

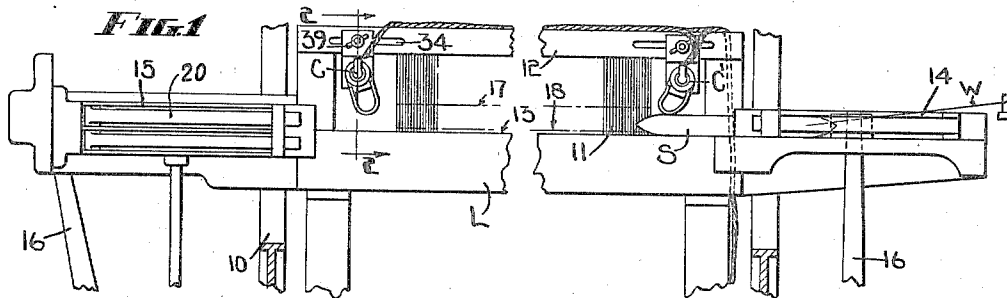
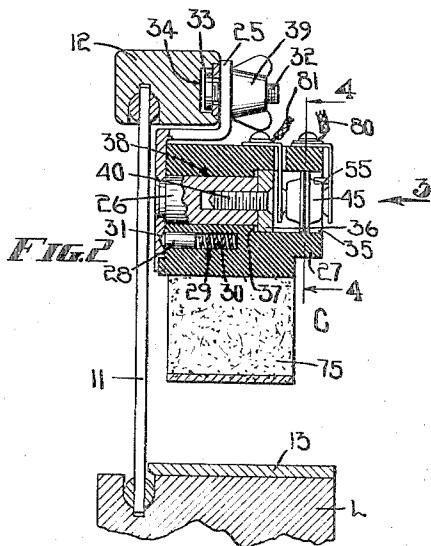
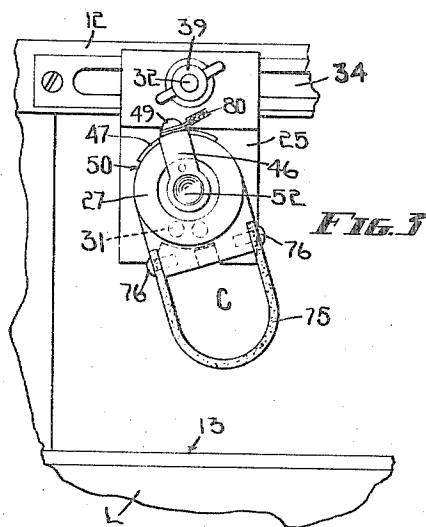
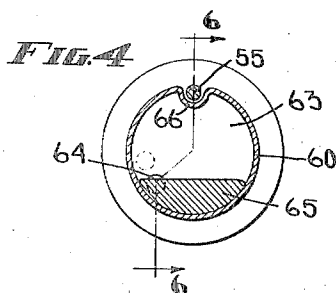
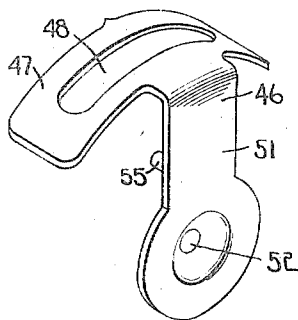
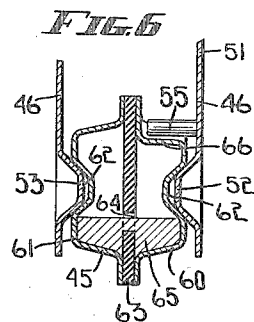
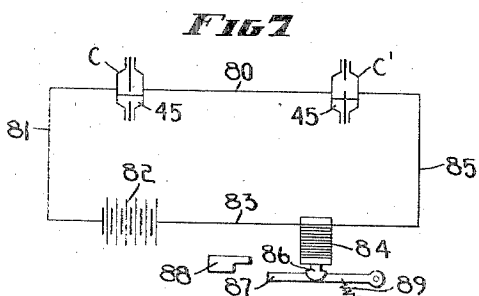
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PROTECTOR MECHANISM FOR LOOMS

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PROTECTOR MECHANISM FOR LOOMS

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This invention relates to protector mechanism for looms and it is the general object of the invention to provide for initiating the stopping of a loom upon failure of the shuttle to travel across the lay at a sufficiently fast rate to effect a proper boxing.

