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FILLING STOP MOTION FOR NARROW
WARE LOOMS

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This invention relates to improvements in filling stop motions for looms more particularly of the narrow ware type and it is the general object of the invention to provide a filling stop mechanism which shall be effective to detect the condition of the filling on each forward beat of the lay and effect loom stoppage on any beat on which weft breakage may occur.

Narrow ware looms ordinarily operate with a set of positively driven shuttles arranged along the lay and moving in unison first in one direction through their respective warp sheds and then in the opposite direction. Because of the large number of such shuttles a broken thread at one of the shuttles may remain unnoticed by the attendant for several beats of the loom after the break. It is an important object of the present invention to provide a filling stop mechanism for each fabric including a detector on each side of the fabric and depend upon movement of one or the other of the detectors by the weft to permit continued operation of the loom. If the thread breaks the detector which would otherwise have been moved by the thread will remain in indicating position to close a loom stopping electric circuit.

It is another object of the invention to provide a stop motion having a pair of detector members, one on each side of the web being woven, so arranged that when these members are in normal indicating position they will close a detector switch in a loom controlling circuit which is closed at another point at a given time in the loom cycle to effect loom stoppage. The circuit must be completed through both detector members, and if one or the other of the latter is rocked or otherwise moved by the weft thread the detector switch is opened and the electric circuit will not close, thereby permitting continued loom operation.

It is a further object of the invention to provide a combined adjustable stop and common electric contact for the detector members which can be adjusted to vary the distance between the detectors and also be relied upon to form part of the stopping electric circuit if both detector members remain unmoved at a time in the loom cycle when one or the other of them would normally be moved by an intact thread.

In order that the invention may be clearly understood reference is made to the accompanying drawings which illustrate by way of example two embodiments of the invention and in which:

Fig. 1 is a front elevation of part of a narrow ware loom having the preferred form of the invention applied thereto,

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Fig. 2 is an enlarged plan view looking in the direction of arrow 2, Fig. 1, illustrating the manner in which a filling thread extending from the fabric to a shuttle moves a detector member to open a normally closed detector switch,

Fig. 3 is a side elevation looking in the direction of arrow 3, Fig. 2,

Figs. 4 and 5 are enlarged detailed vertical sections on lines 4—4 and 5—5, respectively, Fig. 2,

Fig. 6 is an enlarged plan looking in the direction of arrow 6, Fig. 1, showing the time switch which is normally closed only for a brief interval during each one-pick cycle of the loom,

Fig. 7 is a diagrammatic view showing a loom controlling electric circuit in which three detectors are shown, and

Fig. 8 is a view similar to a part of Fig. 2, but showing a modified form of the invention wherein the detector members are normally in direct electric contact with each other.

Referring particularly to Figs. 1 and 2, the loom includes a frame 1 comprising loomsides, one of which is shown at 2, and a breast beam 3. A lay 4 is mounted in usual manner to rock back and forth in the loom away from and toward the breast beam by well-known mechanism not shown herein. The lay will ordinarily be supported on lay swords, parts of which are shown herein at 5.

Secured to and extending upwardly from the lay is a series of shuttle blocks 6 which are aligned with each other lengthwise of the lay and accommodate shuttles 7, each of which is moved first to one and then to the other of two adjacent shuttle blocks by well-known mechanism including pinions 8. Between the shuttle blocks are the usual reeds 9 to beat up the weft laid by the shuttles to the fells 10 of the fabrics 11.

Fig. 2 shows one of the shuttles 7. The shuttle has a weft quill 12 wound with a supply of weft W which is delivered forwardly through an eye 13 on the front part of the shuttle. The weft W leads from the eye 13 to the cloth as suggested in Fig. 2. Under normal operations the shuttles will move through the warp sheds 14 when the lay is in the rear part of its stroke and weft will unwind from the quill and pass through the eye 13 to supply the filling required for the weaving operation. After the shuttles have moved out of the sheds and are in the shuttle blocks the lay moves toward its front center position and the weft threads W will be moved forwardly by the lay through some such position as that shown at W1, Fig. 2, and reach position W2 when the lay is at or near its front center position. So long as the weft of a shuttle remains intact it will extend diagonally forwardly from the corresponding

fell when the lay is at or near front center, being first on one side of the fabric on one beat-up and then the other side of the fabric on the next beat-up. The fabric 11 for each reed is led forwardly and around a guide roll 15 and then downwardly to wind-up mechanism not shown herein.

The matter thus far described is of common construction and operates in usual manner. At each beat-up of the lay the wefts, if intact, will extend forwardly from their respective fells, either to the right or to the left.

