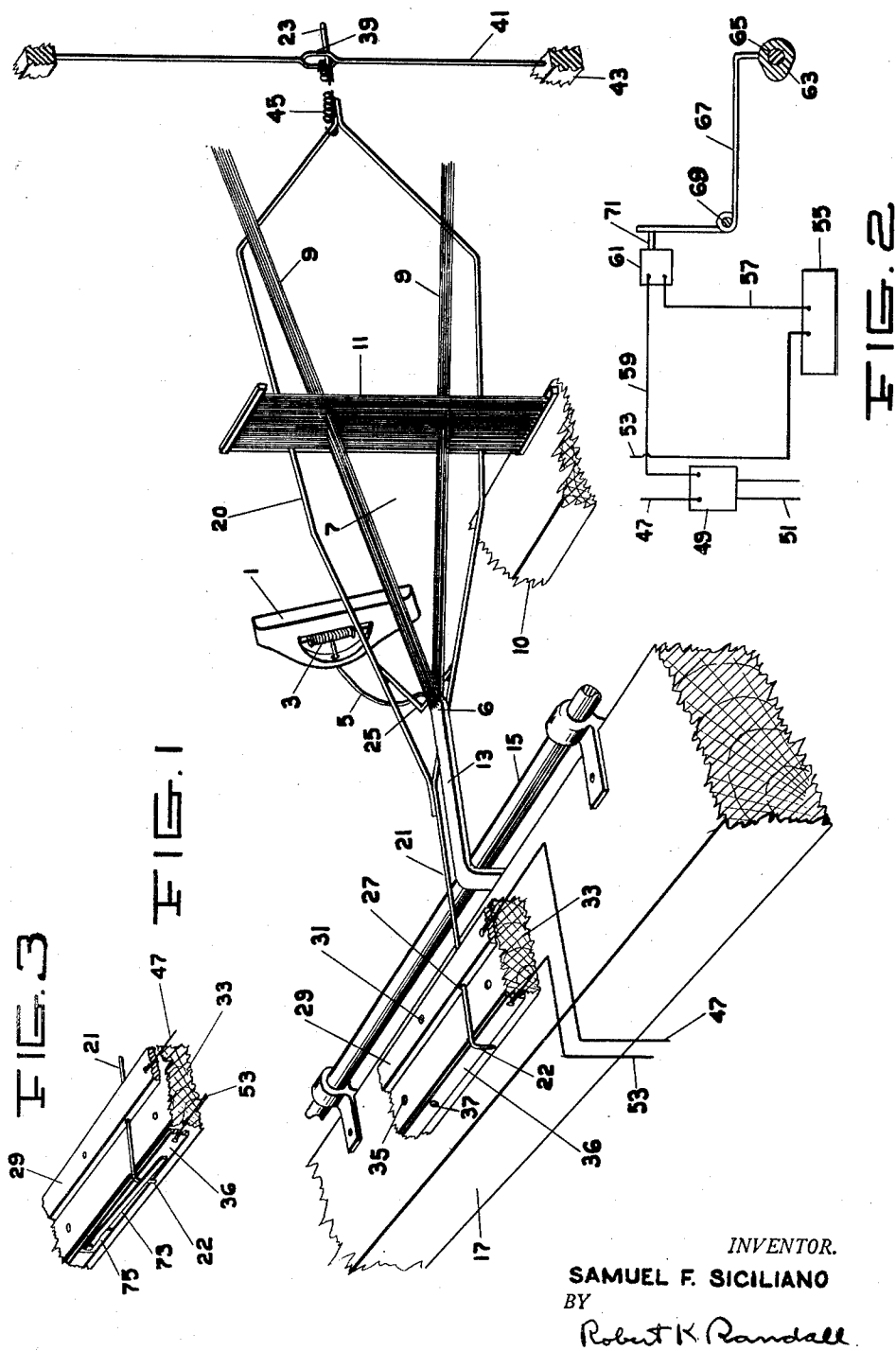


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WEFT DETECTOR FOR LOOMS
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WEFT DETECTOR FOR LOOMS

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11 Claims. (Cl. 139—370)