The usual protector mechanism for looms acts to stop the loom if the shuttle fails to be boxed properly, the purpose being to prevent a warp smash which would otherwise result by forcing the shuttle against the warp threads when the lay beats up. Such mechanisms as heretofore made have been controlled from the shuttle box and the indication to stop has therefore been given comparatively late in the forward beat of the lay, thereby causing an abrupt stoppage of the loom. It is an important object of my present invention to provide means for indicating a loom stoppage before the shuttle reaches the shuttle box and therefore make it possible to initiate loom stoppage when the lay is in a relatively rearward position. By operating in this way more time is allowed for arresting the lay and the loom is therefore subjected to a reduced shock.

In the ordinary loom the shuttle leaves the shuttle box when the lay is moving rearwardly and enters the shed when the lay is in a relatively rear position, later emerging from the shed to approach the shuttle box at the opposite end of the lay. It is a further object of my present invention to set the loom for stopping when the shuttle enters the shed and cancel or revoke the setting so as to prevent stoppage when the shuttle leaves the shed. By this arrangement the warp threads are protected against a shuttle smash during the whole time that the shuttle is in the shed and this protecting condition is brought about by the shuttle itself. In order to accomplish this result I provide two controls, one at each side of the cloth being woven, both to be actuated by the shuttle. When the shuttle leaves a shuttle box it will set the adjacent device in stopping position where it will remain until the subsequent passage of the shuttle in the opposite direction. As a shuttle enters the shed, therefore, it sets the near device for stopping and since the device at the opposite end was set by the previous shuttle flight in the opposite direction, the conditions are set up which will stop the loom unless the shuttle emerges from the shed.

It is a further object of my present invention to provide a stopping electric circuit which when energized will cause loom stoppage comparatively

early in the forward beat of the lay. The circuit will be controlled by the shuttle while in flight and will be closed as the shuttle enters the shed and will be opened when the shuttle leaves the shed during the time therefore that the shuttle is in the warp shed the stopping circuit is closed and the parts set by the circuit will be in stopping position.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth in the claims.

In the accompanying drawing, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is a front elevation of a loom having my invention applied thereto,

Fig. 2 is a vertical section on line 2—2 of Fig. 1 on an enlarged scale,

Fig. 3 is a front elevation of the structure shown in Fig. 2 taken in the direction of arrow 3, Fig. 2,

Fig. 4 is a vertical section through the rotating switch carrier on line 4—4 of Fig. 2,

Fig. 5 is a perspective view of the switch positioner,

Fig. 6 is a vertical section on line 6—6, Fig. 4, and

Fig. 7 is a diagrammatic view of the stopping electric circuit.

Referring to Fig. 1, the loom frame 10 supports a lay L which moves back and forth as usual and is provided with a reed 11 the upper end of which is held in place by a hand rail 12. The lay is provided with a shuttle race 13 located between the shuttle boxes 14 and 15 located respectively at the right and left hand ends of the lay. Picker sticks 16, one at each end of the lay, propel the shuttle across the lay in usual manner first to the right and then to the left, the shuttle travelling toward and entering one or the other of the shuttle boxes. Each shuttle box is provided with a binder 20 to be engaged by a shuttle S.

