April 6, 1954 S. F. SICILIANO 2,674,277

WEFT DETECTOR FOR LOOMS

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Fig. 1.

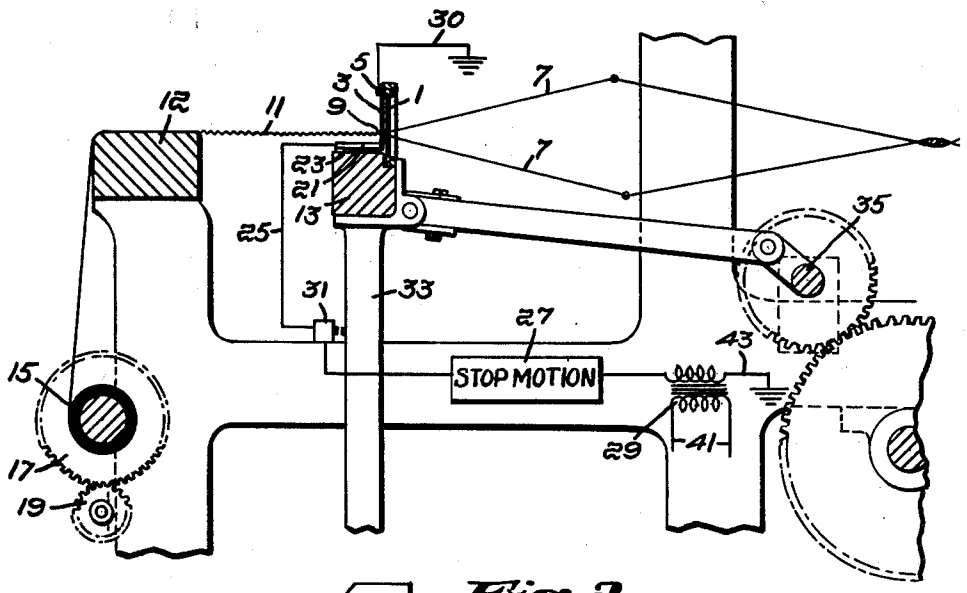
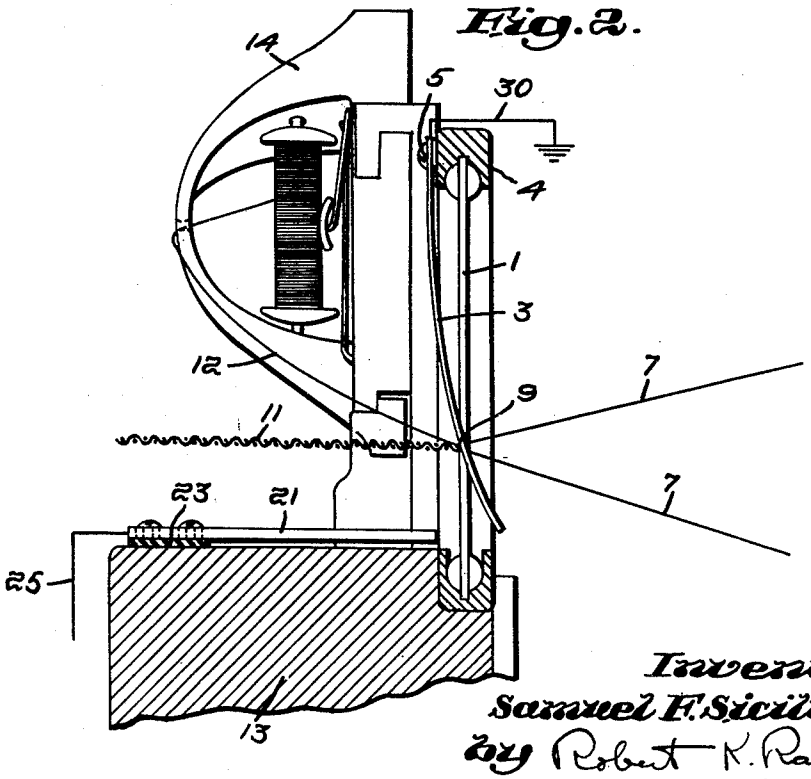


Fig. 2.



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Fig. 3.

