As is well known, the sheet of warp ends is led over a whip roll mounted for swinging movement, to accommodate the beating up and shedding operations while maintaining the warp ends under proper tension. I have discovered that by providing suitably disposed electrical contact members, controlling the knock-off motion of the loom, it is possible to stop the loom immediately upon occurrence of any objectionable variation in the tension of the warp ends. More specifically, I provide an electrical contact member movable in accordance with the movements of the whip roll, and two other electrical contact members cooperating with the whip roll contact member in such manner that excessive travel of the whip roll in either direction will cause operation of the knock-off motion of the loom. In that connection, when the warp ends are under the optimum tension, the whip roll will travel a predetermined distance forward and rearward. Any appreciable variation in tension of the warp ends from the desired optimum will result in increased travel of the whip roll in one direction or the other. When that occurs, the contact member moved by the whip roll contacts one of the other two contact members thereby stopping the loom, as above explained. In order certainly to accomplish that result, the movements of the whip roll are controlled by

2

the tension of the warp ends, so as to be truly representative of that tension at any given moment. Further objects and advantages of my invention will appear from the detail description.

In the drawings:

Figure 1 is a perspective side view of a loom provided with a whip roll stop motion embodying my invention;

Figure 2 is a fragmentary isometric detail view, on an enlarged scale and partly in section, of the whip roll and the stop motion therefor and associated parts;

Figure 3 is an isometric view, on an enlarged scale, looking toward the left of the loom, as viewed from in back, of the knock off stop motion and associated parts, certain parts being broken away and certain other parts being broken away and shown in section, with other parts omitted for clearness of illustration; and

Figure 4 is a circuit diagram of the whip roll stop motion and the mechanisms actuated thereby.

This application is a division of my copending application for Loom, Serial No. 696,089, filed September 11, 1946.

I have shown the whip roll stop motion of my invention, by way of example, as applied to the loom of my above identified application. The loom is, in general, of known construction and operation and a brief description thereof, except as to those features having to do with my invention, which will be explained in detail, will suffice.

The loom comprises a suitable frame **50** at the back of which is rotatably mounted a slack warp beam **51** from which the warp ends are laid, in a suitable manner, over and about an idle let off roll, a driven let off roll, a guide rod, lease rods, spreader bars, and split rolls to the heddles of the harness frames, and thence through the reed of the lay **83** to the fell of the woven fabric or cloth. The driven let off roll is driven by a continuously operating let off motion of known type, which is reversible to permit reversing the loom for unwinding the cloth for repair of defects, broken warp ends, and the like, or other purposes, as is known. A tight warp beam **54** is rotatably mounted on frame **50** adjacent and in front of slack warp beam **51**. The warp ends from warp beam **54** are led over and about a tight warp idle let off roll, a tight warp driven let off roll, a whip roll shaft **55**, a whip roll **56** rotatably mounted in cranks **57** fixed to shaft **55**, the lease rods, the spreader

bars, and the split rolls to the heddles of the harness frames and thence through the reed to the cloth. The tight warp driven let off roll is driven by a let off motion similar to that which drives the slack warp driven let off roll. A pile warp beam 58 is rotatably mounted on frame 50, in front of tight warp beam 54. The warp ends from warp beam 58 are led to and about an idle pile warp let off roll, a driven pile warp let off roll, and pile warp lease rods to the heddles and thence through the reed to the cloth. The pile warp driven let off roll is driven by a let off motion similar to those which drive the driven slack warp and tight warp let off rolls, and each warp beam is provided with known means frictionally resisting rotation thereof.