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This invention is an improvement in weft detectors for multishuttle narrow fabric looms of the kind set forth in my prior Patent No. 2,470,527, granted May 17, 1949, for Weft Detectors, and as in such patent has as its object the provision of a novel and improved mechanism of this sort having general utility and especially adapted for use in a narrow fabric loom employing a plurality of reeds and a plurality of shuttles on the same lay beam to weave a number of distinct fabrics simultaneously. The main purpose of the invention is to provide a device which will detect instantly a failure in the weft supply to any one of the plurality of fabrics being woven, whether such failure is caused by breakage or exhaustion of such weft or comprises slackness in the length of weft extending from the fabric to the shuttle during the beat-up and resulting from failure of the shuttle tension or other causes, and which mechanism will respond to such detection by calling a change in the working of the loom, as by stopping the loom, or by operating an audible or visual signal, or otherwise calling the weaver's attention to the fact that the loom needs attention. Further aims of the invention are to provide a structure which will operate correctly in spite of changes in the widths of the respective fabrics being woven, and to make it possible to install the detectors in existing looms with a minimum of effort and change therein and without adding appreciably to the weight of the lay or cluttering up the lay or the breast-beam with motion-transmitting elements or wiring interfering with the weaver's work or otherwise adding obstructions.

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

An illustrative embodiment of the invention is shown in the accompanying drawings, in which

Fig. 1 is a fragmentary view in perspective indicating the breast beam and lay of a narrow fabric loom and the shuttle and reed employed in the weaving of one of the plurality of narrow fabrics woven thereon, together with the weft detector of the invention.

Fig. 2 is a diagram showing the timer and the electrical connections between the weft feelers and the loom stop motion.

Fig. 3 is a fragmentary perspective view of a portion of the breast beam and the electrical contact elements thereon showing an alternative way of positioning the weft feeler in its normal position.

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 the reed, shuttle, and weft detector shown herein are duplicated and identical at each of the plurality of locations in the length of the lay where the respective narrow fabrics are being woven, only the parts involved in the invention at one such location are shown and described herein, all other parts being standard, it being understood that one of the novel feelers of the weft detector is provided alongside of each fabric being woven in the loom. As usual in many instances, the bow shuttle 1 carrying the bobbin 3 on which is wound the weft 5 travels back and forth through the shed 7 of warps 9 in a curved path guided by part-circular slots forming a shuttle race in blocks (not shown) supported on the back of the lay 10 at each side of the reed 11 also supported on the lay-back, all in conventional manner, the shuttle passing back and forth in front of the reed. The fabric 13 is drawn forward over rail 15 on the breast beam 17, and wound on a cloth roll (not shown) under substantial tension.

In accordance with the invention, a weft feeler 20 is provided, preferably made out of light, stiff steel wire, in the shape of a symmetrical polygonal loop having a forward extension 21 and a rearward extension 23 disposed in the line of its axis. This feeler extends through the reed, being located in the interval between two dents outside the adjacent final selvage warp. The width of the loop is such as to exceed the height of the shed 7 throughout a portion of the fore-and-aft length of the shed in excess of the length of the excursions of the reed, so that the shuttle 1 can pass freely through the loop in front of the reed during its travel through the shed 7 without any contact with the loop, the dents of the reed on either side of the loop always holding the latter in a vertical plane.

To perform its detecting functions, the feeler 20 is designed to be moved forward each time the lay beats up with the weft 5 extending in proper taut and unbroken relation from the fell 6 of the cloth to the shuttle when the latter is at the same side of the fabric 13 as the feeler 20. To this end, the loop of feeler 20 has a bent cross-piece or portion 25 which is engaged by the weft 5 as the latter is beaten into the fell by the reed as the lay reaches front center, and thus the whole feeler 20 is moved forward a fraction of an inch at this instant.

So that the loop 20 will always be maintained vertical, the junction of the forward extension 21

with the diverging portions forming the forward apex of the loop 20 is located well in advance of the fell 6. Thus the reed can never reach the front end of the loop, and the dents of the reed serve to maintain the loop 20 always in a vertical plane.

To mount the feeler with capacity for forward and rearward sliding movement with respect to the breast beam, the forward extension 21 is guided and supported in a hole 27 through a strip of metal 29 or other electrically-conductive material secured as by screws 31 on a non-conducting base 33 of wood or other material applied to and fixed on the breast beam 17 as by screws 35. A second strip 36 of electrically-conductive material is attached as by screws 37 to the vertical front wall of base 33, with its top edge below the top surface of base 33. The forward extremity of extension 21 is bent down at right angles to provide a finger 22 to make contact with this strip 36 except when the feeler is pushed forward by the weft 5 on beat-up as described.

