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W. H. BAKER

MEANS FOR PROTECTING WARPS FROM DAMAGE IN LOOMS

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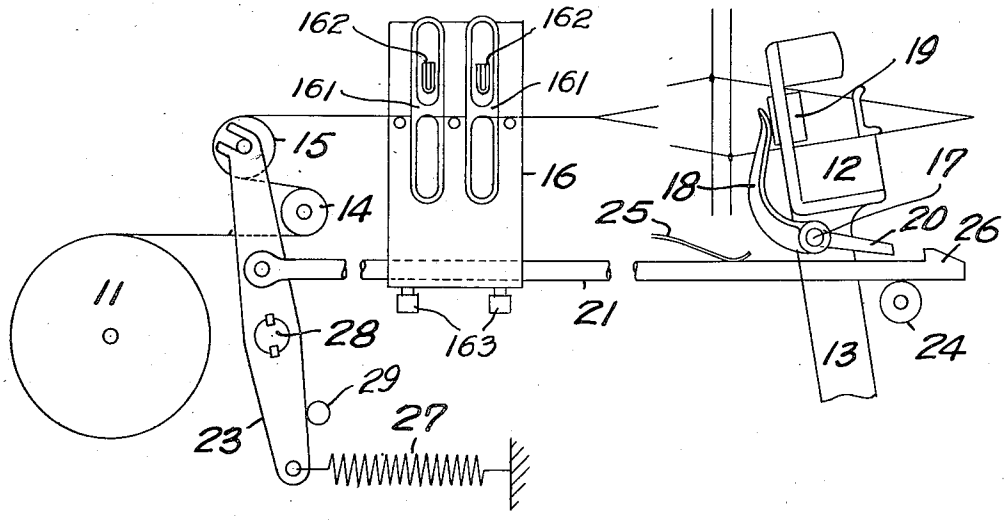


FIG. 1

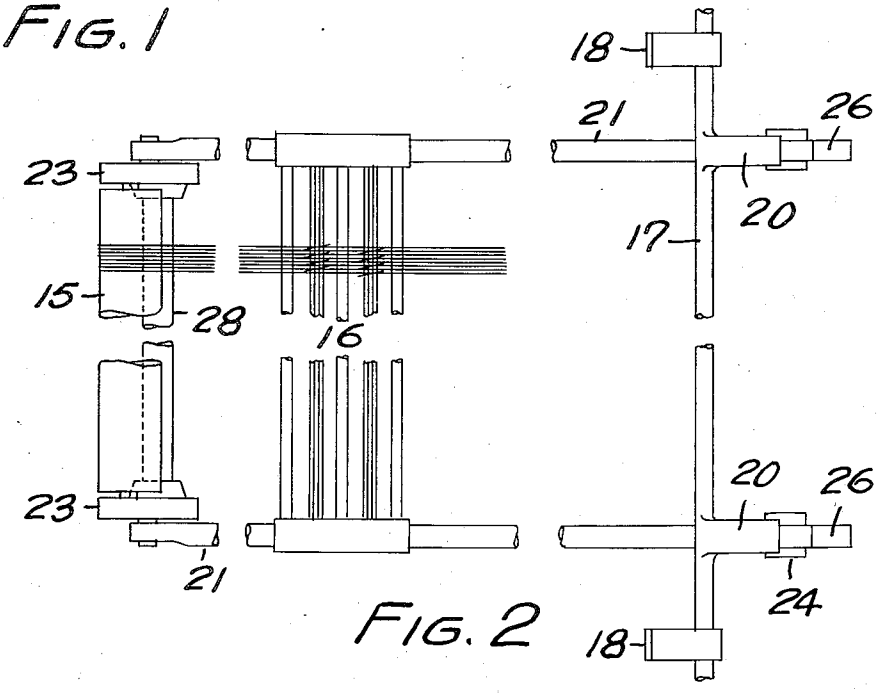


FIG. 2

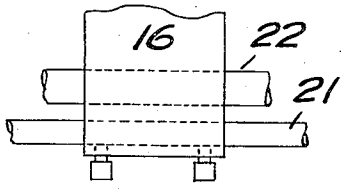


FIG. 3

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UNITED STATES PATENT OFFICE.