The shuttle S may be of the usual form to pass through the upper and lower warp sheds indicated by dash and dot lines 17 and 18, respectively, Fig. 1, to lay the weft thread designated at W. It is to be understood that the picker stick is actuated during the rearward stroke of the lay and that the shuttle passes through the warp shed during the backward motion of the lay and also during the first part of the forward motion thereof. The closing of the shed by harness mechanism not shown and the

motion of the lay are so timed that the shuttle ordinarily has time to leave the shed during the forward motion of the lay in time to reach the shuttle box which it is approaching without being forced into the warp threads by the lay. There are conditions, however, which occasionally arise to interfere with the proper flight of the shuttle, in which case the shuttle may still be in the shed when the lay reaches the point in its forward travel when further forward motion will cause a warp smash and my present invention relates to means for stopping the loom under these conditions.

In carrying my invention into effect I provide two controllers C and C', one located at each side of the warp shed and carried by a hand rail in such position that the lower part of each controller projects into the path of the shuttle. These controllers are located between the shuttle boxes and binders at the opposite ends of the lay, and since they are alike a specific description of controller C will suffice for both.

Secured to the hand rail is a bracket 25 which extends downwardly to support a bearing stud 25 projecting forwardly from the bracket. Rotatably mounted on the stud is a barrel 27, preferably of electric insulating material, carrying a spring plunger 28 located in a bore 29 and urged rearwardly by a spring 30. The plunger 28 is adapted to enter notches 31 formed in the bracket 25 to hold the barrel yieldingly in one of two angular positions with respect to the bracket. A screw 32 having a head 33 is adjustable in a slot 34 in the hand rail to locate the bracket at different distances from the end of the lay. This adjustment is of advantage when fabrics of different widths are woven in the loom. A winged nut 39 on screw 32 holds the adjustment.

The forward part of the barrel has an enlarged recess 35 in the rear part of which is located a washer 36 to engage a shoulder 37 formed on the barrel between the recess 35 and the bore 38 which receives the stud 26. A holding screw 40 threaded into stud 26 holds the washer 36 and therefore the barrel 27 on the stud and prevents the barrel from moving forwardly, rearward motion of the barrel being limited by the lower part of bracket 25. By this construction the barrel is held against substantial back and forth motion relatively to the bracket but may have a limited angular motion about the stud determined by the pockets 31 and the spring plunger 28.

The recess 35 receives an electric switch 45, preferably of the mercury type, which is supported by a pair of resilient electric conducting carriers 46 shown in Fig. 6. Each carrier has an arcuate upper arm 47 slotted at 48 to receive a holding screw 49 tapped into the arcuate surfaces 59 of the insulating barrel. By changing the angular adjustment of the carrier, made possible by the slot 48, the angular position of the depending arm 51 of the carrier may be varied with respect to the barrel 27. The lower part of the front arm 51 has a protuberance 52 which as shown in Fig. 6 projects rearwardly whereas on the rear or left hand arm the protuberance 53 projects forwardly. One of the arms 51 is provided with a rearwardly extending pin 55.

The switch 45 as shown in Fig. 6 comprises two shells 60 and 61 each formed with a cavity or depression 62 to receive the protuberances 52 and 53. The shells are separated by a plate 63 of insulating material having a slight perforation 64 therein through which may flow a body of mercury 65 when the switch is in such position as to

place perforation 64 down or in its lowest position. The shell 60 adjacent to the outer carrier has a slight recess 66 which receives the pin 55, the latter thereby placing the switch in fixed position with respect to the arms 51 and causing angular adjustment of the switch when the position of the carriers is altered as already described. The switch may be removed after the outer screw 49 is loosened sufficiently to permit removal of the outer or front carrier.

When the switch is in the position shown in Fig. 4 the mercury passes through the perforation 64 to cause electrical connection between the shells 60 and 61, which in turn are connected through their respective protuberances 52 and 53 and the carriers therefor to wires 80 and 81, respectively, which are held under the screws 49. When the switch is turned angularly about its axis, however, the perforation 64 rises above the mass of mercury, as indicated in dotted lines in Fig. 4, to break the contact between the shells 60 and 61.

Each barrel 27 has attached thereto a flexible strap formed for instance of leather and designated at 75, the strap being held to the barrel by means of screws 76. The straps 75 ordinarily extend down far enough to be engaged by the shuttle when the latter passes thereunder and the contact established with the shuttle is sufficient to rock the barrel from one angular position to another.