The rearward extension 23 of the feeler 20 is supported and guided in an eye 39 of one of the wires 41 of a heddle 43 standing ever in fixed position behind the lay, and a very light contracting coil spring 45 has one of its ends hooked into the loop of feeler 20 and its other end hooked into heddle eye 39 to exert a pull sufficient to hold the downturned end 22 of the forward extension 21 in contact with strip 36, to prevent the slight tendency of the friction against the adjacent dents of the advancing reed from carrying the feeler forward during beat-up. This pull of spring 45 is however too weak to prevent the forward movement of the feeler when the weft 5 is caught in the angle of the portion 25 as the weft is beaten into the fell, and thus on every other pick the finger 22 is removed from contact with strip 36 so long as the weft remains in good working order, in unbroken extent from the fell to the shuttle eye and properly tensioned by the friction device in the shuttle. But if the weft is broken or has run out, or is too slack, it will fail thus to move the feeler forward at this phase of the loom's cycle, and the finger 22 will remain in contact with strip 36.

In order to get a detecting impulse from this result of a defective weft, strips 29 and 36 are respectively made conducting elements of an electrical circuit actuating a shipper knock-off, or loom stop-motion, this circuit being completed as between these two strips by the contact of finger 22 with strip 36 and that of the extension 21 with the interior of the hole 27 in the strip 29. Thus, strip 29 is connected by wire 47, Figs. 1 and 2, with one terminal of the low side of a step-down transformer 49, Fig. 2, supplying 12 to 18 volt current taken from high voltage mains 51 connected with a suitable source of power (not shown) while strip 36 is connected by wire 53 with one terminal of an electrically actuated loom stop-motion 55. The other terminal of the stop-motion is connected by leads 57, 59, to the other terminal of the low voltage side of transformer 49, through a switch 61 which is actuated mechanically in timed relation to the loom's cycle in such manner that the current can pass switch 61 and thus flow through the circuit only as the lay arrives at front center to effect the beating up of the pick which has been laid in from right to left of the cloth. That is, the circuit is energized only as the lay reaches front center on every other pick.

The timing switch 61, which thus limits the response of the circuit including the loom stop-motion 55 to the brief period during which the weft feelers 20 of the plurality of reeds disposed across the lay should be moved forward by the respective wefts if the latter are in proper working condition, is actuated from any suitable or preferred going part on the loom herein by means of a cam 63 fixed on the loom cam-shaft 65, which shaft makes one rotation for every two cycles of the lay. Thus the rise of cam 63 rocks a bell-crank lever 67 counterclockwise about a pivot 69, suitably mounted on a fixed part of the loom, such lever pushing in the spring plunger 71 of switch 61 to close such switch, each time the lay reaches front center with the shuttles 1 standing at the left side of the respective fabrics being woven thereby, namely at every other beat-up of the lay. In this way, the contact of the feeler fingers 22 with contact strip 36 normally occurring throughout the entire working of the loom except at the moments when the simultaneous testing of the several wefts by the feelers 20 takes place, is nullified and rendered ineffective to stop the loom. As is obvious, it is only when the circuit is closed simultaneously by the finger 22 of a feeler and the switch 61 that the stop-motion 55 acts to stop the loom; and this simultaneous closure of the circuit at two points can occur only at the beat-up of a pick laid in from right to left. The result is that a failure of the weft weaving in one of the plurality of fabrics in the loom instantly calls the change in the manner of operation of the loom, hereby stopping the loom.

While in the drawings the weft feeler 20 is shown located at the left hand side of the fabric, yet it is in certain instances located at the right hand side of the fabric as where it is the practice or preference of the weaver to replenish the weft in the shuttles with the latter located at the left of the webs of fabric. In this location it is well out of the weaver's way. The timing cam 63 is then fixed on cam-shaft 65 so as to rock lever 67 and close switch 61 each time the lay reaches front center with the shuttles 1 standing at the right hand side of their respective fabrics being woven thereby.

When it is desired to test the weft at each pick, instead of at every other pick, as in the forms described, two feelers are used at each fabric, one on each side thereof. Thus, the form of complete detector mechanism shown and described in connection with Figs. 1 and 2 and having its feeler 20 located at the left of the fabric, and a second complete detector mechanism with its own wiring, switch, cam, and other parts shown in Fig. 2, having its feeler located at the right of the fabric as just described in the preceding paragraph, and extending through the same reed, are employed simultaneously at each fabric, the two cams 63 being located 180° apart on the cam shaft and two pairs of contact strips such as 29 and 36 being provided side by side across the breast beam on bases 33 of unequal heights, so that the forward extensions 21 of say the right hand feelers will extend above and out of contact with the strip 29 on the lower and rearward base 33. Thus if the feeler located at the shuttle side of the fabric at each successive beat up fails to be moved forward by the weft, the loom will be stopped immediately following the defective pick.

