June 3, 1930. W. H. WAKEFIELD 1,760,970

PROTECTOR MECHANISM FOR LOOMS

Filed March 16, 1928 2 Sheets-Sheet 1

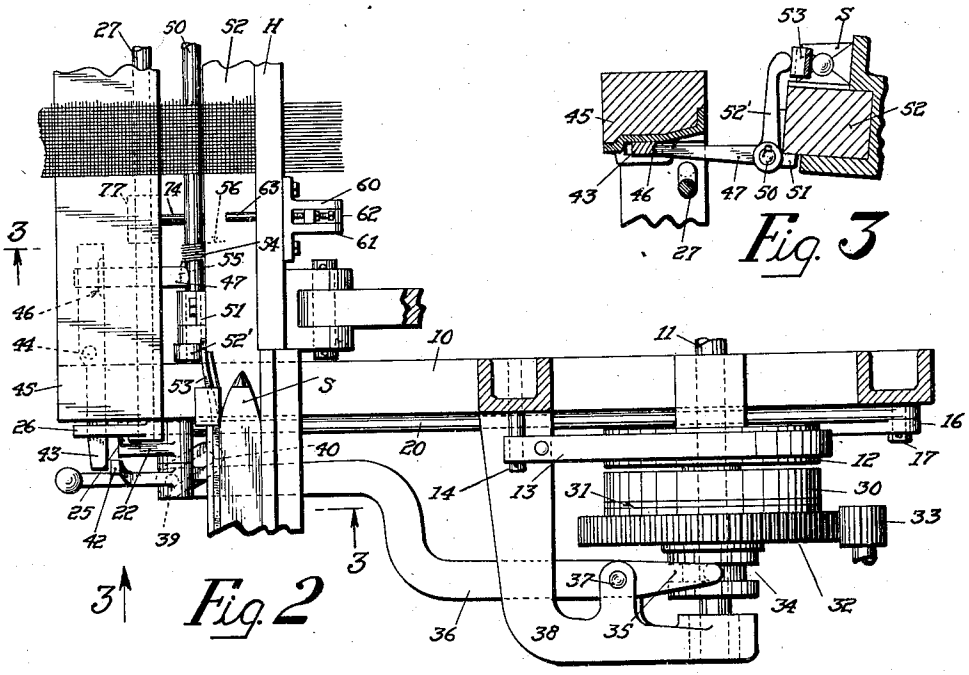


Fig. 2

Fig. 3

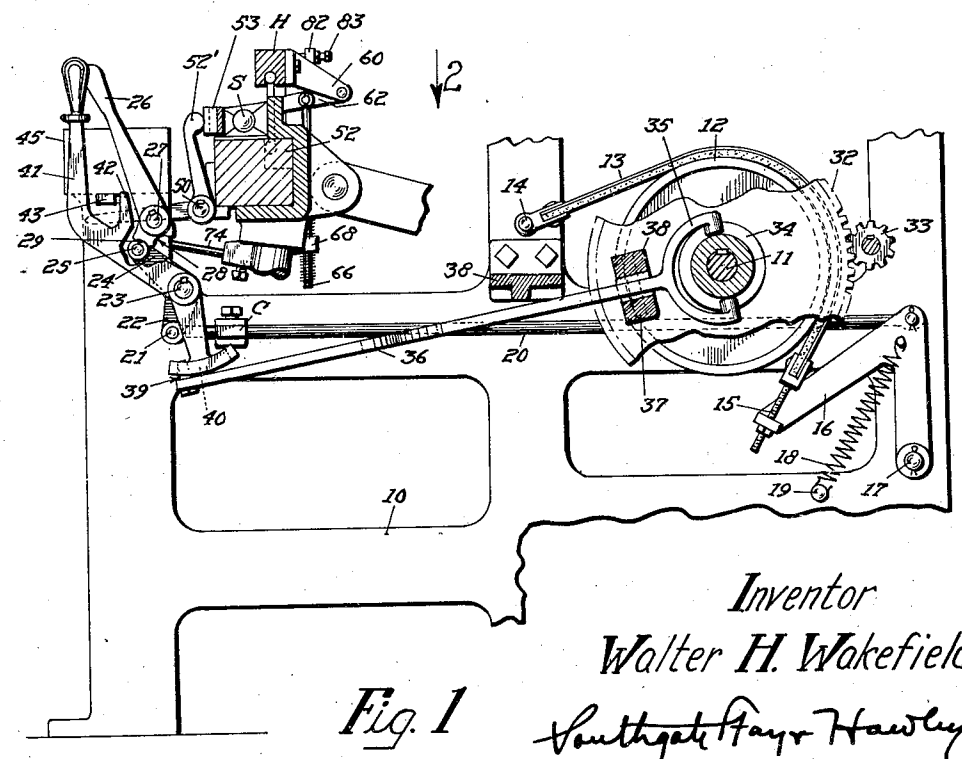


Fig. 1

Inventor
Walter H. Wakefield
Southgate Sayre Hawley
Attorneys

June 3, 1930. W. H. WAKEFIELD 1,760,970

PROTECTOR MECHANISM FOR LOOMS

Filed March 16, 1928 2 Sheets-Sheet 2

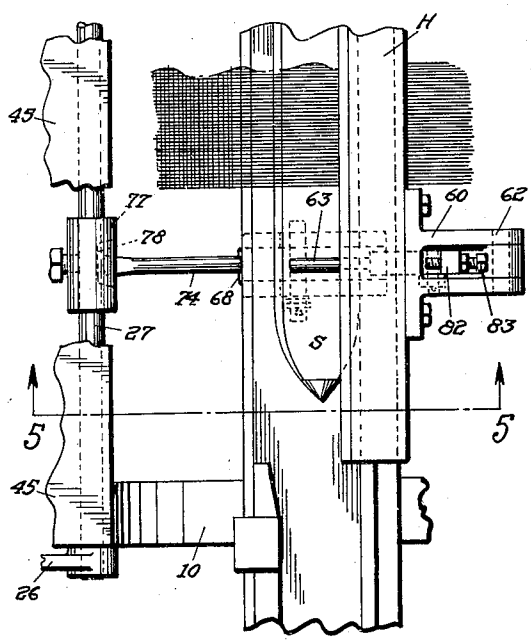


Fig. 4