As is shown more clearly in Figures 1 and 2, an arm 59 is fixed to each end of whip roll shaft 55 and extends rearward therefrom. Each arm 59 carries a weight 60, adjustable thereon, which urges the whip roll 56 rearward. In the normal operation of the loom, the whip roll 56 swings forward during the forward stroke of the lay, in the beating up operation, and swings rearward on the rearward stroke of the lay, oscillating about the axis of its shaft 55. In the event of failure of the tight warp let off motion and continued operation of the take up motion, the tight warp ends might be subjected to excessive tension, such as would cause tearing of the tight warp ends or of the cloth. In the event of maladjustment of the warp let off motion, the warp ends might become too slack, or too tight, and cause defects in the cloth. To guard against that, I provide two contact springs 61 (Figure 2) carried by an insulating support 62 mounted on the side of frame 50, one a suitable distance in front of, and the other a suitable distance in back of, a contact finger 63 secured to the whip roll shaft 55 and grounded thereby to frame 50. The springs 61 are connected by a common wire, 232, insulated from the loom frame, to one side of a knock-off electro-magnet 176 (Figure 4), to be referred to more fully later, the other side of which is grounded to the frame. If the whip roll swings an abnormal distance in either direction, finger 63 contacts one of the springs 61. That closes a circuit through the knock-off electromagnet 176 thereby actuating a knock-off motion and stopping the loom before damage occurs, as will be explained more fully later. The contact springs 61 and finger 62 thus constitute one of the protective motions—the whip roll stop motion—of the loom.

The knock-off motion comprises a plate 137 (Figure 3) hinged at its upper edge to a guide bracket 138 fixed to an upright 139 rigid with the front of the loom frame adjacent the left hand side thereof. The bracket 138 defines an elongated opening or slot in which is received the upper portion of a control lever 140 pivoted at its lower end, at 141, on the front of the loom frame for swinging movement about an axis extending fore and aft thereof. Conveniently, the control lever 140 is formed of strap steel and possesses appreciable inherent resiliency. When lever 140 is in starting position, it is disposed to the left of a stop strip 142 of the guide bracket structure 138, toward which stop strip the lever 140 is urged, by a tension spring 143 anchored thereto and to upright 139. The lever 140 has operating connection, by a rod 145, to handle 146 of a switch 147, which controls the motor 127, which drives the loom. The switch 147 is shown, for purposes of illustration, as a known type of air break switch. In practice, however, an oil switch of suitable known type preferably is used, with appropriate connection to the control lever for stopping and starting the motor, such switch being reversible for reversing the operation of the loom when it is desired to unwind the cloth for repairing defects, or for other purposes, as is known. Switch 147 is mounted on a suitably located panel 206.

A lever 148 is pivoted at its lower end, at 149, on a side frame member 150 of the loom frame 50. A stud 151 is secured to lever 148 and projects outward therefrom, this stud being connected by a tension spring 152 to frame member 154. Tension spring 152 urges lever 148 toward its forward position, with its upper end in contact with a stop block 148a fixed to frame member 154. A connecting rod 156 is pivoted at its rearward end on stud 151 and has its forward end pivoted to an arm 157, adjacent the lower end thereof, which arm is pivoted, at its upper portion, at 158, on a plate 159. This plate 159 is pivoted, adjacent its rearward edge and intermediate its ends, at 160, on a mounting plate 161 fixed to an angle bracket 162 which is fixed to frame member 163 at the front of the loom frame 50. The plate 159 has its upper end urged toward the hinged plate 137, by a tension spring 164 anchored to the upper forward corner of plate 159 and to the guide bracket 138. The spring 164 is rather light and the front edge of plate 159 normally is disposed in back of a stud 165 carried by an angle bracket 166 fixed to the back of the hinged plate 137, the stud 165 extending across the plane of plate 159.

An arm 167, fixed on lever 148 and extending forward therefrom, carries a roller 168 disposed for contact by a camming roller 169 mounted eccentrically on a disc 169a fixed on a middle shaft 170 extending across, and suitably mounted for rotation on, loom frame 50, below the main crank shaft 110. Middle shaft 170 is driven at one-half the average or mean speed of crank shaft 110, the shafts 170 and 110 being driven by an electric motor 127 (Figure 4) in a suitable manner, preferably as disclosed in my above identified application. When the loom is in operation, the crank shaft 110 is continuously driven, as is also the middle shaft 170 and, under normal conditions, the arm 157 (Figure 3) oscillates freely about its pivot 158 without affecting the position of plate 159.