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MEANS FOR PROTECTING WARPS FROM DAMAGE IN LOOMS.

Application filed February 12, 1923. Serial No. 618,584.

To all whom it may concern:

Be it known that I, WILLIAM H. BAKER, a citizen of the United States of America, and resident of the city of Montreal, in the Province of Quebec and Dominion of Canada, have invented certain new and useful Improvements in Means for Protecting Warps from Damage in Looms, of which the following is a full, clear, and exact description.

This invention comprises improvements in looms more particularly designed for increasing the speed and efficiency of existing and new looms as compared with the speeds at present obtaining, especially in fast reed looms.

In all power looms it is necessary to provide some means of protecting the warp from damage by reason of a shuttle being improperly boxed or not boxed at all and lying partially or wholly in the open shed when the lay beats up. In fast reed looms this protection is obtained by the provision of means to effect an instant arrest of the lay in its beating-up movement if the shuttle is not properly boxed. Such means usually takes the form of a frog on the frame or other stationary part of the loom and a dagger on the lay normally positioned to strike the frog and adapted to be moved out of such position by the shuttle when properly boxed. It has also been proposed to simultaneously slacken the warp.

Arrest of the lay by means such as just described subjects the loom mechanism to very great shocks and imposes very great stresses on the mechanism with the result that breakages frequently occur. There is therefore a limit to the speed of the loom determined by the nature of the protection mechanism and the ability of the loom to withstand shock. If the speed limit is exceeded the breakages increase in frequency necessitating shut downs for repairs, thus lowering the efficiency of the machine and at the same time greatly increasing the deterioration of the machine.

According to this invention the rigid elements of the usual protection mechanism are replaced by a yielding means which will stop the lay at an intermediate point in its beating-up movement without detrimental shock to the loom. In addition to provision for definitely and positively moving the warp bodily with the lay so that the threads are not jerked through the reed and thereby broken, as may readily occur with mechanisms in ordinary use, the warp stop mechanism (which in present practice is a part of most looms) is moved with the warp and lay during the stopping to avoid jerking the warp threads through the stop mechanism, when the warp is moved, with consequent danger of breakage.

In the consideration of the feature of causing the warp to move forward bodily with the lay the exposed portion of the warp may be regarded as supported toward one end by the lay. Toward the other end, i. e., toward the warp beam, the warp is supported by a second support, which may be a whip roll. For the attainment of the said movement of the warp this second support is movable, it being arranged in such relation to the warp beam and any other elements that the support may be moved toward the lay, without any increase in the tension of the warp between the support and beam, and preferably with a slackening of the warp between the support and the beam. It is evident that if the lay and the warp support are moved simultaneously in the same direction and at the same speed they will carry the warp with them but without relative movement between the warp and themselves so that the warp will not move through the reed. Since the shuttle moves, in the line of the warp, only to the extent that the lay moves it follows that by thus moving the warp with the lay relative movement between the warp and shuttle will be nil. If a shuttle should be lying in the open shed when the lay commences to beat up and the aforementioned bodily movement of the warp with the lay is brought about breakage of the warp from the trapping of the shuttle will be impossible.

It has been indicated above that the warp stop motion is movably mounted and arranged to move with the warp and its supports. The yielding force absorbing means, such as a spring, connectible on occasion with the lay to absorb the momentum thereof and bring the lay rapidly to a stop, may serve also to normally position the warp support and warp stop mechanism or a separate positioning means may be provided. The force absorbing lay stopping means may, however, be omitted and only positioning means for the warp support used. The reason for connecting the force

absorbing device, warp support and stop motion with the lay, the said connecting means being designed to be rendered inoperative upon the proper boxing of the shuttle, may be common to all the elements to be moved or separate means may be employed for each. A convenient form of connecting means includes rods connected to the force absorbing device, warp support and warp stop mechanism and formed or provided with frogs adapted to be engaged by daggers mounted on the ordinary protector shaft of the lay. The absorbing of the momentum of the lay in its beating-up movement, as well as the moving of the second warp support and the stop motion may be accomplished in a variety of ways and by a variety of means and it is therefore to be understood that the invention is not to be considered as limited to the particular mechanism hereafter described and illustrated, such description and illustration being purely for the purpose of explanation.

