STOP MOTION MECHANISM FOR NARROW FABRIC LOOMS

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Filled Aug. 31, 1946

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Application August 31, 1946; Serial No. 694,366

8 Claims. (Cl. 139—370)

1. This invention relates to improvements in means for automatically stopping a loom before the filling or weft in the shuttle is entirely exhausted; and a primary object of the invention is to provide efficient, practical, economical and automatic means for stopping a narrow fabric loom before the filling or weft in the shuttle is exhausted, thus preventing danger of broken or miss picks or weft threads or preventing unevenness in the fabric thereby producing a more perfect fabric.

The continuation of the running of a loom with an empty shuttle causes damage to or imperfections in the woven fabric and also causes loss of waste of yarn. In narrow fabric looms a series of shuttles are simultaneously operated to produce a plurality of ribbons or other narrow fabrics, thus making observations regarding exhaustion of the thread on the bobbins in the shuttles more difficult.

It is, therefore, a further object of the present invention to provide electric stop-motion for narrow fabric looms enabling the machine to stop automatically as soon as the weft thread in one of the shuttles is near exhaustion.

It is a further object of the present invention to provide the shuttle with a metal quill or metal surfaced quill, so that, when the yarn has reached its stage of exhaustion, electrical contact may be established with a device brought into intermittent contact with the bobbin or quill to close an electric circuit controlling the starting mechanism of the loom.

It is a further object of the present invention to equip conventional narrow fabric looms with electric stop-motion without requiring modification or change thereof; a still further object being to provide automatic stop-motion which may be readily applied to conventional narrow fabric looms.

These and other objects and certain advantages features are accomplished by the novel and practical construction, combination and arrangement of parts hereinafter disclosed and illustrated in the accompanying drawings, constituting an essential part of the disclosure, and in which:

Figs. 1, 2 and 3 are diagrammatic front views of three stages in the operation of a narrow fabric loom.

Fig. 4 is a diagrammatic top plan view, showing the relationship between the various essential parts, including one shuttle and an empty-shuttle position.

Fig. 5 is a cross sectional diagnostic view of one of the bobbin contact fingers in inoperative position, the other finger being hidden from view; and Fig. 6 is a modification thereof.

Fig. 7 is an enlarged plan view of a shuttle, bobbin and contact fingers in position.

Fig. 8 is a right hand end view of Fig. 7.

Fig. 9 is an electrical diagram including a modified form of quill contact finger.

In the conventional narrow fabric loom a plurality of shuttles are simultaneously operated to produce a plurality of ribbons or other narrow fabrics. Only part of such a machine is shown in the drawings, covering only the essential parts of the invention.

Referring to Figs. 1 to 3, inclusive, the illustrations disclose a conventional narrow fabric loom having the batten 15 to which are secured the supports 16 for the upper and lower shuttle blocks 17 and 18 respectively. The shuttles 19 are guided within these shuttle blocks 17 and 18 and are moved by means of the rack 20 contacting the pins 21 in the lower shuttle block 18. The upper portion of the pinion 23 engages a rack portion 22 in the shuttle guide groove 23 (see Figs. 7 and 9).

The moving of the rack 20 in the direction of the arrow 24 will cause the shuttle 19 to move in the direction of the arrow 25; these movements being reversed, thus weaving the narrow fabric in the conventional manner. In the interest of clarity, the contact fingers and levers are not shown in Figs. 1 to 3.

Referring more particularly, to the top plan view shown in Fig. 4, the warp threads W come from the warp beam 30 rotatably mounted on the framework of the machine and are threaded through the reed 31 clamped as indicated at 32 to the batten 15. The harnesses 38, 39 (see Fig. 2) reciprocate vertically in a conventional manner. The batten 15 is adapted to rock forwards and backwards by means of the connecting rods 57 connected to the crank shaft 55. Batten 15 includes the shuttle rack 23 and the supports 16 to which are secured the slotted shuttle blocks 17, 18. The lower block 18 (Figs. 1—3) rotatably carries the pinion 21 in engagement with the shuttle rack 23, the rack 20 being adapted, as previously explained, to reciprocate longitudinally by means of the strap 36 trained over pulleys 34, 35 which in turn are connected to a shuttle motion drive (not shown). The shuttles 19 carrying the thread-wound quills 37 move back and forth in accordance with the movement of
the batten 15 and then move longitudinally reciprocatingly in accordance with the movement of the rack 20 and in the shed formed between the two layers of V-formed intertwined warp between two adjacent shuttle blocks or holders 17 and 18. During this longitudinal movement, a shuttle 19 slides along a shuttle block SB (Fig. 4) through the warp shed across the warp threads and into an adjacent shuttle block SB'. A layer of warp threads W carried by one gang of heddles (not shown) on one harness 38 is then moved by the latter relatively with respect to a layer of warp threads carried by a second gang of heddles (not shown) on another harness 39, one layer of warp threads meshing with the other layer of warp threads, holding the weft thread W wound on the quill 37 and carried across by the shuttle 19 between the threads of the layers.

