

Jan. 10, 1956

F. A. LOVSHIN ET AL

2,730,140

MEANS FOR PREVENTING INJURY IN CASE OF LOOM SHUTTLE STOPPAGE

Filed Oct. 10, 1950

2 Sheets-Sheet 1

Fig. 2.

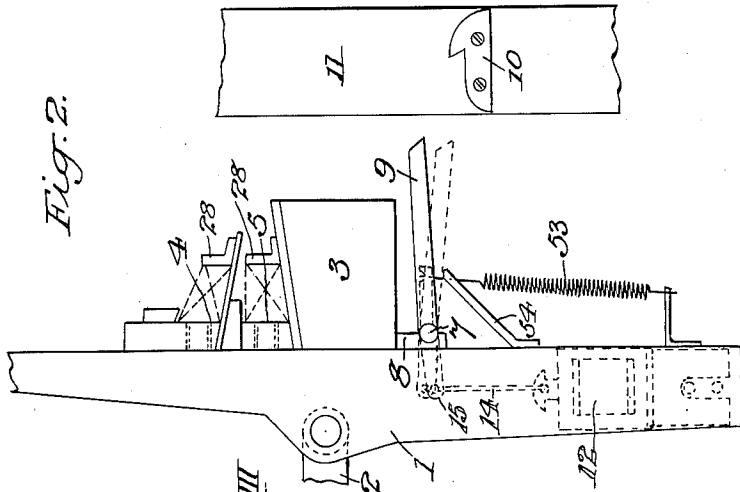


Fig. 1.

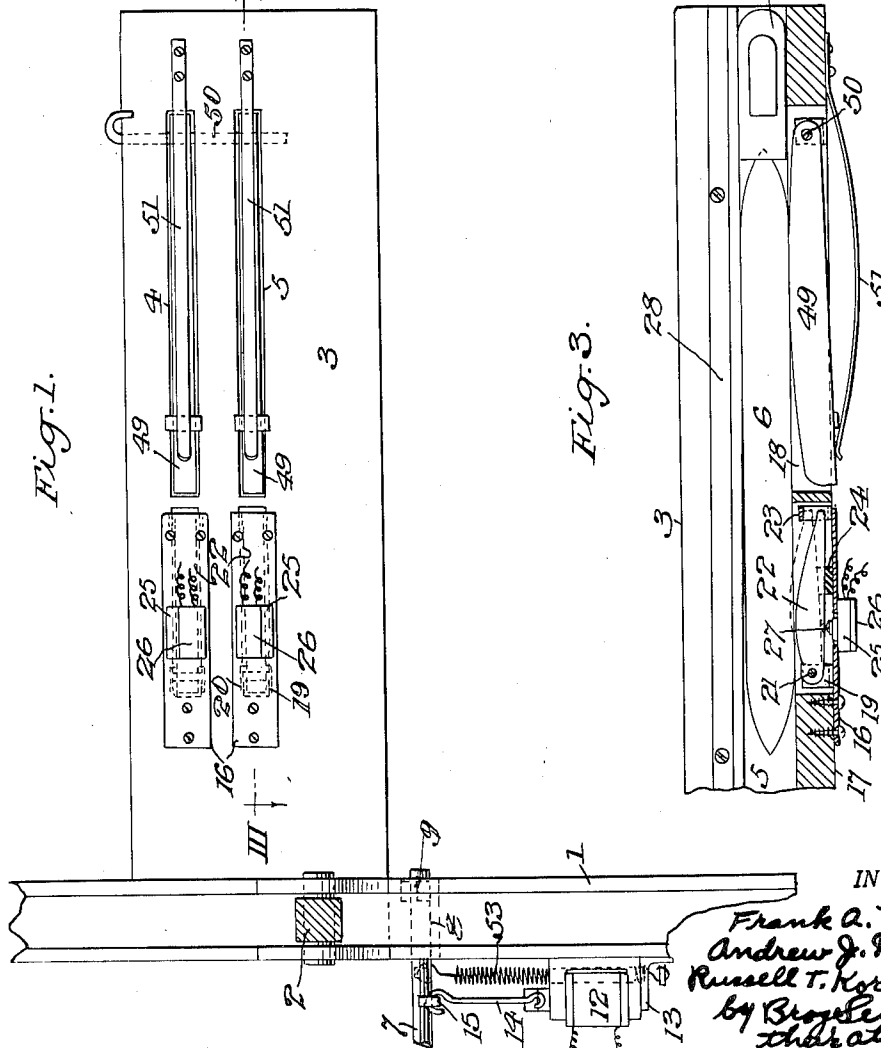
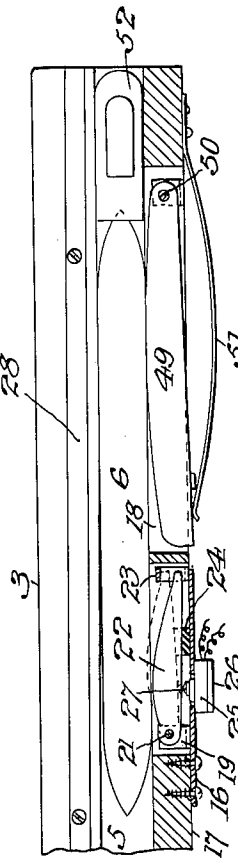