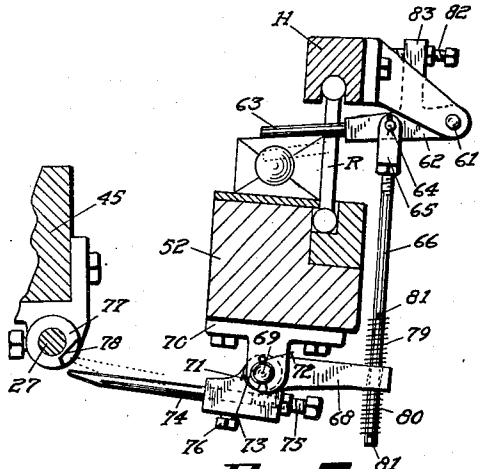


Fig. 5

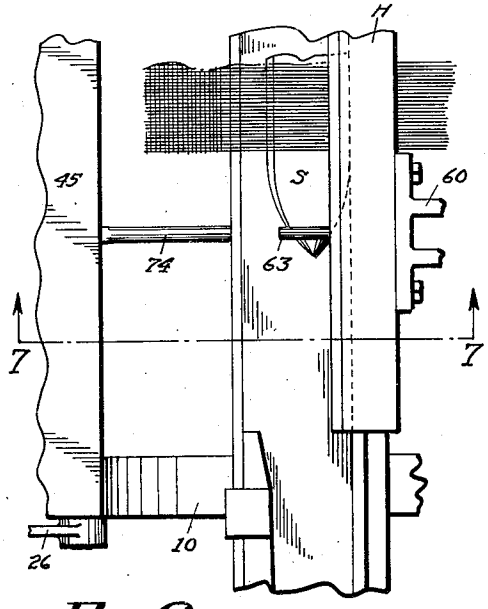


Fig. 6

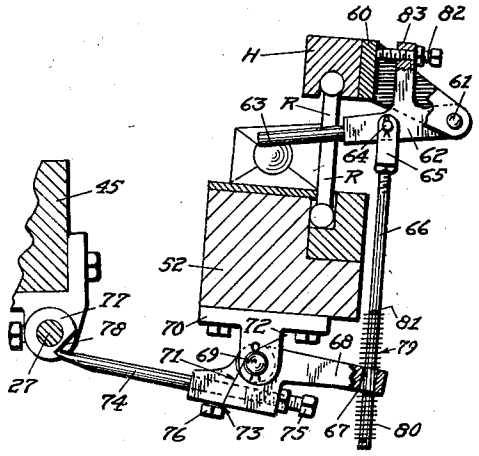


Fig. 7

Inventor
Walter H. Wakefield
Fairbanks Fay & Hawley
Attorneys

Patented June 3, 1930 1,760,970

UNITED STATES PATENT OFFICE

WALTER H. WAKEFIELD, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO CROMPTON & KNOWLES LOOM WORKS, OF WORCESTER, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