As shown in Fig. 7 the controllers C and C', which more specifically are the switches 45, are connected electrically with loom controlling mechanism. One side or shell of each of the switches 45 is attached to a wire 80, while the other side of the switch of controller C may be connected by wire 81 to a source of electric energy 82 which in turn is connected by wire 83 to an electromagnetic device, such as a solenoid 84. The latter is connected by means of wire 85 to the other side of the switch forming part of controller C'.

The solenoid 84 has a core 86 controlling the position of a stopping dagger 87 moving with the lay and adapted for engagement with a regularly reciprocating knock-off element 88. When the solenoid is energized the knock-off dagger is lifted into position to engage the knock-off element 88 on the forward beat of the lay when the latter is in a relatively rear position. When the solenoid is deenergized by the breaking of the circuit containing it, the dagger falls to clear the element 88, a light tension spring 89 being used if desired to assist gravity in lowering the dagger. The solenoid will ordinarily be energized every beat of the loom to set the parts for stopping, and will be deenergized if the shuttle is running properly.

In operation, when the shuttle leaves the shuttle box at the right hand side of the loom for instance, it will in its passage engage the strap of controller C' and rock the same in a clockwise direction. The perforation 64 of the switch 45 in the controller C' will move to low position and connect wires 80 and 85. Assuming that controller C has been rocked by motion of the strap 75 toward the center of the loom by the previous passage of the shuttle so that the switch of said controller C is also closed, wires 80 and 81 will also be connected, and under these conditions the circuit indicated in Fig. 7 will be closed as the shuttle enters the shed to energize the solenoid 84 with resultant placement of the dagger 87 into the path of the knock-off element 88. If the flight of the shuttle be normal it will engage the strap of

controller C before the dagger 87 on the lay reaches the knock-off element 88, rocking controller C in a right hand direction to break the circuit and permit the dagger to fall below the element 88. The loom will therefore continue to run.

On the next pick of the shuttle in the opposite direction controller C, previously opened, will be engaged by the shuttle before it enters the left hand part of the shed and the circuit will again be established by rocking of the controller C in a counter-clockwise direction as viewed in Fig. 1. The conditions are then identical with those already described except that the shuttle is traveling in the opposite direction. It will be seen therefore that when the shuttle enters the shed it closes the switch at the entering side and when emerging from the shed opens the switch or controller on the leaving side. The setting of the switches 45 in the two controllers will be similar but of opposite hand.

If, on the other hand, as the shuttle enters the shed it is moving with a reduced rate of travel due to some defect, such for instance as a faulty pick, the dagger 87 will reach the knock-off element 88 in the forward advance of the lay before the shuttle can rock the controller at the far or leaving side of the shed, and element 88 will therefore remain in position to effect loom stoppage. This stoppage is initiated at a point behind that at which stoppage is begun in the ordinary protector mechanism of looms due to the fact that the shuttle is not required to reach its shuttle box before giving an indication, the indication being given by the shuttle while the latter is in flight and while the lay is in a relatively rearward position.

While I have shown an electric control for the loom yet certain aspects of my invention are not necessarily limited to a control of that form. The controllers C and C' may be located at convenient points along the hand rail so placed as to require the shuttle to be in such position as to avoid damage to the warp threads before the controllers can be rocked by the shuttle.