Fig. 3.



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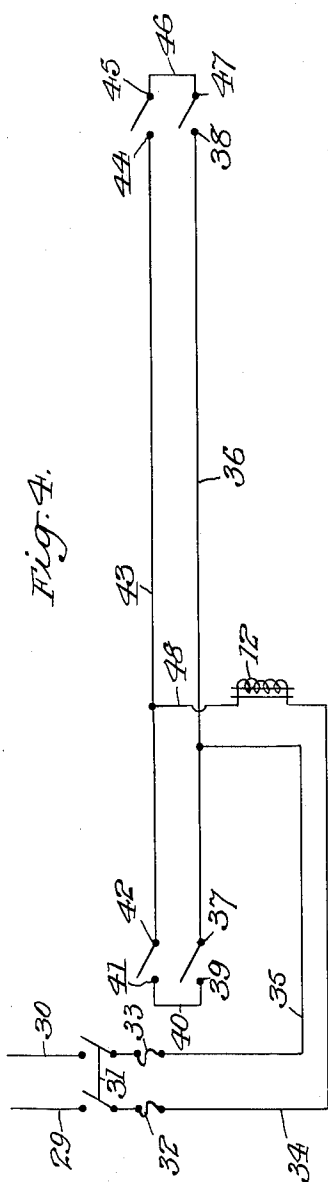
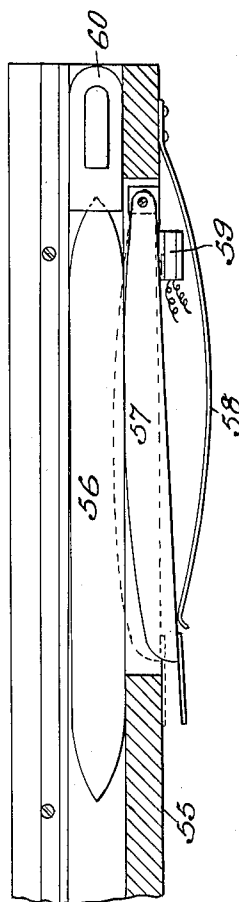


Fig. 5.



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MEANS FOR PREVENTING INJURY IN CASE OF LOOM SHUTTLE STOPPAGE

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Application October 10, 1950, Serial No. 189,348

4 Claims. (Cl. 139—341)

This invention relates to looms and, more particularly, to electrically actuated means for preventing injury in case of shuttle stoppage. It has for an object to provide an improved construction in which the failure of a shuttle to enter its box at the end of a flight across the loom through the sheds will set in motion electrically actuated mechanism for stopping the loom before the lay can strike the faulty shuttle and cause injury to it and/or the yarn being woven.

Another object is to provide such a construction which eliminates the necessity for the usual interconnecting mechanism between shuttle box swells and lay daggers for elevating the latter.

Another object is to provide such a construction in which, in a double shuttle loom, a single pair of daggers, together with their electrical actuating mechanism, is adequate for accomplishment of the desired purpose, thereby eliminating the usual second pair of daggers and their cooperating blocks.