PROTECTOR MECHANISM FOR LOOMS

Application filed March 16, 1928. Serial No. 262,315.

This invention relates to improvements in protector mechanism for looms and it is the general object of the invention to provide means which will stop the loom if the shuttle is not running on schedule by devices which are set into operation at an earlier time than usual and at a point in the flight of the shuttle prior to the engagement of the latter with the binder.

The usual form of protector mechanism includes a finger secured to a protector rod which is pivoted to the lay and a substantially horizontal dagger held in fixed angular position with respect to the detector rod. The dagger is normally positioned to engage the bunter on the loom frame to stop the loom but is moved out of this position if the shuttle enters the box at or before a predetermined time. The binder has direct engagement with the protector finger and the shuttle engages the binder to swing the protector rod to move the dagger to non-stopping position. It will be seen that this type of motion is dependent upon the entry of the shuttle into the box a sufficient distance to engage and move the shuttle binder.

It is a common rule in setting protecting devices to have them operate when the lay is to the rear of its foremost position by a distance equal approximately to one and one-half times the width of the shuttle. This dimension is not necessarily fixed because the yielding of the whip roll will act to relieve pressure of the warp threads and where whip rolls are movable forwardly at the time of protection or movable otherwise to shorten the necessary path of the warp from the beam to the fell of the cloth the protecting mechanism may be set somewhat later. Many looms are provided with whip rolls which do not yield to any appreciable extent and the above rule applies to these looms.

The sweep of the lay ordinarily has a fixed relation with respect to the width of the shuttle but this relation is not the same for all looms. For instance, in one type of gingham loom which has gone into general use the sweep of the lay is 2.86 times the width of the shuttle, while in the case of a worsted loom of usual construction the sweep of the lay is found to be 3.04 times the width of the shuttle. Other looms may have different relations, but it will ordinarily be found that the sweep of the lay is approximately three times the width of the shuttle.

From the foregoing figures it will be seen that the lay is approximately one-half way between its front and back extreme positions at the time of protection and because of the crank method of driving the lay the latter is travelling at its fastest rate of speed approximately at the time of protection. Because of this fact the ordinary protector mechanism acts to dissipate a relatively large amount of energy in a very short space of time and it not infrequently happens that lay swords or loomsides break.

It is an important object of my present invention to provide a device which may act in conjunction with the ordinary protector dagger to give an indication to protect the loom at some point between the shuttle boxes on the opposite ends of the lay so that if the shuttle is runing on time or according to the schedule and arrives at a certain point along the lay when the latter has reached a given point in its forward sweep the loom will continue to operate, but if the shuttle is behind its schedule and fails to arrive at the given point along the lay the power will be thrown off and the brake mechanism applied, the actual stopping of the lay being accomplished by the usual dagger should the shuttle actually fail to be boxed in time. Should the shuttle, however, be able to get out of the shed despite the fact that it is behind schedule the protector dagger will be moved to inoperative position and the loom will stop in the usual manner, as is the case with filling stop motions, without subjecting the loom to the impact and severe strains usual in stopping by the protector mechanism.

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 drawings, wherein I have shown a convenient embodiment of my invention,

Fig. 1 is an end elevation of a loom, certain parts being in section, showing the driving and brake mechanism and having my invention applied thereto,

Fig. 2 is a top plan view taken in the direction of arrow 2, Fig. 1 showing the loom in running position,

Fig. 3 is a detailed vertical section on line 3—3 of Fig. 2,

Fig. 4 is an enlarged top plan view of a portion of the structure shown in Fig. 2,

Fig. 5 is a vertical detailed section on line 5—5 of Fig. 4,

Fig. 6 is a view similar to Fig. 4 but with the shuttle shown as being behind schedule and permitting indication to stop the loom, and

Fig. 7 is a vertical section on line 7—7 of Fig. 6.