A latch member 171 is pivoted at its rearward end, at 172, on plate 159 adjacent the lower end thereof. The forward end portion of latch member 171 is of reduced width to provide an upwardly extending shoulder 173. A light tension spring 174 connects the forward end of latch member 171 to the rockably mounted armature 175 of a knock-off electromagnet 176, of known type, mounted on the guide bracket 138 for the control lever 140. Normally, the knock-off electromagnet 176 is de-energized and the armature 175 thereof is in its lowered position, latch member 171 being then also in its normal lowered position as limited by a stop pin 171a carried by plate 159.

Referring to the diagram of Figure 4, the two whip roll contact springs 61 are connected to a common lead or wire 232 which is connected to one side of the knock-off electromagnet 176. The other side of the electromagnet 176 is connected to the secondary of a transformer 233, mounted on the panel 206 (Figure 3), the primary of which transformer is connected in shunt with the motor

127 to the power line, the connection for the primary of transformer 233 being between the motor switch 147 and motor 127. The secondary of the transformer 233 is grounded to the frame of the loom as indicated.

When the warp ends are maintained at the desired optimum tension, the movement of the whip roll 56 in either direction is such that contact member 63 does not contact either of the contact members 61. In the event of objectionable decrease in tension of the warp ends, the rearward travel of the whip roll 56 is increased so that member 63 makes contact with the rearward member 61. Likewise, upon objectionable increase in tension of the warp ends, the forward travel of the whip roll 56 increases, and contact member 63 then makes contact with the forward contact member 61.

When contact member 63 makes contact with either of the members 61, the knock-off electromagnet 176 is energized thereby raising its armature 175 and, through tension spring 174, lifting the outer or forward end of latch member 171. When that occurs, shoulder 173 of the latch member 171, which shoulder is slightly undercut as shown, is disposed for engagement by a corresponding tooth 157a at the lower back corner of arm 157, on the back stroke of the latter. Upon engagement of arm 157 with latch member 171, the lower end of plate 159 is swung rearward and the upper end of this plate is swung forward into contact with stud 165, thus swinging the hinged plate 137 forward and releasing the control lever 140, which is swung into its off position, opening switch 147 and stopping the loom. Movement of lever 140 by tension spring 143 is limited by a stop 142a of the bracket structure 138. As will be understood, by undercutting shoulder 173 of latch member 171, and providing the complementary tooth 157a on arm 157, I guard against slippage and assure that these parts will remain in proper engagement during the rearward stroke thereof, for actuating plate 159 as and for the purpose stated. The knock-off electromagnet 176 is of known type, as stated, and is provided with means for establishing and maintaining its own local holding circuit, once it has been energized, so that it remains energized if and when the contact members 63 and 61 break contact and until the main switch 147 is opened, at which time the knock-off electromagnet 176 is de-energized and the armature 175 thereof returns by gravity to its normal lowered position.

It will be understood that changes in detail may be made without departing from the field and scope of my invention, and I intend to include all such variations, as fall within the scope of the appended claims, in this application in which the preferred form only of my invention has been disclosed.

I claim:

1. In a whip roll stop motion for a loom, a warp beam, a driving motor, and means responsive to the tension of a sheet of warp passing from said beam effective for disabling the drive of the loom by said motor responsive to abnormal tension and to subnormal tension of the warp sheet.

2. In a whip roll stop motion for a loom having a warp beam and a driving motor, a member having a first normal position corresponding to normal tension of a sheet of warp passing from said beam and movable from said first position to a second position and a third position respectively responsive to abnormal tension and subnormal tension of the warp sheet, and means effective for disabling the drive of the loom by said motor when said member is in either of its said second and third positions and ineffective when said member is in its said first position.