In lieu of the pull spring 45 to hold the feeler in its normal waiting position with its finger 22 against contact strip 36, a leaf spring 73, Fig. 3,

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mounted on a block of insulation 75 and held in place by a screw passing through a hole in contact strip 36 into base 33 without contact with the sides of the hole, applies the necessary light and yielding rearward bias to feeler 20.

While I have illustrated and described certain forms in which the 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, or to the details of construction thereof, but what I do claim is:

1. In a narrow fabric loom having a lay and a plurality of reeds and shuttles weaving fabrics thereon, in combination, a weft feeler mounted for forward and backward sliding movement alongside the fell of the fabric being woven at one of the reeds, and slid forward by engagement with a weft thread extending from a shuttle to the fabric being woven by the latter, and means calling a change in the action of the loom when the feeler fails to be thus moved forward as the lay beats up.

2. The combination according to claim 1, in which one such weft feeler is provided in connection with each fabric in the loom, and the change-calling means responds to the failure of any one feeler to be moved forward as the lay beats up.

3. In a narrow fabric loom having a lay and a plurality of reeds and shuttles thereon, in combination, a member engaged by the weft extending from a working shuttle and supported on the breast beam for sliding movement forward and backward in the loom, mechanism calling a change in the working of the loom, and an electric circuit actuating the change-calling mechanism when the member fails to be slid forward through engagement with the weft as the lay beats up.

4. In a narrow fabric loom having a breast beam, a lay, and a plurality of reeds and shuttles on the lay, in combination, a member supported on the breast beam for sliding movement forward and backward in the loom and engaged by the weft extending from a working shuttle on alternate beats of the lay, a loom stop-motion, and an electric circuit controlling such stop-motion and closed to cause actuation thereof whenever the weft fails to slide the member forward on such alternate beats.

5. In a narrow fabric loom having a lay and a reed and shuttle thereon, in combination, a weft feeler extending through the reed and supported on the breast beam and behind the lay with capacity for movement forward and backward in the loom, and having a portion to be engaged by the weft thread extending from the shuttle to the fabric being woven thereby, and means calling a change in the working of the loom when the feeler fails to be moved forward by the weft on two successive beats of the lay.

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6. In a narrow fabric loom having a lay, a reed, and a shuttle, in combination, a weft feeler comprising a loop extending through the reed and held in a vertical plane by the dents thereof, means supporting the feeler so that the shuttle passes through the loop therein to lay the weft therethrough, and loom stop motion mechanism set to stop the loom on alternate beats of the lay and prevented from so doing by the engagement of the weft with a portion in connection with the loop of the feeler.

7. In a narrow fabric loom having a lay, a reed, a shuttle, and a stop-motion, in combination, an electric circuit actuating the stop-motion when closed, a weft feeler comprising a loop through which the shuttle passes to lay the weft therethrough, means on the breast beam normally closing the circuit at this point unless the weft moves the feeler forward on beat-up, and timer means closing a remaining break in the circuit only during the completion of alternate beats of the lay.

8. A weft feeler for looms having a lay, a heddle, a shuttle, and a breast beam, the feeler comprising a loop through which the shuttle travels, a rearward extension thereon to be supported by a heddle, and a forward extension thereon to be supported by the breast beam.

9. In a narrow fabric loom, in combination, a weft feeler slid forward bodily by the weft at beat-up, and a stop-motion actuated by the feeler when the latter fails to be slid forward by the weft.

10. In a narrow fabric loom having a lay and a reed, in combination, a weft feeler extending through the reed and supported before and behind the lay for bodily sliding movement forward and backward of the loom, means in connection with the feeler providing a surface for engagement by a taut weft extending outwardly from the selvage of the fabric to move the feeler bodily, and a stop-motion actuated by such movement of the feeler to stop the loom.

11. In a narrow fabric loom having a breast beam, a lay, and a reed having dents thereon in combination, a weft feeler extending through the reed and having spaced wires engaging the dents at different elevations and having a portion in connection with such wires to be engaged by a weft, means supporting the feeler on the breast beam and behind the lay for forward sliding movement, a stop-motion, an electrical circuit actuating such stop-motion when closed, timing means periodically closing a gap in such circuit as the lay beats up, and the feeler simultaneously opening a gap in such circuit when the said portion of the feeler is engaged by a taut weft and the feeler is slid forward thereby.

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