The driving, braking and protecting of the loom to which my invention may be applied is of usual construction. The loomside 10 supports a driving shaft 11 having a friction drum 12 secured thereto and adapted for cooperation with a flexible friction band 13 one end of which is anchored to a fixed stud 14. The other end of said band is adjustably connected as at 15 to a lever 16 pivoted at 17 to the loom frame. A tension spring 18 interposed between the lever 16 and a fixed stud 19 acts normally to move the strap 13 against the drum 12. A forwardly extending rod 20 pivoted to the lever 16 is connected as at 21 to a lever 22 pivoted for free movement on a shipper rod 23 and having an upper arm 24 on which a roll 25 is mounted for rotation. A brake handle 26 is keyed to a rocker shaft 27 and has two recesses, the low recess 28 being nearer the shaft 27 than the relatively higher recess 29. The roll 25 is adapted to enter one or the other of these recesses and in loom running position the parts will be as shown in Fig. 1 with the roll 25 in the high recess 29. When in this position the brake handle 26 serves to push rearwardly on the rod 20 to hold the flexible band 13 away from the drum 12 against the action of spring 18.

A friction plate 30 is secured to the top shaft or driven shaft 11 and has a friction face 31 to cooperate with a corresponding face on the motor gear 32 which is freely rotatable on shaft 11. A driving pinion 33 is in mesh with gear 32 and is the source of power by which the loom is operated. A grooved collar 34 rigid with the gear 32 cooperates with an arm 35 of a shipper lever 36 pivoted as at 37 to a bracket 38 secured to and forming part of the fixed frame of the loom. The forward end of said shipper lever 36 is provided with an upstanding pin 39 which is received by the slot 40 formed in the bottom of shipper handle 41. The shipper handle is secured to the shipper rod 23 and has a projection 42 which lies behind a knock-off lever 43 pivoted as at 44 to the underside of the breast beam 45. Lever 43 has a notch 46 adapted to receive a dagger 47 forming part of the usual protector mechanism. When the loom is running the shipper handle will be moved to the left as viewed in Fig. 1 or frontwardly, the shipper mechanism being what is known as the "front pull" type.

A portion of the protector mechanism may be of the usual type and may include a protector rod 50 pivoted in one or more brackets 51 secured to the lay 52 and having the aforesaid dagger or daggers 47 secured thereto. In the case of end protection there will be a dagger at each end of the lay, while in the case of center protection there will be but one dagger located approximately at the center of the loom. Adjacent each end of the protector rod 50 is a finger 52′ adapted for engagement with shuttle binder 53 which is moved outwardly by the shuttle S. A torsion spring 54 surrounds the protector rod and has one end located under one of the daggers as at 55 while the other end extends as at 56 under the lay 52. The effect of the torsion spring is to hold the dagger or daggers 47 in raised position while the action of the protector fingers 52′ is to rock the protector rod 50 in a counter-clockwise direction as viewed in Fig. 3 against the action of the torsion spring whenever the shuttle S engages the binder and moves the latter outwardly or to the left as viewed in Fig. 3.

So long as the shuttle S is properly boxed the dagger or daggers 47 will be lowered before they arrive in position to engage the knock-off lever 43, but should the shuttle fail to arrive in the box or in the position to move the binder sufficiently to cause the dagger 47 to clear the knock-off lever 43, the latter will be rocked in a counter-clockwise direction about its pivot 44 as viewed in Fig. 2 to engage the projection 42 and move the shipper handle and brake handle to stopping position. The matter thus far described is of common construction and of itself forms no part of my present invention.

The protector mechanism thus far described depends for its operation upon actual engagement of the shuttle binder by the shuttle to prevent stopping of the loom, and as previously stated there are times when conditions are such that a knocking-off or stopping of the loom by means of this form of protection subjects the loom frame or the supporting structure for the lay to considerable strains, resulting not infrequently in breakages. It is the purpose of my present invention to determine at some earlier time in the flight of the shuttle whether it will be necessary to stop the loom to prevent warp breakage due to the fact that the shuttle is behind its schedule as it travels along the lay. Accordingly, I provide a detecting device located between the binders and the shuttle boxes and cause the same to be en-

gaged by the shuttle as the latter is in flight so that if the shuttle be behind its schedule stopping of the loom will be initiated.

