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PROTECTION MECHANISM FOR LOOMS

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2 Sheets-Sheet 1

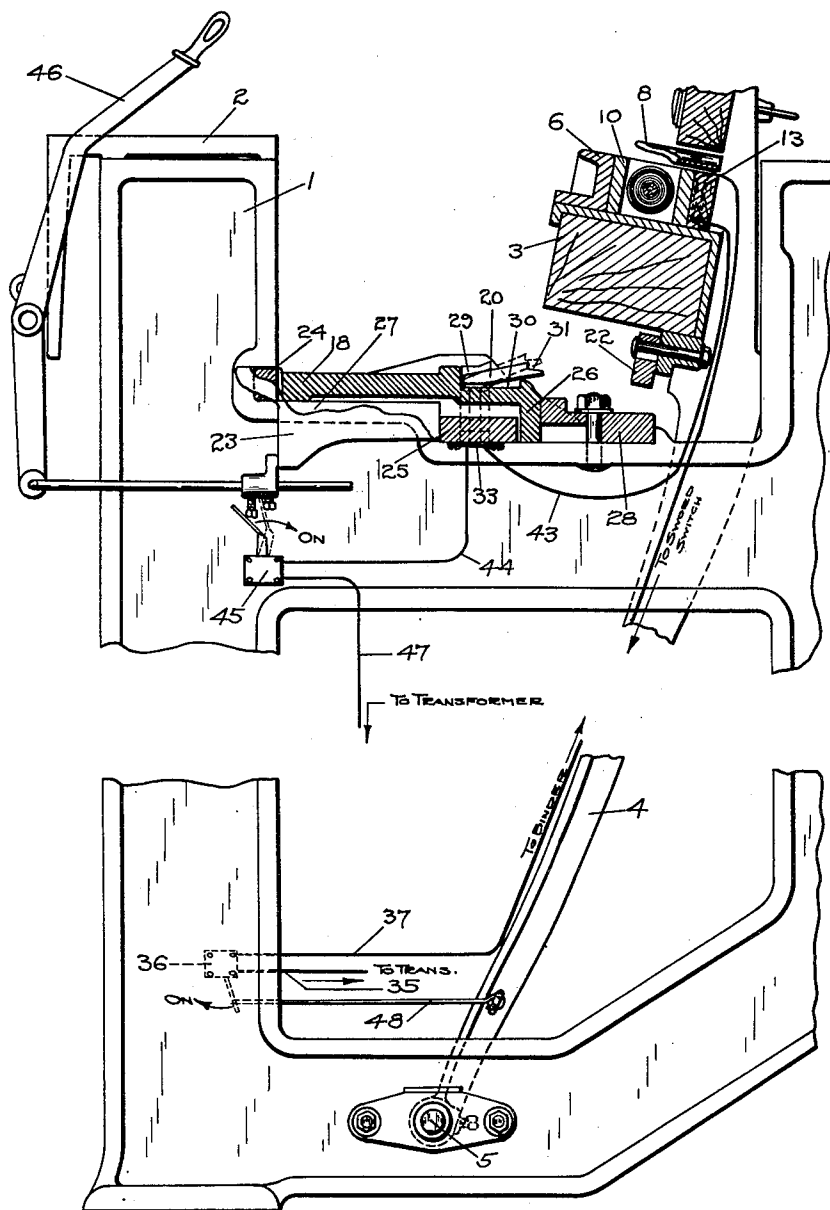


Fig. 1.