From the foregoing it will be seen that I have provided a protector mechanism for looms wherein two controllers are both actuated by a single flight of the shuttle, and wherein the shuttle must be able to reach the controller at the far side of the fabric to permit continued weaving. It will also be seen that on any given flight of the shuttle the latter will set one of the controllers so that it will cooperate with the other controller when the latter is actuated by the next succeeding pick of the shuttle. It will further be seen that the straps 75 are relatively light and impose little or no retarding effect on the shuttle. Again, the stopping circuit is operative to hold the stopping dagger in stopping position during the time that the shuttle is in the shed and that the dagger is not released by its solenoid until after the shuttle is out of the warp shed. The controller circuit is closed by the shuttle as it enters the shed and opened by the shuttle as it leaves the shed. Furthermore, the switches can be adjusted to different angular positions to suit the speed of the loom and the controllers are located along the hand rail to accommodate the width of the fabric being woven. The general result of the invention is that the controllers, being located between the shuttle boxes at each end of the lay, engage the shuttle before the latter enters a shuttle box or engages a binder which it is approaching, and loom stoppage can therefore be initiated earlier than is

possible with the usual type of protector mechanism.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a protector mechanism for a loom having a lay with a shuttle box and shuttle binder at each end thereof and having a shuttle to move from one shuttle box to the other, loom stopping mechanism, a pair of controllers for the mechanism on the lay between the binders and each movable independently of the other by the shuttle in a flight thereof, and means jointly controlled by said controllers to initiate operation of the stopping mechanism upon failure of the shuttle to move both of said controllers prior to a given point in the forward motion of the lay before the shuttle enters the shuttle box which it is approaching.

2. In a protector mechanism for a loom having a lay with a shuttle box and shuttle binder at each end thereof and having a shuttle to move from one shuttle box to the other, loom stopping mechanism, a pair of spaced controllers on the lay between the binders to be moved by the shuttle at different times in a single flight thereof, said controllers being movable independently of each other by the shuttle, and means jointly controlled by the controllers to initiate operation of the stopping mechanism upon failure of the shuttle to move both of said controllers prior to a given point in the forward motion of the lay before the shuttle enters the shuttle box which it is approaching.

3. In a protector mechanism for a loom having a lay with a shuttle box and shuttle binder at each end thereof and having a shuttle to move from one shuttle box to the other, loom stopping mechanism, a pair of independently movable controllers between the binders jointly controlling the mechanism to be moved by the shuttle when the latter crosses the lay, one controller at each side of the lay, one controller to be moved by the shuttle in the early part of the flight thereof to a position to initiate operation of the mechanism to stop the loom, and the other controller normally in position to initiate operation of the mechanism to stop the loom and being moved by the shuttle in the latter part of a normal flight thereof to a position to prevent operation of the mechanism before the shuttle enters the shuttle box which it is approaching.

4. In a protector mechanism for a loom having a lay with a shuttle box and shuttle binder at each end thereof and having a shuttle to move from one shuttle box to the other, loom stopping mechanism, a pair of independently movable controllers between the binders each movable by the shuttle when the latter is in flight to stopping or running position, means to initiate operation of the stopping mechanism when both controllers are in stopping position at a given point in the loom cycle, one controller normally in stopping position and the other controller normally in running position at the beginning of a flight of the shuttle, the shuttle in the early part of a normal flight moving said other controller to stopping position and later in the flight moving said one controller to running position, failure of the shuttle due to abnormal flight thereof to move said one controller to running position leaving both

controllers in stopping position before the shuttle enters the shuttle box which it is approaching.

5. In a protector mechanism for a loom having a lay with a shuttle box and shuttle binder at each end thereof and having a shuttle to move from one shuttle box to the other, loom stopping mechanism, a pair of independently movable controllers between the binders for the stopping mechanism mounted on the lay and to be moved successively in any given flight of a shuttle, the second controller to be engaged normally being in stopping position and movable by the shuttle to running position, the first controller to be engaged by the shuttle in said flight being moved to stopping position, and means to initiate operation of the stopping mechanism when both controllers are in stopping position at a given point in the forward motion of the lay due to failure of the shuttle to move said second controller to running position before the shuttle enters the shuttle box which it is approaching.