As showing one convenient embodiment of my invention I provide the hand rail H with a bracket 60 to which is pivoted as at 61 a lever 62 having a forwardly extending finger 63 which may project through a reed R. The lever is pivotally connected as at 64 to a rod head 65 having adjustable connection with a rod 66 and extending downwardly to pass through an opening 67 formed in a lever 68. Said lever 68 is freely pivoted on a stud 69 supported by a bracket 70 secured at the under side of the lay. A torsion spring 71 surrounds the stud 69 and has one end disposed as at 72 behind a portion of the bracket 70 while the other end passes as at 73 under the lever 68 and acts to hold the lever with the forward end thereof (the left hand end as viewed in Fig. 5) in raised position. The dagger 74 is mounted in lever 68 and is moved longitudinally by means of a set screw 75 threaded into the lever 68 and is held against accidental displacement by means of a second set screw 76.

The previously described shaft 27 has secured thereto a collar 77 provided with a notch 78 adapted to receive the forward end of the dagger 74. The spring 71 normally holds the dagger 74 so that the same will enter the notch 78 unless moved downwardly.

A connection between levers 62 and 68 is afforded by means of a pair of compression springs 79 and 80 which may lie above and below, respectively, that portion of the lever 68 through which the rod 66 extends and said springs 79 and 80 may be equal so that a movement of said rod 66 in either direction will result in a corresponding movement of lever 68. Pins 81 extending through the rod 66 limit movement of said compression springs 79 and 80. The vertical position of the levers may be determined by means of a set screw 82 carried by an upstanding arm 83 formed on lever 62 and positioned for engagement with a portion of the bracket 60, as shown in Fig. 7.

In operation, the shuttle will be picked back and forth across the lay in the usual manner and when it is running properly will be in the relative positions shown in Figs. 4 and 5 with respect to the finger 63 when the lay reaches a predetermined forward position in its advance movement toward the breast beam 45. The finger will therefore be raised from the position shown in Fig. 7 to that shown in Fig. 5 and there will be a corresponding upward movement of the rod 66 and depression of dagger 74 so that the latter will clear the notch 78. This condition prevails so long as the shuttle is running on schedule. Should the shuttle be behind schedule, however, and be running slow enough so that in all probability it will be necessary to protect the loom in order to prevent warp breakage, finger 63 will be down when the lay reaches the aforesaid predetermined position in its forward advance and the dagger 74 will enter the notch 78 and move the rolling rod 27 angularly in a clockwise direction as viewed in Figs. 5 and 7. The effect of this movement on the part of rolling rod 27 is to rock the brake handle to the right as viewed in Fig. 1, thereby permitting the roll 25 to enter the low notch 28 which is accompanied by a downward movement of the lever 16 under action of spring 18 to bring the flexible band 13 into stopping relation with respect to the drum 12. This movement is accompanied by a forward motion on the part of rod 20 and an adjustable collar C on said rod will engage the shipper handle 41 to move the latter to stopping position to bring about separation of the friction drum 30 and the gear 32, thereby throwing power off and braking the loom.

As the lay continues to move forwardly the main dagger of the protecting device will be raised to enter notch 46 of the knock-off lever 43. Said knock-off lever operates in the usual manner to bring about an abrupt stopping of the lay in time to prevent the shuttle from breaking out warp threads, but inasmuch as the auxiliary device which controls the dagger 74 operates earlier in the pick or when the lay is in a relatively rearward position there is sufficient time for the brake to operate on the drum 12 so that the main dagger has less work to do in stopping the lay than is ordinarily the case and consequently the loom is subject to less strain than usual. The dagger 74 will be of sufficient length to engage the collar 77 at any desired point within limits and this point will occur at a part of the cycle of the pick appreciably in advance of the time allowed for the operation of the protector mechanism.

The auxiliary mechanism shown herein is illustrated as being adjacent one selvage of the cloth but it is to be understood that a similar device will be located on the opposite side of the loom and will have similar effects to those of the mechanism described. While I have shown the device as located outside the selvage yet I do not wish to be limited to this construction as certain features of my invention will operate satisfactorily if but one indicating device were used in the center of the loom.