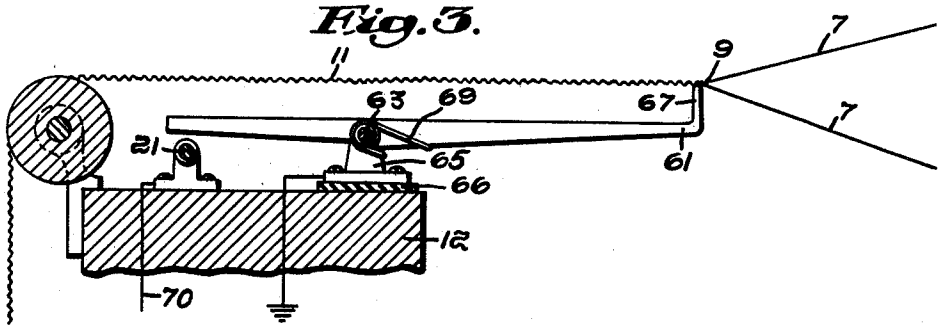


Fig. 4.

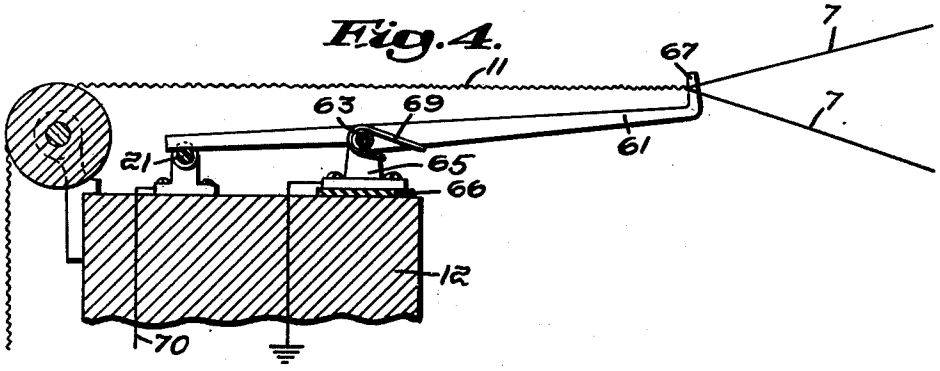
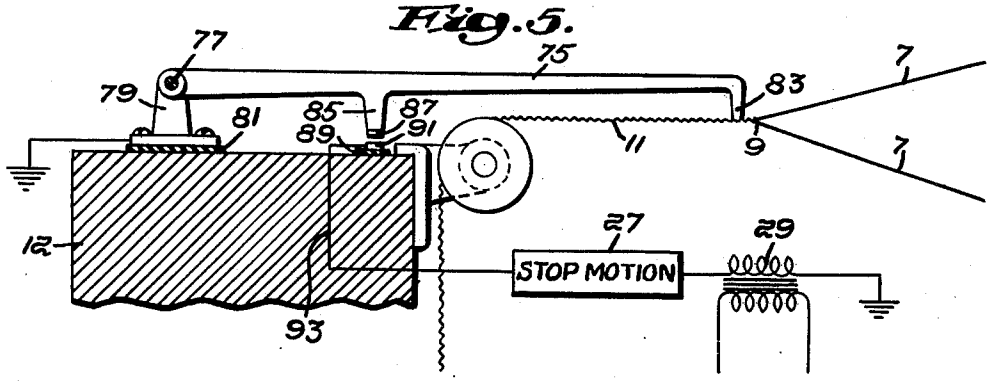


Fig. 5.



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WEFT DETECTOR FOR LOOMS

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14 Claims. (Cl. 139—348)

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This invention relates to devices in the nature of weft detectors for multi-shuttle narrow fabric looms. The main purpose of the present device is to provide a mechanism which will instantly detect a failure in the weft or filling supply to any one of the plurality of fabrics woven, whether such failure is caused by breakage or exhaustion of such weft, or by other weft defects which interrupt the continuing growth of the fabric at the normal fell line. Prior devices of this type usually function solely in response to a broken filling, inadequate tension thereof, or other faults in the weft itself. However, such devices prove inadequate in certain instances, as for example where the shuttle motion fails because a shuttle strap breaks, and the shuttle is prevented from entering the shed to lay the filling in the warps, yet the loom continues to run since the filling itself has not broken and is in proper working condition, and no indication of trouble is given by the usual weft detecting methods, thus producing defective fabric.