In carrying the invention into effect a detecting mechanism is provided for each fabric. The preferred form of one of these mechanisms is indicated at D and is shown more particularly in Figs. 2-5. Detector D includes a base 20 made preferably of electric insulating material, such as fiber, fastened at its forward end to a block 21 by means of screw 22. The latter passes through a backwardly and forwardly extending slot 23 to permit back and forth adjustment of the body 20. A screw 24 is shown in Fig. 3 for securing the block 21 to a flange 25 formed as part of the breast beam 3.

The body 20 has pivotally mounted thereon right and left detector members 30 and 31, respectively, which are similar except that they are of opposite hands. These members are preferably made of metal or electric conducting material. The right hand detector member 30, Fig. 2, has a rearwardly extending arm 32 provided with a depending weft engaging finger 33 positioned for engagement with the thread W when the lay beats up. Detector member 30 is pivoted on a metallic or electric conducting stud 35 which is screw threaded as at 36 into the base 20 and has a shoulder 37 providing a bearing for the arm 32 and has a top flange 38 to prevent upward movement of the arm 32, see Fig. 5. In the present instance an electric conducting wire 39 is soldered or otherwise secured to the flange 38. In similar manner, the left hand detector member 31 is provided with a rearwardly extending arm 40 having a depending detecting finger 41 and mounted for pivotal movement on a stud 42 similar to stud 35 and having secured thereto an electric wire 43. Detector member 30 has an electric contactor 45 formed preferably integrally therewith and in similar manner the other detector member 31 is formed with an electric contactor 46.

A combined electric contact and stop member 50, made preferably of metal, is provided for the contactors 45 and 46 and is held to the base by a screw 51. The latter is tapped into the base and extends through a backwardly and forwardly extending slot 52 in member 50 which permits back and forth adjustment thereof. Stop 50 has an upstanding stop and contact 53, see Fig. 4, against which the contactors 45 and 46 are normally held by springs 54. These springs are anchored to the base as at 55 for engagement at 56 with their respective detector members 30 and 31, and the base 20 is provided with a stress pin 57 for each spring. The effect of the springs is to hold the detector members 30 and 31 normally away from the selvages of the fabric or in the indicating position shown in full lines, Fig. 2, and also hold the contactors normally against member 50 so that the contactors are electrically connected. The contactors and contact 53 may be considered as comprising a detector switch DS.

Wires 39 and 43 extend forwardly to electric connectors 60 and 61, respectively, which are held in fixed position on the base 20 by screws 62. The connectors 60 and 61 are connected, respectively,

to wires 63 and 64 which form part of the electric circuit shown in Fig. 7.

A timer switch TS is provided at the end of the loom and is mounted on a bracket 65 secured as at 66 to one of the loomsides 2. The switch TS is mounted on the rear part 67 of the bracket 65 and has a plunger 68 which is normally in rear position corresponding to the normally open condition of switch TS. When the lay approaches the forward limit of its motion it engages the plunger 68 to move the latter forwardly to close the switch TS. This is indicated diagrammatically in Fig. 7, where the full line positions of the lay 4 and the switch TS correspond to conditions existing while the lay is in the rear part of its stroke and the dotted line positions indicate the lay near its front center and switch TS closed.

Each of the detectors D for the several fabrics will have its electric wire 63 connected to line wire 70 and will have its wire 64 connected to another line wire 71. The switches DS are therefore connected in parallel across the line wires 70 and 71, see Fig. 7.

Under normal conditions when the lay is in rear position the detector members 30 and 31 of each detector D will be in indicating position and line wires 70 and 71 will be connected through all of the switches DS. At this time switch TS, and therefore the circuit shown in Fig. 7 is open. As the lay moves forwardly, assuming the shuttles are to the right of their respective fabrics and the weft threads are all intact, the threads will move to position W2, Fig. 2, and will engage fingers 33 of their detector members 30 and rock the latter toward the adjacent selvages to the non-indicating position shown in dotted lines, Fig. 2. This results in moving contactors 45 away from contacts 53, and all of the switches DS will be open. Switch TS then closes, but the circuit cannot be closed because all of the switches DS are open. On the next beat-up of the lay when the shuttles are to the left of their fabrics, detector members 31 will be rocked to move their contactors 46 away from contact 53, and again the circuit will be open despite closure of switch TS. Under these conditions each switch DS will be opened every beat-up and the loom can continue to run. If, however, as the lay moves forwardly the thread of any shuttle is broken, the corresponding detector member will not be moved and its switch DS will remain closed, and when switch TS closes, electric current will flow in the circuit to energize solenoid S by power derived from source E the effect of which will be to stop the loom.