From the foregoing it will be seen that I have provided a loom having the usual protector mechanism with an auxiliary device which acts to initiate stoppage of the loom when the shuttle is behind schedule but before the lay has advanced to the position where the shuttle would ordinarily engage the binder to disable the protector mechanism. By reason of this auxiliary device the power may be disconnected and the braking

mechanism applied at an earlier point in the cycle of the pick than would be possible if the device depended entirely upon the movement of the shuttle binder in the usual manner. While I have shown the auxiliary device in combination with the usual protector, yet where the brake operates with sufficient promptness it may be possible to dispense with the usual dagger. It may happen, however, that a shuttle will be behind its schedule so as to set the auxiliary device into action but will nevertheless be able to arrive in the box in time to prevent stopping of the loom through the main dagger 47, in which case the loom will be stopped merely by the brake and the lay will be spared the impact which ordinarily attends protection. On the other hand, a shuttle may be up to schedule when it arrives at the finger 63 but will be delayed by some cause or another after it passes the auxiliary device, in which case the main dagger will stop the loom as usual.

Having thus described my invention it will be apparent 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 at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, detector means positioned to be engaged by a shuttle and located between the boxes, and mechanism operatively connected to the detector means and controlled thereby to initiate stopping of the loom before the shuttle reaches the box toward which it is travelling if said shuttle fails to actuate the detector means at a predetermined point in the forward movement of the lay by reason of the fact that the shuttle is running slower than normal and fails to arrive in position to engage the detector means when the lay reaches said predetermined position.

2. In a protector mechanism for a loom having a lay with a shuttle box at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, mechanism normally operative to stop the loom, control means for the mechanism to have operative engagement with the shuttle at a point between the boxes somewhere along the length of the lay, said means effective to disable the stopping mechanism to prevent the latter from stopping the loom if the shuttle is running normally, said means controlling the mechanism to effect stoppage of the loom if the shuttle is running slower than normal and fails to arrive at a given point along the length of the lay when the latter has reached a given position in its forward movement.

3. In a protector mechanism for a loom having a lay with a shuttle box at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, primary protecting mechanism to stop the loom if the shuttle fails to be boxed when the lay reaches a predetermined position in its forward motion, and auxiliary mechanism located between the shuttle boxes to initiate stopping of the loom if the shuttle fails to reach a predetermined point between the boxes when the lay has reached a given position which is earlier in the cycle of the pick than said predetermined position.

4. In a protector mechanism for a loom having a lay with a shuttle box at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, primary protecting mechanism to stop the loom if the shuttle fails to be boxed at the proper time, and auxiliary mechanism operative at a time prior to the normal time for boxing of the shuttle to stop the loom when the shuttle fails to reach a predetermined point between the shuttle boxes when the lay reaches a given point in its forward movement.

5. In a protector mechanism for a loom having a lay with a shuttle box at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, two separate protector mechanisms to be controlled by the shuttle, one of said mechanisms being associated with one of the shuttle boxes and the other mechanism having a portion between the shuttle boxes to be engaged by the shuttle and effective to stop the loom when the shuttle is behind schedule and fails to reach a given point along the length of the lay between the boxes as the lay reaches a predetermined position in its forward movement.

6. In a protector mechanism for a loom having a lay with a shuttle box at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, two separate devices each normally effective to stop the loom and each engageable by the shuttle to be disabled by the latter to permit continued running of the loom, one of said mechanisms being disabled by a shuttle when the latter is properly boxed, and the other mechanism having a portion located between the shuttle boxes to be engaged normally by the shuttle at all times in the cycle of the pick prior to the normal time for boxing of the shuttle, failure of the shuttle to engage said other mechanism at the given time causing said other mechanism to stop the loom.

7. In a protector mechanism for a loom having a lay with a shuttle box at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, two independent stopping mechanisms each normally effective to stop the loom and both

movable to non-stopping position by the shuttle to a position to permit continued running of the loom, one of said devices being located intermediate the boxes at a point along the length of the lay and effective to initiate stopping of the loom if the shuttle fails to reach a given position along the length of the lay as the latter reaches a predetermined position in its forward motion, and said other mechanism effective to stop the lay abruptly after the first named mechanism acts to initiate stopping of the loom.