A noteworthy feature of this invention is that, by reason of moving the warp with the lay in the event of improper boxing of the shuttle, it is not necessary, though it may be desirable, to stop a fast reed loom if the shuttle is not properly boxed. This capability places the fast reed loom on a parity with a loose reed loom in point of permissible speed, and owing to possibility of stopping the loom without detrimental shock the chief obstacle to an increase of speed in fast reed looms is removed.

In the accompanying drawings which represent only one embodiment of the invention;—

Fig. 1 is an end view of a loom mechanism diagrammatic in character, illustrating one method of putting the invention into practice.

Fig. 2 is a plan view corresponding to Figure 1.

Fig. 3 is a fragmentary view illustrating a modification in connection with the warp stop motion.

Referring more particularly to the drawings, 11 designates a warp beam, and 12 a lay, mounted by means of swords 13 to beat in the usual way, and to be regarded as one support for the warp. The term "lay" as here used is held to include the usual appurtenances thereof, such as shuttle boxes, reed and the like, and it is therefore to be understood that elements stated to be carried by the lay are not of necessity connected directly to the lay beam, per se, but may be associated with the beam or any of the connected parts or mechanism. At 14 is a stationary warp guiding roll and at 15 is a roll occupying the position of the usual whip roll and made movable as described hereinafter, the roll 15 being the second warp support according to this invention. The warp stop motion is as a whole designated by the numeral 16, its drop wires being represented at 161, 161, mounted upon guide-bars 162, 162, supported by the end-castings of the frame of the warp stop motion. The lay carries the usual protection shaft or rod 17 on which are mounted the usual binder fingers or feelers 18 pressing against the shuttle box swells 19 and intended to be moved to partially rotate the shaft 17 each time the shuttle is properly boxed.

In the illustrated embodiment of the invention there is fixed on the protection shaft adjacent each shuttle box a finger or dagger 20, which may be the usual dagger, and which is therefore associated with the lay for bodily movement with the lay.

At each end of the loom there is provided a rod 21 which is disposed approximately parallel with the path of the wrap between the whip roll and lay. These rods form means to move the rear warp support 15 and the warp stop mechanism, and to connect the lay with the momentum-absorbing means. In the form shown, the rods also form supports for the warp stop mechanism 16, which is made fast to the rods by clamping screws 163, 163, but it will be understood that this is not essential as the stop motion may be movably mounted on supports 22 which are entirely separate from the rods 21, as shown in Figure 3. The rods 21 are mounted in any suitable way, for example, by being pivotally connected at their rear ends to oscillatable arms or levers 23 and by being supported toward their opposite ends on rollers or the like 24. A spring 25 may be provided for each rod engaging the opposite side thereof from the roller 24 to hold the rod against jumping off the roller. One end of each rod is shouldered or hooked as at 26, to form in effect a frog, the shoulder or hook being properly located for co-operation with the adjacent dagger 20. The rods 21 are supported in such position relatively to the lay and the daggers 20 that the shoulders or hooks 26 will be engaged by the daggers 20 as the lay beats up if the shuttle is not properly boxed. If the shuttle is properly boxed the daggers 20 are displaced so as to pass the shoulders of hooks 26 without engaging the same when the lay beats up.