Fig. 8 shows a modified form of detector D1 which includes a base 75 similar to base 20 and having right and left metallic detector members 76 and 77 pivoted thereon by means of studs 78 and 79, respectively. These studs are similar to the studs used in the preferred form of the invention and are electrically connected to line wires 70 and 71.

The base 75 is provided with an adjustable stop screw 80 for each of the detector members 76 and 77, and a tension spring 81 for each member 76 and 77 mounted as indicated in Fig. 8 normally urges the detector members 76 and 77 toward their corresponding adjusting stop screws 80. Each detector member 76 and 77 has a vertically extending weft engaging finger 82 similar to finger 33.

The detector members 76 and 77 are made with forwardly extending contactors 83 and 84, respectively, which in this modified form of the

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invention normally have direct engagement with each other under action of the springs 81. The contactors 83 and 84 may be considered as a modified detector switch DS1. If either detector member 76 or 77 is rocked on its pivot as the lay moves forwardly the associated contactor 83 or 84 will move away from the other contactor, and the latter will be prevented from following the first contactor by its stop screw. The corresponding switch DS1 will be thus opened to prevent closure of the control circuit. If the weft thread corresponding to any detector DI is broken, however, the associated switch DS1 will not be opened and closure of the timer switch will result in stoppage of the loom, as described for the preferred form of the invention.

In both forms of the invention the detector members are normally and yieldingly held in position so that their contactors will be electrically connected with each other and rocking of either detector will break the electrical connection between them so that a control circuit connected to them cannot be closed. If, however, the thread is broken on any beat-up of the lay then the corresponding contactors will remain in their normal position to effect closure of the control circuit when switch TS closes.

From the foregoing it will be seen that the invention sets forth a form of detector adaptable more particularly to narrow ware looms and wherein each detector comprises a pair of detector members which normally maintain a detector contact in closed position. If, when the lay beats up, all the weft threads are intact, one detector of each pair of detectors will be rocked, and all of the normally closed detector switches will be opened. This condition will result in continued running of the loom due to the fact that the detector switches will all be open when the timer switch TS closes. If, however, the thread of any shuttle breaks and is unable to rock one or the other of the detector members of its detector the detector switch then remains closed and the loom will be stopped. Each detector member has a vertically extending and preferably depending finger, such as 33, which is forward of and in the path of the weft as the lay beats up. The thread when engaging a finger moves it toward the fabric to effect rocking of the associated detector member. The combined stop and contact member 50 used in the preferred form of the invention electrically connects both of the contactors of the preferred form and also limits angular motion of the detector members. In the modified form of the invention the contactors have direct engagement with each other, and a stop screw 80 associated with each modified contactor prevents its spring 81 from maintaining engagement with the other contactor when the latter moves incident to movement of its detector member to non-indicating position. While the details of construction and operation have been set forth with respect to only one detector it is to be understood that the loom will have a detector for each of its fabrics and these detectors will be conducted in parallel to the loom controlling circuit, as suggested in Fig. 7.

Having now particularly described and ascertained the nature of the invention and in what manner the same is to be performed, what is claimed is:

1. In electric stopping means for a loom wherein a lay on one beat-up thereof moves a weft thread forwardly at one side of the fabric and on the next beat-up thereof moves the thread

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forwardly at the opposite side of the fabric, a detector member on each side of the fabric tending to be in indicating position, each detector member being moved to non-indicating position by the thread when the latter extends from the side of the fabric on which the detector member is located as the lay beats up, an electric contactor for and controlled by each detector member, said contactors being electrically connected when both detector members are in indicating position but each detector member when moved to non-indicating position by the thread moving the corresponding contactor to interrupt the electric connection between said contactors, and means controlled by said contactors effective to stop the loom if said contactors are electrically connected at a given point in the forward beat of the lay due to failure of the thread to move one or the other of said detector members to non-indicating position.

2. In electric stopping means for a loom wherein a lay on one beat thereof moves a weft thread forwardly at one side of the fabric and on the next beat-up thereof moves the thread forwardly at the opposite side of the fabric, a stationary support, a detector member on each side of the fabric pivoted to said support and tending to be in indicating position, the thread when on either side of the fabric being operative due to beat-up motion of the lay to move the detector on the same side of the fabric to non-indicating position, an electric contactor for each detector member having the position thereof determined by the detector member, said contactors having electric connection with each other when both detector members are in indicating position and each contactor being moved to interrupt said electric connection when the corresponding detector member is moved to non-indicating position, and electric means to effect loom stoppage in the event that both of said detector members are in indicating position and effect electric connection of said contactors when the lay is at a given point in the beat-up thereof.