8. In a protector mechanism for a loom having a lay with a shuttle box at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, a pair of independently movable daggers each normally positioned to effect stopping of the loom, a control member for each dagger to be moved by the shuttle as the latter moves across the lay, one of said control members being located between the shuttle boxes to be engaged by the shuttle to disable the corresponding dagger if the shuttle be running normally, but remaining inactive if the shuttle is behind schedule, whereby stopping of the loom is initiated, and the second dagger effective to stop the lay abruptly independently of prior engagement between the shuttle and the second control member.

9. In a protector mechanism for a loom having a lay with a shuttle box at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, a pair of independent stopping devices each normally effective to stop the loom and each to be disabled by the shuttle as the latter moves across the lay, one of said devices being located intermediate the boxes at a point along the length of the lay and effective to initiate stopping of the loom but to be disabled by the shuttle when the lay is in a given position if the latter is running normally, and the other mechanism associated with a shuttle box and effective to stop the lay abruptly should the shuttle engage the first named mechanism when the lay is in said given position but fail to arrive at the second mechanism at the normal time.

10. In a protector mechanism for a loom having a lay with a shuttle box and binder at each end thereof and a shuttle to move across the loom from one shuttle box to the other and effective to engage the binder of the shuttle box toward which the shuttle is traveling, means located between the shuttle boxes and acting independently of the binders and effective to stop the loom if the shuttle fails to engage said means at a predetermined point in the forward movement of the lay prior to the time in the cycle of the loom when the shuttle normally engages the binder.

11. In a protector mechanism for a loom having a lay to move backwardly and forwardly and having a shuttle box on each end thereof, together with a shuttle which moves across the lay to be boxed first in one shuttle box and then in the other, means to stop the lay abruptly in its forward movement if the shuttle fails to be properly boxed when the lay reaches a predetermined position in its forward movement, and mechanism to initiate a more gradual stopping of the lay if as the shuttle passes across the lay the same fails to arrive at a given point between the shuttle boxes along the length of the lay when the latter reaches another predetermined point in its forward movement which is farther from the extreme forward position of the lay than the first named predetermined point.

12. In a protector mechanism for a loom having a lay with a shuttle box at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, mechanism to stop the loom, a device normally out of operative relation with the mechanism but capable of being related thereto when the lay reaches a predetermined point in its forward motion to initiate stopping of the loom, and detector means controlling the device and located between the boxes at an intermediate point along the lay and positioned to be engaged by the shuttle when the latter is between the boxes and travelling along the lay toward one of the boxes, said device being so related to the detector means that when the latter is moved by the shuttle said device will be moved out of operative relation with the stopping mechanism when the lay reaches the aforesaid predetermined point in its forward travel, and the detector when out of operative relation with the shuttle as the lay reaches the aforesaid predetermined position causing operative relation between the device and stopping mechanism to stop the loom.

13. In a protector mechanism for a loom having a lay with a shuttle box at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, stopping mechanism for the loom, means between the boxes to be engaged by the shuttle in flight and capable of assuming two positions, one a normal position out of engagement with the shuttle and the other an abnormal position when in engagement with the shuttle, and connections between the means and stopping mechanism effective to cause the mechanism to stop the loom if the means is in normal position when the lay reaches a predetermined point in its forward motion.

14. In a protector mechanism for a loom having a lay with a shuttle box at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, stopping mechanism for the loom, means between the boxes to be engaged by the shut-

tle in flight and capable of assuming two positions, one a normal position out of engagement with the shuttle and the other an abnormal position when in engagement with the shuttle, and connections between the means and stopping mechanism effective to cause the mechanism to stop the loom if the means is in normal position when the lay reaches a predetermined point in its forward motion, the connections being ineffective to cause the mechanism to stop the loom if the means be in abnormal position.

15. In a protector mechanism for a loom having a lay with a shuttle box at each end thereof and a shuttle to move from one shuttle box across the loom to the other shuttle box, mechanism to stop the loom, a device normally out of operative relation with the mechanism but capable of being operatively related to the mechanism to initiate loom stoppage when the lay reaches a predetermined point in its forward travel, and detector means controlling the device and located between the boxes at an intermediate point along the lay and positioned to be engaged by the shuttle as the latter moves across the lay, said means having operative relation with the device to relate the latter operatively with the mechanism if the shuttle fails to engage the means at the aforesaid predetermined point in the forward travel of the lay.

In testimony whereof I have hereunto affixed my signature.

WALTER H. WAKEFIELD.