Another object is to provide such a construction in which the failure of a shuttle in a double shuttle loom properly to enter either shuttle box at either side of the loom will actuate the mechanism for stopping the loom.

Another object is to provide such a construction which reduces the power required for picking the shuttle across the loom, and also facilitates adjustment of the shuttle boxes for fitting the shuttles.

Another object is to provide such a construction which reduces the usual number of moving parts, attains a saving in weight, and requires less than usual braking power.

Another object is to provide such a construction in which the electric system is simple and of low cost without the inclusion of electronic parts.

Another object is to provide such a construction which is adapted to be applied to looms of standard form without the necessity of any substantial rearrangement of parts.

Another object is to provide certain improvements in the form, construction and arrangement of the parts whereby the above named objects, and others inherent in the invention, may be effectively attained.

Practical embodiments of the invention are shown in the accompanying drawings which, for convenience and avoidance of repetition, delineate the invention as installed on a double shuttle loom, the installation on single shuttle and box looms being the same in principle, and in which:

Fig. 1 represents a detail rear elevation of one side of the upper portion of a loom lay and shuttle boxes, disclosing features of the present invention;

Fig. 2 represents an end elevation of the parts shown in Fig. 1, looking from right towards left, and showing a portion of the loom frame with a dagger block thereon;

Fig. 3 represents an horizontal section taken in the plane of the line III—III of Fig. 1, and looking in the direction of the arrows;

Fig. 4 represents a diagrammatical layout of the electrical system constituting part of the invention; and

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Fig. 5 represents a view similar to Fig. 3 showing a modified form of shuttle box switch mechanism.

It has been common practice in loom construction to provide means for stopping the loom in the event that a shuttle fails properly to enter its box, in order to prevent injury to the shuttle and/or yarn being woven as a result of the striking of the former by the lay. This means has usually included in the case of single shuttle looms one pair, and in the case of double shuttle looms two pair, upper and lower, of moveable daggers carried by the lay in position to contact cooperating blocks fixed to the loom frame, the contact serving to stop the loom by what is commonly referred to as a "bang-off." To avoid this stoppage while the loom is operating properly and the shuttle or shuttles are properly entering their boxes, mechanism, generally including bell cranks and rods, has been connected with the swells that are normally associated with the backs of the shuttle boxes, the said mechanism serving to lift the daggers on each forward or beat-up stroke of the lay when the shuttles are properly entering their boxes, the said lifting of the daggers obviating their contact with the blocks. It will be clear that the arrangement just described necessarily entails a certain amount of complication in loom structure and need for additional power in operation, as well as increasing the probability of failure or faulty operation due to the number of moving parts. The present invention is calculated largely to overcome the said disadvantages by eliminating a substantial part of the above mentioned mechanism and obviating the necessity of physical actuation of the parts by the shuttle box swells when contacted by the shuttles; thus obtaining a substantial practical advance in loom construction and operation which includes the hereinabove recited objects of this invention.

Referring now to Figs. 1 through 4 of the accompanying drawings, one loom lay leg is denoted by 1, and it is pivotally mounted for reciprocation on the usual rock shaft (not shown) journaled in the lower part of the loom frame; the oscillation being accomplished by a pitman 2, that is actuated by any suitable mechanism (not shown) which is well understood in this art and calls for no description herein as it constitutes no part of the present invention.

The lay is indicated by 3, and carries the usual upper and lower shuttle boxes 4, 5, which may be of any standard or approved construction and are adapted to receive shuttles, one of which is shown and marked 6, which may also be of any standard or approved form.

One end of the dagger rod 7 is pivoted at 8 in the leg 1, and carries the usual daggers, one of which is shown and marked 9, that are positioned at opposite sides of the loom for cooperation with dagger blocks, one of which is shown and marked 10, which are suitably secured to an appropriate portion of the loom frame 11. It will be seen, by reference to Fig. 2, that when the daggers are in their upper position, shown in full lines, there will be no contact between them and their blocks on the forward motion of the lay, whereas, when the daggers are in their lower position, shown in dotted lines, they will contact their blocks upon such forward motion of the lay and bring about stoppage of the loom in a manner which is thoroughly understood by operatives in this field.