Then the said shuttle 19 reverses in direction and returns to the first mentioned shuttle holder laying another weft across the forming fabric F, the direction of movements of the said harnesses 38 and 39 being reversed. This is conventional in narrow fabric looms.

According to this invention the quill 37 is made of metal or is provided with a metal surface.

Attached to loom breast beam B by screws 40 is a bracket 41 to which is hinged connected by hinge 42 an electrical insulating plate or strip 43. Hinge 42 is secured to bracket 41 by bolts and nuts 42c and to plate 43 by bolts and nuts 42b. Plate 43 is provided with a pivot 44 to which is connected a rod 45, connecting the plate 43 to a cam lever 46. The lever 46 is hinged connected to bracket 47. The bracket 47 in turn is secured to the loom breast beam 35 by means of bolts 48. The lever 46 has a roller or projection 49 at its opposite free end in engagement with a cam 35 mounted on the shaft 51. A sprocket wheel 52 (Fig. 4) is also mounted on the shaft 51 connecting with another sprocket wheel 53 by means of the sprocket chain 54. The sprocket wheel 53 is secured to the loom crank shaft 55. Crank portions 56 of the crank shaft 55 are connected to the batten 15 by means of rod or links 57. It is evident, that the crank shaft 55 and the cam shaft 51 are driven in unison and that reciprocal or back and forth rocking motion is imparted to batten 15, while simultaneously radial up and down movement is imparted to plate 43 about the hinge 42.

Secured to plate 43 in spaced relation are a pair of spring metal fingers 58. These fingers 58 each have a portion 59 disposed over the plate 43, a downwardly directed portion 60 disposed over the free end of the plate 43, and a rearwardly formed portion or feeder 61 disposed beneath the under face 62 of the plate 43.

The rearward portions or feeders 61 of the fingers 58 may each terminate in an upwardly directed portion 63. The forward parts of portion 59 pass through a retaining insulating block 64. Each portion 59 enters a slot or hole in a set screw 65 maintaining electrical connection between each finger or feeder 58 and an electrical conductor 67 of cable 68. Studs 65 are secured to plate 43 by means of screws 66.

As seen in Fig. 4, one of the wires 67 connects through a transformer 70 and by conductor 67a to one terminal of the electromagnet 71 of a 110/6 volt relay 73, the other terminal of the electromagnet 71 being connected with the other wire 67 of cable 68. The auxiliary contact 72 of relay 73 is connected to one terminal of a magnetic starter 74 by the wire 75. The control 75 circuit stop side wire 76 connects another terminal of the magnetic starter 74 to the pivoted arm 77 of the relay 73. The leads 75 and 76 connect with the motor leads 78 through the magnetic starter 74. The relay and magnetic starter are conventional.

It is now evident that if the thread T on quill 37 in a shuttle 15 is up to such an extent that surface metal portions 37a of the quill 37 are exposed, then when the plate 43 comes down (see Figs. 5 and 6), the fingers 61 of fingers 58 will contact these bare metal surface portions of the quill 37 and thereby make an electrical connection between the two fingers 58 on plate 43. This will close the circuit which includes the transformer 70 and electromagnet 71 of the relay 73, thereby energizing the electromagnet 71, causing switch arm 77 to be attracted and moved away from auxiliary contact 72, thus breaking the motor circuit controlled by the magnetic starter 74. After the quill 37 has been replenished with thread, the machine is again started in conventional manner.

Although it is preferable to employ two feeders 61 to indicate when another full quill is required, one feeder may be employed by grounding the metal quill or bobbin through the frame structure of the machine. Fig. 9 shows such a modified arrangement. In this latter case, the quill 37 may be grounded through conductor 67b and one terminal of the electromagnet in the relay may also be grounded through conductor 67c. Feeler 61a on hinged plate 43 connects with transformer 70 through conductor 67d.