WITNESS.
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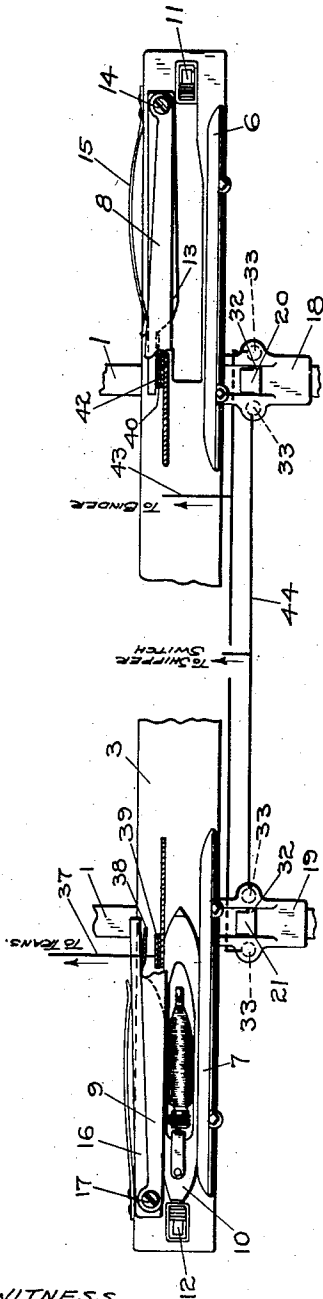


Fig. 2.

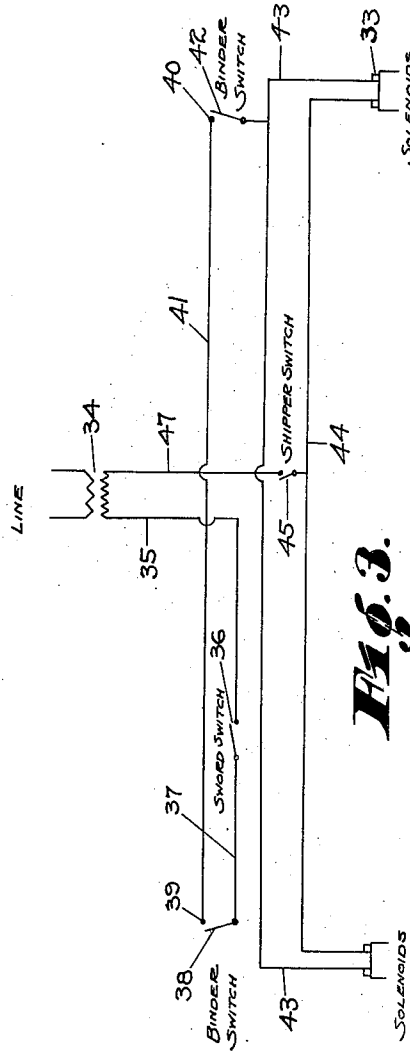


Fig. 3.

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PROTECTION MECHANISM FOR LOOMS

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4 Claims. (Cl. 139—341)

The present invention relates to protection mechanism for looms, adapted to forcibly stop the lay when the shuttle is trapped in the shed or is only partially boxed.

5 The usual protection mechanism, which includes a protector rod carrying a dagger that engages a fixed frog when the shuttle fails to box properly, is subject to several major disadvantages. One of these is that, since the protector rod, dagger, and connections to the binder must be almost instantaneously moved from protecting to non-protecting position if the shuttle arrives in the box on time, the shuttle must be traveling quite fast when it enters the box. Otherwise, the shuttle does not have enough kinetic energy to overcome the inertia of the parts to be moved, and is stopped while only partially boxed, whereupon the dagger engages the frog and stops the lay. Thus, in one sense, the protection mechanism serves to increase the number of times protection is required.

10 A further disadvantage of the usual protection mechanism is that the aforementioned inertia of the parts thereof causes considerable pressure on the side walls of the shuttle (through the binder) which results in the shuttle wearing out sooner than it should. A still further disadvantage of this mechanism is that its weight adds appreciably to the weight of the lay assembly, which is particularly undesirable in high speed looms.

15 Accordingly, a principal object of my invention is to provide a protection mechanism in which the power for moving the parts thereof is derived independently of the energy contained in the moving shuttle.

20 A further object of the invention is to, so far as possible, position the parts of the protection mechanism on the loom frame rather than on the reciprocating lay, thereby removing considerable weight from the lay.

25 A still further object of my invention is to provide a novel and improved electric control for a protection mechanism, irrespective of whether other parts thereof are carried by the lay or by the loom frame.