Movement of the daggers is accomplished by a solenoid 12 that is mounted in a bracket 13 fixed to leg 1 of the lay and is connected by a link 14 with an arm 15 which is fixed to dagger rod 7 and projects therefrom in a direction opposite to the projection of the daggers. The said arm may, if desired, be provided with a series of holes for the purpose of adjusting the point of connection between it and link 14.

The operation of solenoid 12 is controlled by switch devices, one of which is associated with each shuttle box.

As these devices are all the same in construction, arrangement and operation, it is deemed sufficient to describe one of them reference being had to Fig. 3 of the drawings. A plate 16 is fastened by screws, or the like, to the rear wall 17 of the shuttle box so as to overlie a portion of the usual swell slot 18, formed in the wall. From the inner face of plate 16 project a pair of bearing lugs 19, 20, in which is pivoted at 21, one end of a switch actuator 22, that has its inner edge curved in a manner quite similar to the curve on the customary shuttle arresting swell or binder. The other end of actuator 22 lies within a keeper or hood 23, which also projects from the inner face of plate 16, and the actuator is normally urged to swing inwardly on its pivot 21 by a sponge rubber pad 24, or equivalently functioning element, the extent of its inward motion being limited by the keeper 23.

A micro switch 25 is secured, by screws or other suitable fastening, to a flange 26 that projects outwardly from plate 16, and the switch contact plunger 27 projects inwardly through a hole in said plate so as to be in position to be operated by the actuator 22. As micro switches are well known with respect to both their construction and mode of operation and can be purchased in the open market as units, there is deemed to be no occasion to describe the same herein.

The normal inwardly swung position of the actuator 22 is shown in dotted lines in Fig. 3 and it will be clear that, when the shuttle 6 enters the box 5, moving from left to right in said figure, near the end of its flight across the loom, it will be constrained by the front wall 28 of the box to swing actuator 22 on its pivot into the position shown in full lines in Fig. 3, and cause it to contact switch plunger 27 and close the switch.

The switch terminals (not shown) are connected by wires with the solenoid 12, and with an electric wiring system arranged so that the actuation of the switch by the proper entry of the shuttle into the box and its movement of the switch actuator therein will operate solenoid 12 to cause it to swing arm 15 downwardly and thus elevate the daggers to prevent them from contacting their cooperating blocks and stopping the loom on the forward motion of the lay. This electric system will now be described.

Referring to Fig. 4, supply lines from a suitable source of power are denoted by 29, 30, and may be connected by a master switch 31 through the usual fuses 32, 33, with a wire 34 that extends to one terminal of solenoid 12, and a wire 35 that connects with a wire 36 which leads to one terminal 37 of the switch that is associated with the lower left hand shuttle box, and also leads to one terminal 38 of the switch which is associated with the lower right hand shuttle box. The other terminal 39 of the switch for the lower left hand box is connected by a wire 40 with one terminal 41 of the switch associated with the upper left hand box, and the other terminal 42 of said last named switch is connected by a wire 43 with one terminal 44 of the switch for the upper right hand box, the other terminal 45 of which is connected by a wire 46 with the terminal 47 of the switch for the lower right hand box that is not in connection with wire 36. A wire 48 connects wire 43 with the terminal of the solenoid 12 which is not in connection with wire 34.

When the loom is in operation the master switch 31 is, of course, closed, and it will thus be seen that, to maintain the loom in operation, it is necessary for both shuttles properly to enter the right hand boxes and the left hand boxes in alternation as they are picked back and forth across the loom. When both shuttles properly enter the right hand boxes, both switches associated with said boxes are closed and solenoid 12 is operated to lift the daggers. The same is true when both shuttles properly enter the left hand boxes. If, however, either shuttle fails properly to enter a right hand box or a left hand box, the switch associated with said box will be left open, the solenoid 12 will not be operated, the daggers will not be lifted,

and the loom will come to a "bang-off" stop by contact of the daggers with the blocks 10.

It should be mentioned that each shuttle box is provided with the usual shuttle arresting swell or binder 49, that swings on the pivot pin 50 and is urged inwardly by spring 51 in the usual manner which calls for no further description. The picker is denoted by 52 and may be of any appropriate kind in construction and operation. The swell 49 is somewhat shortened to provide room for the electric switch and its activating mechanism. The dagger 9 has associated therewith a retraction spring 53 and a stop 54 for holding it in normal position.