It is evident that the stop-motion device is applicable to narrow fabric looms wherein the two adjacent shuttle blocks have slots which form portions of a continuous arc, a shuttle sliding from one block to the adjacent block laying one weft down and then back laying another weft or filling. The shuttle defines an arc as it slides from one shuttle block to another. In this case it would be necessary to hingely mount the plate 43 at an angle so that the feeders may contact the metal quill after the shuttle has traversed its arcuate path.

It is thus seen that the present invention comprises simple, and practical stop-motion device for narrow fabric looms, which will be safe, efficient, and reliable in use and operation. The device comprises relatively few parts which may be inexpensively manufactured and assembled and which is well adapted to accomplish, among others, all of the objects and advantages herein set forth.

In Fig. 5a, parts corresponding to those seen in Fig. 5, are indicated by the same numerals with the letter "a" affixed, except that, instead of the rod 48 and lever 46, there is seen an extension 45a of plate 43.

Without further analysis the foregoing will so fully reveal the gist of the invention that others can by applying current knowledge readily adapt it for various applications without omitting certain minor features that from the prior art fairly constitute essential characteristics of the generic or specific aspects of this invention, and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalency of the following claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. Stop-motion for a narrow fabric loom hav-
5. A magnetic starter provided with a relay including a transformer, comprising a member upon which weft thread may be wound, said member being carried by the usual shuttle and being adapted to make an electrical contact, an electrical insulating plate, means hingedly connecting said plate to the usual loom breast beam, a pair of electrical contact members carried by said plate and adapted for engagement with said member, a cam lever, means hingedly connecting said plate to said transformer to said relay, the other terminal of said low voltage side to one contact of said pair of electrical contacts, and the other contact of said pair of electrical contacts to said relay.

4. A stop motion for a narrow fabric loom having a magnetic starter provided with a relay including a transformer, comprising a member upon which weft thread may be wound, said member being carried by the usual shuttle and being adapted to make an electrical contact, a support, means hingedly connecting said support to the usual loom breast beam, electrical contact means carried by said member and adapted for engagement with said member, a cam follower, means hingedly connecting said follower to said breast beam, a rod pivotally connected to said plate and being attached to said follower, a shaft, means connecting said shaft to the usual loom crank shaft, a cam on said first-mentioned shaft engaged by said follower whereby said electrical contact means is adapted to intermittently engage weft thread wound upon said member and to contact with said member before the weft thread on said member is exhausted, and electrical conductors connecting said electrical contact means with transformer means.

5. Stop motion for a narrow fabric loom having electrical starting and stopping means, said stop motion comprising a member upon which weft thread may be wound, said member being carried by the usual shuttle and being adapted to make an electrical contact, a support, means hingedly connecting said support to the usual loom breast beam, electrical contact means carried by said member and adapted for engagement with said member, a cam lever, means hingedly connecting said plate to said transformer to said relay, the other terminal of said low voltage side to one contact of said pair of electrical contacts, and the other contact of said pair of electrical contacts to said relay.

6. Stop motion for a narrow fabric loom having electrical starting and stopping means, said stop motion comprising a member upon which weft thread may be wound, said member being carried by the usual shuttle and being adapted to make an electrical contact, a support, means hingedly connecting said support to the usual loom breast beam, electrical contact means carried by said member and adapted for engagement with said member, a cam lever, means hingedly connecting said plate to said transformer to said relay, the other terminal of said low voltage side to one contact of said pair of electrical contacts, and the other contact of said pair of electrical contacts to said relay.
7. Support carrying cam engaging means, electrical contact means carried by said support and adapted for engagement with said member, a shaft, means connecting said shaft to the usual loom crank shaft, a cam on said first-mentioned shaft in engagement with said cam engaging means whereby said electrical contact means is adapted to intermittently engage weft thread wound on said member and to contact with said member before the weft thread on said member is exhausted, and means connecting said electrical contact means with said electrical starting and stopping means.

8. Stop motion for a narrow fabric loom having electrical starting and stopping means, said stop motion comprising a member upon which weft thread may be wound, said member being carried by the usual shuttle and being adapted to make an electrical contact, a support swingably connected to the usual loom breast beam, electrical contact means carried by said support and adapted for engagement with said member, a shaft, means connecting said shaft to the usual loom crank shaft, a cam and cam engaging means between said first-mentioned shaft and said support whereby to facilitate said electrical contact means to intermittently engage weft thread wound on said member and to contact with said member before the weft thread on said member is exhausted, and means connecting said electrical contact means with said electrical starting and stopping means.

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