6. In a protector mechanism for a loom having a lay with a shuttle box and shuttle binder at each end thereof and having a shuttle to be in flight in opposite directions across the lay when the latter advances during a part of the loom cycle, loom stopping mechanism, a pair of independently movable spaced controllers mounted on the lay between the binders, each controller to be moved by the shuttle when the latter is in flight either to stopping or running position, said controllers to be moved successively by the shuttle in any given flight thereof so that the first controller is moved to stopping position and the second controller is moved from stopping to running position in a normal flight of the shuttle, said second controller being normally in stopping position, and means to initiate operation of the stopping mechanism if the shuttle fails to move the second controller from stopping to running position while the first controller is in stopping position at a given point in the advance motion of the lay due to failure of the shuttle to move said second controller by the time the lay reaches said point before the shuttle enters the shuttle box which it is approaching.

7. In a protector mechanism for a loom having a lay with a shuttle box and shuttle binder at each end thereof and having a shuttle to move from one shuttle box to the other, loom stopping mechanism capable of initiating loom stoppage during a flight of the shuttle, a pair of controllers between the binders jointly controlling the stopping mechanism, each controller movable independently of the other controller and movable to stopping or running position by the shuttle when the latter is in flight, means to initiate operation of the stopping mechanism when both controllers are in stopping position at a given point in the loom cycle, the controller near the starting point of a shuttle flight being normally in running position and the other controller being normally in stopping position, the shuttle in the early part of its flight moving the first controller to stopping position and effective in a normal flight to move said other controller from stopping to running position at a later time in the same flight, failure of the shuttle to move said one controller from running to stopping position prior to said point in the loom cycle resulting in positioning both controllers in stopping position before the shuttle enters the shuttle box which it is approaching.

8. In a protector mechanism for a loom having a lay provided with a shuttle box and a

shuttle binder at each end thereof and across which occur successive shuttle flights in opposite directions, loom stopping mechanism, a pair of independently movable spaced controllers for the stopping mechanism between the binders, each controller movable either to stopping or running position by a shuttle flight, means to initiate operation of the stopping mechanism when both controllers are in stopping position at a given point in the loom cycle, one of said controllers to be moved to stopping position and the other controller to be moved to running position on a given normal shuttle flight, and the next succeeding shuttle flight thereof moving said other controller to stopping position and moving said one controller from stopping to running position, failure of the second shuttle flight to move said one controller to running position prior to said given point in the loom cycle leaving both controllers in stopping position to cause operation of the stopping mechanism through said means before the shuttle enters the shuttle box which it is approaching.

9. In a protector mechanism for a loom having a lay provided with a shuttle box and a shuttle binder at each end thereof and across which a shuttle has flights in opposite directions, loom stopping mechanism, a pair of spaced controllers for the stopping mechanism on the lay between the binders and each to be moved independently of the other by the shuttle when the latter is in flight and each controller movable either to stopping or running position, means to initiate operation of the stopping mechanism when both controllers are in stopping position at a given point in the forward motion of the lay, flight of the shuttle in one direction moving the first controller to be engaged by said shuttle in the early part of its flight to stopping position and the second controller to be engaged by the shuttle later in the same flight being moved by the shuttle to running position, the shuttle on the next flight moving the second controller from running to stopping position in the early part of said second flight and normally moving the first controller from stopping to running position in the latter part of said second flight, failure of the shuttle to move said first controller to running position in the second shuttle flight leaving both controllers in stopping position to initiate loom stoppage at said given point in the motion of the lay before the shuttle enters the shuttle box which it is approaching.

10. In a protector mechanism for a loom having a lay with a shuttle box and shuttle binder at each end thereof and having a shuttle to move from one shuttle box to the other, loom stopping mechanism, a pair of spaced controllers for the mechanism between the binders to be engaged successively by the shuttle in any flight thereof, said controllers movable independently of each other either to stopping or running position by the shuttle, one of said controllers to be moved to stopping position on a given flight of the shuttle and the other controller to be moved to stopping position on the next flight of the shuttle, said shuttle on the next flight normally moving the first named controller to running position, and means to initiate operation of the stopping mechanism if the shuttle in its second flight fails to move to running position the controller which was moved to stopping position on the previous flight by the time the lay reaches a given point in its forward motion before the

shuttle enters the shuttle box which it is approaching.