Referring now to the modified form shown in Fig. 5, the switch activating mechanism is omitted and the switch is operated by the shuttle arresting swell or binder itself. As the mode of operation is the same as that of the form shown in Fig. 3, there seems to be no call for more than mere enumeration of the parts of this modified form, in which the shuttle box is denoted generally by 55, the shuttle by 56, the swell by 57, its spring by 58, the switch by 59, and the picker by 60. The electrical system is the same as hereinabove described and, as already noted, the operation is the same except that the incoming shuttle swings the arresting swell or binder to close the switch instead of swinging a separate switch actuator. In this connection, it may be noted that the form shown in Fig. 3 is generally preferred because, in that form, the shuttle closes the switch a little earlier in its flight.

In connection with both forms of the invention, it should be mentioned that other kinds of suitable switches such, for instance, as a leaf switch, may be substituted for the micro switch.

It will be seen that the present invention thus eliminates a substantial part of the mechanical linkage which heretofore commonly connected the shuttle box swell and the daggers, while retaining desirable standard protective features. The arrangement is thus simplified, maintenance is reduced, the picking operation requires less power, while the necessity for precision in the fit of the shuttles in the shuttle boxes is reduced because their contact with the switch actuators or swells merely closes switches instead of serving to actuate mechanical connections. This simplifies the preparation of the loom for operation. The electric system is very simple and does not require the use of any electronic elements. Furthermore, the whole arrangement may be defined as of the "fail-safe" type because, if any part of the system fails, the loom is stopped.

As the operation has been described in connection with the description of the various parts, it is believed that there is no occasion here to summarize or repeat the same.

It will be understood that various changes may be resorted to in the form, construction, material and arrangement of the parts without departing from the spirit and scope of the invention, and hence we do not intend to be limited to details herein shown or described, except as they may be included in the claims or be required by disclosure of the prior art.

What we claim is:

1. In a double shuttle loom having upper and lower shuttle boxes at each side thereof for cooperation with upper and lower shuttles, means for stopping the forward motion of the lay when either shuttle fails properly to enter either of its boxes, said means comprising, complementary members on the lay and the loom frame normally in position to contact on the forward motion of the lay, and electric means for preventing such contact including an electrically energizable element operatively connected to at least one of said members, a switch on each of said shuttle boxes arranged to be operated when its shuttle properly enters each of its boxes, and an electric connection between said element and all of said switches.

2. In a double shuttle loom having upper and lower shuttle boxes at each side thereof for cooperation with up-

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per and lower shuttles, means for stopping the forward motion of the lay when either shuttle fails properly to enter either of its boxes, said means comprising, complementary members on the lay and the loom frame normally in position to contact on the forward motion of the lay, and electric means for preventing such contact including an electrically energizable element operatively connected to at least one of said members, a normally open switch on each of said boxes arranged to be closed when its shuttle properly enters each of its boxes, and an electric connection between said element and all of said switches.

3. In a double shuttle loom having upper and lower shuttle boxes at each side thereof for cooperation with upper and lower shuttles, means for stopping the forward motion of the lay when either shuttle fails properly to enter either of its boxes, said means comprising, a plurality of complementary members on the lay and the loom frame normally in position to contact on the forward motion of the lay, and electric means for preventing such contact including a single electrically energizable unit operatively connected to the said member on the lay, a switch on each of said shuttle boxes arranged to be operated when its shuttle properly enters each of its boxes, and an electric connection between said unit and all of said switches.

4. In a double shuttle loom having upper and lower

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shuttle boxes at each side thereof for cooperation with upper and lower shuttles, means for stopping the forward motion of the lay when either shuttle fails properly to enter either of its boxes, said means comprising, a single dagger rod carried by the lay, at least one dagger on said rod, at least one member on the loom frame in position to be contacted by a dagger on the forward motion of the lay, a single electrically energizable unit operatively connected to the dagger rod for moving it so as to prevent such contact, a switch on each of said shuttle boxes arranged to be operated when its shuttle properly enters each of its boxes, and an electric connection between said unit and all of said switches.

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