3. In electric stopping means for a loom wherein a lay on one beat-up thereof moves a weft thread forwardly at one side of the fabric and on the next beat-up thereof moves a thread forwardly at the opposite side of the fabric, an electric detector at each side of the fabric normally in indicating position but movable to non-indicating position by the thread when the latter is on the side of the fabric corresponding to the detector during beat-up of the lay, detector switch means normally closed when both detector members are in indicating position but opened due to movement of either detector member to non-indicating position, and electric means to initiate loom stoppage in the event that both detector members are in indicating position at a given point in the beat-up of the lay due to failure of the thread to move one or the other of the detector members to non-indicating position.

4. In electric stopping means for a loom wherein a lay on one beat-up thereof moves a weft thread forwardly at one side of the fabric and on the next beat-up thereof moves a thread forwardly at the opposite side of the fabric, a stationary base made of electric insulation material, a pair of metallic detector members pivoted to said base, one member on one side of the fabric and the other member on the opposite side of the fabric, means tending normally to maintain the detector members in indicating position, detector switch means closed when both

detector members are in indicating position but opened due to movement of either detector member to non-indicating position, the thread when extending to either side of said fabric during the beat-up movement of the lay being effective to move the detector member at said side to non-indicating position, and electric means to effect loom stoppage in the event that both of said detector members are in indicating position at a given point in the forward beat of the lay.

5. Electric stopping means as set forth in claim 4 wherein each detector member is provided with a vertically extending finger forward of and in the path of the thread to be moved by the latter to move the associated detector member to non-indicating position when the thread is moved forwardly by the lay on the side of the fabric on which the detector member is located.

6. In electric stopping means for a loom wherein a lay on one beat-up thereof moves a weft thread forwardly at one side of the fabric and on the next beat-up thereof moves a thread forwardly at the opposite side of the fabric, a detector member on each side of the fabric having a tendency normally to be in indicating position but moved to non-indicating position by the thread when the latter is on the side of the fabric corresponding to the detector during beat-up of the lay, an electric contactor controlled by and moving with each detector member, a stop electric contact engaging the contactors and limiting movement thereof due to said tendency of said detector members, said contactors having electric connection with the contact when the detector members are in indicating position, but each detector member when moving to the non-indicating position thereof moving the associated contactor away from said contact, and electric means to effect loom stoppage in the event that both of said contactors engage said contact at a given point in the forward beat of the lay due to failure of the thread to move one or the other of said detector members to move the corresponding contactor away from said contact.

7. The stopping means set forth in claim 6 wherein the detector members are pivoted and the contact serves as a stop to limit angular motion of the detector members in the direction toward their indicating positions.

8. The stopping means set forth in claim 7 wherein the detector members are pivoted on a stationary support and said stop contact is mounted on said support.

9. In electric stopping means for a loom wherein a lay on one beat-up thereof moves a weft thread forwardly at one side of the fabric and on the next beat-up thereof moves a thread forwardly at the opposite side of the fabric, a detector member on each side of the fabric having a tendency normally to be in indicating position but moved to non-indicating position by the

thread when the latter is on the side of the fabric corresponding to the detector during beat-up of the lay, an electric contactor controlled by and moving with each detector member, said contactors having direct electric contact with each other when both detector members are in indicating position, the thread when moving either detector member to non-indicating position moving the associated contactor away from the other contactor, and electric means effective to stop the loom in the event that said contactors engage each other at a given point in the beat-up of the lay.

10. The stopping means set forth in claim 9 wherein a stop is provided for each detector member and resilient means normally holds each detector member in indicating position with the contactor therefor in engagement with the other contactor, the stop for each detector member limiting movement of the corresponding contactor in a direction toward the other contactor when said other contactor is moved due to movement of the associated detector member from indicating to non-indicating position.

11. In electric stopping means for a loom wherein a lay on one beat-up thereof moves a weft thread to a position extending forwardly from one side of the fell of the fabric and on the next beat-up thereof moves the thread to a position extending forwardly from the opposite side of the fell, a pivoted detector member on each side of the fell of the fabric, each detector member being normally in indicating position and having a thread engaging part spaced from the fabric, each detector member being swung to non-indicating position by movement of said engaging part thereof toward the fabric by the thread as the lay when beating up moves the thread to the forwardly extending position on the side of the fell corresponding to the detector member, a pair of electric contactors, one for each detector member, controlled by the members and electrically connected when the detector members are both in indicating position, each detector member when being moved to non-indicating position by the thread moving the corresponding contactor to interrupt the electric connection between said contactors, and electric means effective to initiate loom stoppage if said contactors are electrically connected at a given point in the beat-up motion of the lay due to failure of the thread to move one or the other of said detector members to non-indicating position.

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