It is thus a leading aim of the invention to provide a detection apparatus which will cause the loom to stop not only in the absence of filling but in fact whenever anything occurs to prevent the continuous weaving of cloth by any shuttle at any one of the dozen or more places in the length of the lay beam where such cloth is being woven in a multi-shuttle narrow ware loom.

To these ends the invention utilizes the novel principle of detecting the failure of the filling to be properly laid into the warps for any reason, by noting and responding to the deviation of the fell from its proper location through failure of the filling to produce cloth.

In accordance with the invention the detector comprises a feeler mounted either on the lay or on the breast beam and held by the cloth out of engagement with a contact piece, preferably an electrical contact, so long as the fell stays in its proper place at the limit of the forward excursion of the reed. But when the weaving stops for any reason while the loom continues to run, the shift of the fell forward through action of the take-up then lets the feeler engage the contact to call a change in the operation of the loom, herein by actuating the loom stop motion.

Other aims of the invention and the manner of their attainment are set forth in the following description.

Illustrative embodiments are shown in the accompanying drawings, in which

Fig. 1 is a fragmentary view in side elevation

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indicating the main parts of a narrow fabric loom employed in the weaving of one of the plurality of narrow fabrics woven thereon, together with a lay-mounted form of the weft detector of the invention, and Fig. 2 is a vertical section through the lay and reed of Fig. 1 at the location of one of the fabrics being woven, and with the addition of the shuttle, showing on an enlarged scale the action of the feeler and other parts where the lay is at front center with the weft in good working condition.

Fig. 3 is a fragmentary vertical section of the breast-beam of a narrow fabric loom with an alternative form of the feeler mounted thereon and held in its inactive position by a fabric being properly woven.

Fig. 4 shows the relation of the parts of Fig. 3 when the fell has shifted forward through weft failure and the feeler acts.

Fig. 5 shows another alternative form of breast-beam mounted feeler, in a view similar to Fig. 3.

The invention is shown in connection with a narrow fabric loom employing bow shuttles, though it is equally applicable to straight shuttle narrow fabric looms. Since in all embodiments the reeds, warp yarns, shuttles, and weft detectors shown herein are duplicated and identical at each of the plurality of locations in the length of the lay where the respective fabrics are being woven, only the parts involved in the invention at one such location are shown and described herein.

In the embodiment of Figs. 1 and 2, each reed or comb 1 is provided with a resilient brass or steel feeler wire 3 having its upper end bent into an eye and firmly attached by screw 5 to the reed cap 4, of the reed 1, or, if preferred, to the upper reed frame, so as to extend down in front of the dents of the reed 1 and reach down through the warp yarns 7 and at each beat-up to be brought into contact with the fell 9, the line where the warps 7 turn into cloth 11 through the interweaving of the weft or filling 10 carried by the shuttle 14 (as shown in Fig. 2) which loops back and forth in a semi-circular path in front of the feeler wire 3 and reed 1 as the lay 13 recedes and returns. The fabric 11 is drawn over the breast-beam 12 and wound on cloth roll 15 under substantial tension.

If the shuttles are weaving cloth at all of their various locations throughout the length of the lay, the fell line 9 of each fabric 11 stays in fixed position in the loom though the take-up mechanism rotates cloth roll 15, driven by gears 17, 19, continuously drawing the cloth 11 for-