30 Other objects of my invention will become apparent upon a reading of the subjoined description of the preferred embodiment thereof.

35 The preferred embodiment of my invention is illustrated on the accompanying drawings, in which:

40 Fig. 1 is a view in elevation, from the right hand side, of the loom to which my invention has been applied, certain parts thereof being broken away or shown in section and certain other parts thereof being omitted, for the sake of clearness;

45 Fig. 2 is a fragmentary plan view of the lay and shuttle boxes shown in Fig. 1; and

Fig. 3 is a wiring diagram of the electrical parts involved.

The loom shown to which my invention has been applied, includes loom sides, as 1, connected by cross members including a breast beam 2, a lay 3 carried upon swords 4 mounted on a rocker shaft 5, and certain other well known mechanisms which form no part of the present invention and which need not be illustrated or described.

50 The lay is reciprocated toward and from the front of the loom, defined by the breast beam 2, by any usual connections, not shown. Right and left hand shuttle boxes constituted by front box plates 6, 7 and back box plates 8, 9 are mounted one at each end of the lay for movement therewith. A shuttle 10 is picked from side to side of the loom as by picker sticks 11, 12. A binder 13 is pivoted at its outer end on a bolt 14, and biased toward the shuttle by a suitable light binder spring 15. A similar binder 16 is pivoted on bolt 17 in the left hand shuttle box. These parts of the shuttle box are, likewise, old and well known in the art.

55 The protection mechanism, to which my invention pertains, is adapted to forcibly intercept and stop the lay when, on the forward movement of the latter, the shuttle is trapped in the shed or is improperly boxed. To this end, I have provided frogs 18, 19 mounted on the loom sides 1, each frog having a movable part 20, 21 adapted to be positioned in or out of the respective paths of abutments 22 on the swords, under control of means for determining whether or not the shuttle is properly boxed. The frogs 18 and 19 are identical, and only one will be described.

60 The frog 18 consists of a top member having a downwardly extending flange 23 and a forwardly extending lug 24 on each side thereof for straddling the loom side, as at 27, and an end member 26. The frog bears against a block of rubber 25 on the loom side. A stop 28 prevents rearward movement of the frog. The top of the frog is recessed as at 29 to receive the movable part 19, which rests on and overhangs a ledge 30 formed in the recess.

65 The part 19 consists, in the present instance, of a single casting formed of iron, having a notch 31 formed in its rearward end to receive the lower corner of the abutment 22. The greater portion of the part 19 rests directly on the ledge 30 but the extreme forward end thereof overhangs the ledge, as above noted, and is provided with laterally extending arms 32 (Fig. 2) which overlie and form the armatures of a pair of electro-magnets 33, 33 carried by the frog. The electro-magnets are normally not energized, but when they are they serve to pull the forward end of the part 19 down thus tilting the rearward notched end thereof upwardly to the dotted line position

shown in Fig. 1, where it is in the path of abutment 22. In the present embodiment these parts are duplicated in the other frog.

It should be understood that, while I have shown the frogs as being separate from the loom sides and the movable part of the frog as being a single separate piece, this construction may be departed from, even though that aspect of my invention which requires that the moving parts of the protection be mounted independently of the lay assembly is employed. Likewise, it is not essential to my invention, in some of its aspects, that the control for the movable parts be electrical, although I prefer such construction.

The essential features of the mechanism thus far described are that it permits the removal of the protector rod, bearings, daggers, fingers, springs, etc. from the reciprocating lay, and is susceptible to the derivation of power for actuation of the moving parts from other sources than the moving shuttle, thus reducing the weight of the lay assembly and improving the action of the shuttle.