3. In a whip roll stop motion for a loom having a warp beam and a driving motor, a member subject to the tension of a sheet of warp passing from said beam having a first normal position corresponding to normal tension of the warp sheet and movable therefrom to a second position and a third position respectively responsive to abnormal tension and subnormal tension of the warp sheet, and means effective for disabling the drive of the loom by said motor when said member is in either of its said second and third positions and ineffective when said member is in its said first position.

4. In a whip roll stop motion for a loom having a warp beam and a driving motor, a whip roll for receiving a sheet of warp passing thereabout from said beam, said roll being yieldingly urged rearward but normally held in an intermediate position by the warp sheet when the latter is under normal tension and movable to a forward position and to a rearward position respectively responsive to abnormal and subnormal tension of the warp sheet, and means whereby drive of the loom by said motor is disabled by movement of said roll to either of its said forward and rearward positions.

5. In a whip roll stop motion for a loom having a warp beam and a driving motor, a whip roll for receiving a sheet of warp passing thereabout from said beam, said roll being yieldingly urged rearward but normally held in an intermediate position by the warp sheet when the latter is under normal tension and movable to a forward position and to a rearward position respectively responsive to abnormal and subnormal tension of the warp sheet, a contact member movable with said roll, stationary forward and rearward contact members disposed for contact by said movable member in the forward and rearward positions respectively of said roll, a switch controlling said motor, and means comprising an electric circuit including said contact members effective for opening said switch responsive to contact of said movable contact member with either of said stationary contact members.

6. In a whip roll stop motion for a loom having a warp beam and a driving motor, a whip roll for receiving a sheet of warp passing thereabout from said beam, said roll being yieldingly urged rearward but normally held in an intermediate position by the warp sheet when the latter is under normal tension and movable to a forward position and to a rearward position respectively responsive to abnormal and subnormal tension of the warp sheet, a contact member movable with said roll, stationary forward and rearward contact members disposed for contact by said movable member in the forward and rearward positions respectively of said roll, a switch controlling said motor, and electro-mechanical means comprising an electric circuit including said contact members effective for opening said switch responsive to contact of said movable contact member with either of said stationary contact members.

7. In a whip roll stop motion for a loom having a warp beam and a driving motor, a whip roll for receiving a sheet of warp passing thereabout from said beam, said roll being yieldingly urged rearward but normally held in an intermediate

position by the warp sheet when the latter is under normal tension and movable to a forward position and to a rearward position respectively responsive to abnormal and subnormal tension of the warp sheet, a contact member movable with said roll, stationary forward and rearward contact members disposed for contact by said movable member in the forward and rearward positions respectively of said roll, a switch controlling said motor, means comprising a normally inoperable knock-off motion for opening said switch, and means comprising an electric circuit including said contact members effective for rendering said knock-off motion operable responsive to contact of said movable contact member with either of said stationary contact members.

8. In a whip roll stop motion for a loom having a warp beam and a driving motor, a rockably mounted whip roll shaft, a whip roll fixed to said shaft eccentric thereto for forward and rearward swinging movement for receiving a sheet of warp passing thereabout from said beam, said shaft and with it said roll being yieldingly urged rearward but normally held in an intermediate position by the warp sheet when the latter is under normal tension and movable to a forward position and to a rearward position respectively responsive to abnormal and subnormal tension of the warp sheet, a contact member fixed to said shaft movable therewith, stationary forward and rearward contact members disposed for contact by said movable member in the forward and rearward positions respectively of said roll, a switch controlling said motor, means for opening said switch comprising a normally inoperable member continuously driven in the operation of the loom, and means comprising an electric circuit including said contact members effective for rendering said continuously driven member operable responsive to contact of said movable contact member with either of said stationary contact members.

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