ward and rolling it up on the roll 15, as fast as produced at the fell line 9. Hence the fell bends the flexible feeler 3 back into the dents of reed 1 at each beat-up, as shown in Fig. 2. If, however, the filling in any one of the shuttles breaks or runs out, or if failure of a shuttle strap or anything else occurs to prevent the continuous weaving of cloth by any shuttle, the continued action of the take-up roll 15 in pulling forward the cloth 11 carries forward the fell line 9, where the weaving stopped owing to such breakdown, and feeler wire 3 makes engagement with the rear end of a contact member 21 located within the range of forward excursion of the feeler 3, because the fell 9 is no longer there to prevent it, having moved forward out of range of the feeler as the cloth 11 was taken up and no more weft being forthcoming to keep building onto the cloth at its rear end. These contacts 21, one for each shuttle, reed, or strip of cloth being woven, are rectangular strips of metal all adjustably fixed on a conductor bar 23 of conducting material mounted on and extending throughout the length of the lay 13 and connected by wire 25 into a circuit, Fig. 1, which includes an electric stop motion 27 for the entire loom, a source 29 of low-voltage electric current derived from mains 41 operating the stop motion, and a timing switch 31, the other end of the circuit being grounded as at 43. Each feeler 3 is connected to ground as at 30. Switch 31 is arranged to be closed only at the instant when the lay is at front center and each feeler wire 3 is ordinarily being held out of engagement with its contact 21 by the fell 9 of the cloth. This is easily arranged by using at 31 a micro-switch which is closed by the movement of the lay sword 33, or by working the switch by cams on the loom crankshaft 35, the camshaft 37 or any other constantly going part, as in my U. S. Patent 2,470,527, so that this switch will be closed only at the instant when the lay is at its extreme forward position.

As is obvious, it is only when the circuit is closed simultaneously by the switch 31 and by the feeler 3 touching contact 21 because defective filling supply has failed to prevent such contact, that the stop motion 27 is actuated to knock off the loom. The loom will be stopped because the fell moves forward under the action of the take-up roll 15 whenever anything has interrupted the insertion of filling while the loom continues to run.

Figs. 3 and 4 show another application of the invention principle of detecting filling failure by the shift of the fell line. In this embodiment a hook-shaped feeler 61 of thin sheet metal is pivotally mounted on the breast-beam 12 directly under each narrow fabric 11 by means of a pivot pin 63 supported by a bracket 65 mounted on a conductor bar 66 extending throughout the length of the breast-beam. The angularly bent rear end 67 of such feeler is held in engagement with the under side of the fabric 11 by a wire spring 69. This end presses against the fabric just forward of the fell, whereby any interruption in the weaving of the fabric and resultant advance of the fell line allows the feeler end to rise between the unfilled warps as shown in Fig. 4. The accompanying rocking of feeler 61 is made to stop the loom by closing the loom stop motion circuit of Fig. 1. To this end, a contact bar 21 common to all the feelers and extending along the breast-beam is connected by wire 70 to the stop motion 27 and transformer 29, while feeler 61 is grounded through bracket 65 and conductor bar 66 to the loom frame, thus completing the circuit with the grounded side of the transformer shown in Fig. 1 when the rear end of the feeler rises through the warps and lets its front end touch bar 21. Switch 31 is not used, as not needed.

Alternatively, this type of detector device can be mounted above the fabric as is shown in the embodiment of Fig. 5, in which the light sheet metal feeler 75 is pivoted at 77 at its forward end on bracket 79 on grounded conductor bar 81, and its downturned rear end 83 rests on the fabric 11. A leg 85 on the feeler arm has a contact 87 adapted to engage a contact 89 on a conductor 91 extending along the breast-beam and connected by wire 93 to the loom stop motion 27 and transformer 29 or other suitable source of power. When any defect in the functioning of the loom prevents the proper laying in of the filling the shift of the fell line forward through action of the take-up allows the feeler by the force of gravity to penetrate the warps 7, close contacts 87, 89, and knock off the loom. Thus any cessation in the weaving of any one of the plurality of fabrics in the loom causes loom stoppage within 3 or 4 picks after it occurs.

In both forms of Figs. 3–5 the feeler end 67, 83 is located a short distance forward of the normal fell line 9 in order to prevent unwanted response through penetration of the feeler between the warps when the fell is sprung forward by the reed during the beat-up of the lay.

While I have illustrated and described certain forms in which my invention may be embodied, I am aware that many modifications may be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to the particular forms shown, nor to the details of construction thereof, but what I do claim is:

1. In a narrow fabric loom having a lay, a reed thereon, and means stopping the loom, in combination, a feeler fixed on the lay in front of the reed controlling the stopping means and brought into engagement with the fabric during the beat-up of the lay.

2. In a fabric loom having a lay, a breast beam, a reed, a shuttle carrying weft, and means stopping the loom, in combination, a contact element, and a feeler on the lay to engage such element and thereby actuate the stopping means and kept from so doing, by engagement with the fabric at the fell thereof, only so long as such fell remains in normal position.