The preferred electrical control for the frog will now be described. A proper voltage is derived from a transformer, represented diagrammatically at 34, Fig. 3. From one side of the secondary of the transformer a conductor 35 leads to a sword-actuated switch 36 to be more fully described. From the other side of the switch 36 a conductor 37 leads to a switch on the left hand end of the lay, constituted by spring contact 38 on the binder 16 and a fixed contact 39. The latter contact is connected with a duplicate contact 40 at the right hand end of the lay by a conductor 41. The contact 40 and spring contact 42 on binder 13 constitute a second binder switch in series with the first mentioned binder switch. From contact 42 a conductor 43, which splits into two branches, extends to the pairs of electro-magnets 33. A branched conductor 44 connects the opposite sides of the respective electro-magnets with a shipper switch 45 which latter switch is of the usual spring type and connected to be turned on when the shipper handle 45 is on and off when the shipper handle is in loom stopping position. From the shipper switch a conductor 47 leads to the other side of the secondary of the transformer 34.

Since the two binder switches are connected in series the electro-magnets cannot be energized unless both switches are closed. Both of these switches are closed when the shuttle is absent from the shuttle boxes. However, the entry of the shuttle properly and completely in either shuttle box will move the binder thereof and open the respective binder switch.

The switch 36, in series with the binder switches, is provided in order to restrict the intervals during which it is possible to energize the magnets to that portion of the cycle of movement of the lay when the shuttle is supposed to be boxed, i. e., on the forward beat of the lay. To this end, the switch 36 may be a conventional form of snap switch connected with one of the swords 4 by a rod or link 48, whereby the switch is snapped on as the lay and swords swing forwardly and is snapped off as they swing rearwardly.

While this particular control circuit is possessed of certain obvious advantages, I do not wish to limit myself thereto.

I wish to point out that, in addition to successfully overcoming the above mentioned difficulties, the present invention in one of its aspects

provides a protection mechanism that definitely and unfaillingly assumes either protecting or non-protecting position according to whether or not protection is required, and is never half way between the two positions as commonly occurs with the devices of the prior art.

Having fully disclosed the preferred embodiment of my invention, I claim:

1. In a loom, the combination of a lay and its lay swords, shuttle boxes movable with the lay, a shuttle, a frog having a movable part controlled from the shuttle boxes, an abutment carried by at least one of the lay swords and moving therewith in a fixed path, an electro-magnet for operating the said movable part of the frog, and an electric controlling circuit for said electro-magnet, said circuit including a switch at each end of the lay operated by the boxing of the shuttle and a switch operated in timed relation to the lay whereby said movable part of the frog is moved into the path of the said abutment only when, on the forward beat of the lay, the shuttle is not boxed in either shuttle box.

2. In a loom, the combination of a lay and its lay swords, shuttle boxes movable with the lay, a shuttle, an abutment fixed with respect to the lay and lay swords, a frog having a part thereof movable into and out of the path of said abutment, an electro-magnet operable, when energized, to move the said part into the path of said abutment, and an electric circuit for said electro-magnet, said circuit including a switch in each shuttle box operated by the boxing of the shuttle and a switch operated by forward movement of the lay, providing for energization of said electro-magnet when, on the forward beat of the lay, the shuttle is not boxed in either shuttle box.

3. In a loom, the combination of a lay and its lay swords, shuttle boxes movable with the lay, a shuttle, a lay-stopping frog, a part adapted to be interposed between said frog and the lay for forcibly interrupting forward movement of the latter, an electro-magnet acting when energized to position said part for stopping the lay, and an electric circuit for supplying energy to said electro-magnet, said circuit including a switch that is closed by forward movement of the lay, and a switch in each shuttle box that is closed when the shuttle is absent from the respective box or is improperly boxed, and open when the shuttle is properly boxed, said switches being connected in series whereby said electro-magnet is energized only when all of the said switches are closed.

4. In a loom, the combination of a lay and its lay swords, shuttle boxes movable with the lay, a shuttle, an abutment fixed with respect to the lay and lay swords, a frog having a part thereof movable into and out of the path of said abutment, an electro-magnet operable, when energized, to move the said part in to the path of said abutment, and an electric circuit for said electro-magnet, said circuit including a normally closed switch in each shuttle box that is opened by the boxing of the shuttle and a switch that is closed by forward movement of the lay and opened by backward movement thereof, said switches being connected in series whereby said electro-magnet is energized only when all of the said switches are closed.

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