11. In a protector mechanism for a loom having a lay provided with a shuttle box and a shuttle binder at each end thereof and a shuttle to have flights in opposite directions across the lay, loom stopping mechanism, a pair of spaced controllers on the lay between the binders movable to different distances apart on said lay dependent upon the width of the fabric being woven, said controllers to be independently movable by the shuttle in a flight thereof across the lay, and means jointly controlled by the controller to initiate operation of the stopping mechanism if the shuttle fails to move both of said mechanisms prior to a given point in the forward movement of the lay before the shuttle enters the shuttle box which it is approaching, said point being comparatively early in the advance movement of the lay when said controllers are relatively close together and said point being relatively late in the advance movement of the lay when said controllers are relatively far apart.

12. In an electric protector mechanism for a loom having a lay with a shuttle box and shuttle binder at each end thereof and having a shuttle to move from one shuttle box to the other, loom stopping mechanism, a pair of electric switches between the binders each movable independently of the other either to open or closed position by the shuttle when in flight, and electro-magnetic control means for the stopping mechanism jointly controlled by the switches to initiate operation of the stopping mechanism upon failure of the shuttle to actuate both of said switches prior to a given point in the loom cycle before the shuttle enters the shuttle box which it is approaching.

13. In protector mechanism for a loom having a lay provided with a shuttle box and a shuttle binder at each end thereof and across which occur successive shuttle flights in opposite directions, loom stopping mechanism, a pair of controllers for the stopping mechanism each movable independently of the other on any shuttle flight, and means jointly controlled by said controllers to initiate operation of the stopping mechanism upon failure during any given shuttle flight of both of said controllers to be moved prior to a given point in the forward motion of the lay before the shuttle enters the shuttle box which it is approaching.

14. In protector mechanism for a loom having a lay with a shuttle box and shuttle binder at each end thereof and having a shuttle to move from one shuttle box to the other, loom stopping mechanism, the shuttle making successive flights in opposite directions across the lay, a pair of controllers between the binders for the stop-

ping mechanism to be positioned either in running or stopping position by the shuttle when the latter is in flight, the shuttle on any given flight moving one only of the controllers to stopping position and on the next flight moving the other controller only to stopping position, and means to cause operation of the stopping mechanism if both controllers are in stopping position at a given point in the forward motion of the lay before the shuttle enters the shuttle box which it is approaching.

15. In an electric protector mechanism for a loom having a lay with a shuttle box and shuttle binder at each end thereof and having a shuttle to move from one shuttle box to the other, electrically controlled loom stopping mechanism, a pair of independently movable switches on the lay between the binders spaced from each other to be engaged successively by the shuttle in any given flight thereof, each switch to be movable either to open or closed position by the shuttle while in flight, the shuttle when moving in one direction closing the first switch engaged thereby and opening the second switch and the shuttle on a following normal flight in the opposite direction closing the switch opened on the previous flight and opening the switch closed on the previous flight, and electro-magnetic means to initiate operation of the stopping mechanism when both switches are closed at a given point in the forward motion of the lay before the shuttle enters the shuttle box which it is approaching due to failure of the shuttle to open the second switch normally to be engaged thereby in a flight thereof.

16. In an electric protector mechanism for a loom having a lay with a shuttle box and shuttle binder at each end thereof and having a shuttle to move from one shuttle box to the other, electro-magnetic controlled loom stopping mechanism, a pair of independently movable spaced switches on the lay between the binders each to be moved either to open or closed position by the shuttle when the latter is in flight, the shuttle when moving in either direction across the lay closing the first switch to be engaged thereby and opening the second switch to be engaged thereby on the same flight, one of said switches normally closed at the beginning of a given flight of the shuttle because of closure thereof by the shuttle on a previous flight in the opposite direction and normally to be opened by the shuttle, and electro-magnetic means to be in circuit with said switches when the same are both closed at a given point in the forward motion of the lay to initiate operation of the loom stopping mechanism before the shuttle enters the shuttle box which it is approaching.

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