3. In a fabric loom and a lay, a reed and a stop motion, in combination, a feeler movably mounted on the lay to engage the fabric, and a contact element to be engaged by the feeler to actuate the stop motion when the feeler fails to be positioned by engagement with the fabric as the lay beats up.

4. In a narrow fabric loom having a stop motion, a lay, and a plurality of reeds and shuttles thereon, in combination, a feeler resiliently mounted on the lay before each of the reeds and normally positioned at each beat-up of the lay by engagement with the fell of the fabric being woven by each shuttle, and an electric circuit actuating the stop motion when the cloth fails to position any feeler.

5. In a narrow fabric loom having a stop mo-

tion, a lay, and a plurality of reeds and shuttles thereon, in combination, a feeler mounted on the lay in front of each of the reeds and normally positioned by engagement with the fell of the fabric being woven by each shuttle, and an electric circuit controlling the stop motion and actuated by any one of the feelers to stop the loom when such feeler fails to be positioned by its proper fabric.

6. In a narrow fabric loom having a stop motion, a lay and a plurality of reeds and shuttles thereon, in combination, an electric circuit controlling the stop motion, and a plurality of feelers each mounted on the lay at one of the reeds and each closing the electric circuit and thus actuating the stopping means unless held from so doing by engagement with the fell line of the fabric being woven at its proper reed.

7. In a loom, in combination, a stop motion, a lay, a reed, a shuttle, a feeler on the lay positioned by the fell line of the cloth being woven by the shuttle, an electric circuit for actuating the stop motion, and a contact engaged by the feeler to close the electric circuit when the feeler fails to be positioned by the fabric.

8. In a narrow fabric loom, in combination, a lay, a shuttle, a reed, a loom stop motion, an electric circuit for actuating the stop motion, a contact element in such circuit, and a feeler also included in such circuit located on the lay in front of the reed to extend between the warps into engagement with the contact element and close the circuit but held from such engagement by the fell line of the fabric so long as the latter remains in its place at the limit of the forward excursion of the reed.

9. In a narrow fabric loom, in combination, a lay, a loom stop motion, an electric circuit for actuating the stop motion, a contact element in such circuit located on the lay below the warps, and a feeler on the lay and also included in such circuit and extending down through the warps to engage the contact element and complete the circuit to actuate the stop motion but held from such contact by the fell line of the fabric so long as the fell line remains in its normal location.

10. In a narrow fabric loom, in combination, a lay, a reed, a loom stop motion, an electric circuit for actuating the stop motion, a feeler in such circuit and swinging lengthwise between the warps with the lay, and an electrical contact fixed on the lay connected to the circuit and engaged by the feeler to close the circuit and actuate the stop motion when the feeler fails to be held from such engagement by the fabric being woven.

11. In a narrow fabric loom, in combination, a lay, a reed, a shuttle, a loom stop motion, an electrical circuit actuating the stop motion, a feeler acting to close the circuit and prevented from so doing while the lay is at front center by engagement with the fabric so long as the fell remains in normal location, and means opening the electric circuit at another point therein during the period when the lay is at other positions than at front center.

12. In a narrow fabric loom, in combination, a plurality of reeds, a plurality of shuttles, a plurality of feelers each mounted on the lay in front of one of the reeds and positioned by the fabric being woven at such reed so long as the fell of such cloth is in normal position, a conductor on the lay extending lengthwise of the lay past all the feelers, means adjustably mounted on the conductor extending lengthwise of the fabric and making electrical contact with the respective feelers when any one thereof fails to be positioned by the cloth as the lay beats up the weft, a loom stop motion, an electrical circuit actuating the stop motion and including the feelers and conductor, and timer means interrupting the electrical circuit except when the lay is beating up.

13. In a fabric loom having a lay and a stop motion, in combination, a feeler fixed on the lay and controlling the stop motion and rendered inoperative by engagement with the fabric but actuating the stop motion when shift of the fabric's fell line prevents such engagement.

14. In a fabric loom having a lay and a stop motion, in combination, a feeler fixed on the lay and controlling the stop motion and rendered inoperative by the presence of the fabric within the feeler's range but actuating the stop motion when shift of the fabric's fell line removes the fabric from the range of the feeler.

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