Spring 27, pereferably connected to the levers 23, serve to determine the normal position of the whip roll, rods 21 and stop motion 16 by holding the levers against stops 28, or otherwise as desired. These springs are heavy enough to stop lay movement within a very short distance even if the driving power of the lay should not be disconnected so that the device may serve not only to determine the position of the warp stop mechanism but also to stop the loom

with sufficient rapidity to save the warp if a shuttle is not properly boxed or is lying in the open shed when the lay starts to beat up. On the other hand the springs may be of only sufficient strength to position the roll 15 and stop motion and to properly tension the warp. The invention is not limited to the employment of springs but contemplates the use of any device such as weights or fluid pressure devices which will serve to normally position the warp stop mechanism and whip roll, and if desired, to quickly stop lay movement. In order to ensure uniform movement of both rods and therefore of both ends of the warp stop mechanism and of the whip roll if one of the daggers 20 should fail to catch its mating hook 26, it is desirable to rigidly connect the levers 23 at opposite ends of the loom. This is most conveniently accomplished by rigidly mounting the levers on a rotatably mounted shaft 28. When this connection is established between the levers it may be found possible to dispense with one dagger 20 and hook 26.

It is essential that the roll 15 be moved at least at the same speed and through the same distance as the lay but if desired the proportions may be such that the roll 15 will have greater movement and speed than the lay. It will be understood that many modifications may be made in the manner of establishing connection between the lay and the warp stop motion and other mechanism to move the same when necessary, and that the invention is not confined to the employment of the straight rods 21 illustrated.

While the mechanism has been illustrated as in a horizontal position, it will be understood that its application is not limited to an ordinary or horizontal loom but may be extended with equal facility to upright looms. It will also be understood that, the illustration is of a purely diagrammatic nature, and that the invention must not be considered as in any way limited to the positions illustrated of the parts relative to one another or to the various parts of the loom. In consequence the statement that the roll moves toward the lay must be understood to mean movement substantially in the direction of warp movement, which at the station of the roll may not be along a straight line drawn between the roll and lay.

As long as the loom is operating normally the rods 21 are at rest and the warp stop mechanism and the whip roll 15 remains in its normal position. Each time the lay commences to beat up, if the shuttle is properly boxed, the shaft 17 is partially rotated and the daggers 20 are moved out of position to engage the shoulders or hooks 26. If, however, the shuttle should fail to be properly boxed or should be lying in the open shed when the lay commences to beat up, the shaft 17 will be insufficiently rotated or not rotated at all and early in the lay movement the daggers 20 will engage the shoulders or hooks 26 and transmit lay movement to the rods 21, thereby moving the warp stop mechanism and whip roll forward in unison with the lay, or until the lay is brought to rest by the devices 27 or by any other means. Simultaneously, the equal and similar movements of the whip roll and lay move the warp with them and will save the warp from breakage by jerking through the reed as in the case of a shuttle trapped in the open shed, while the simultaneous movement of the stop motion will largely or entirely prevent movement of the warp through the stop motion and eliminate breakage of threads by being jerked through the drop wires of the stop motion.

While the device has been described as operated only by the shuttle feelers it will be understood that the operation may be effected by any other device operating on the protection rod or on a similar rod.

Having thus described my invention, what I claim is:—

1. In a loom having a warp-beam, a movably-mounted warp guide with which the warp is engaged on its way from the warp-beam, a lay, and protector-mechanism including a dagger and a frog, the latter connected operatively with said warp-guide for warp-slackening and lay-arresting purposes, the combination with said elements of yielding means holding said warp-guide in normal position, such means capable of arresting the lay without shock before completion of the beating-up movement of the lay by absorbing the momentum of the lay.

2. In a loom having a lay, protector-mechanism including a dagger and a frog, a warp-beam mounted at the rear of the loom, a swing-frame at the rear of the loom comprising a rock-shaft and levers affixed to said rockshaft at opposite sides of the loom, a warp-guide connected with said levers, and a connection between the frog and the swing-frame whereby the latter and the warp-guide are actuated to slacken the warp when the protector-mechanism acts, the combination with the said elements of momentum-absorbing means combined with said swing-frame capable of arresting the lay without shock before completion of its beating-up movement, by absorbing the momentum of the lay.

3. In a loom, the combination with the lay, protector-mechanism including daggers and frogs at both sides of the loom, a warp-beam mounted at the rear of the loom, levers at opposite sides of the loom, with the respective frogs connected with the respective levers, and a warp-guide combined with said levers, whereby the warp is slackened through movement of the levers and warp

guide induced by the action of the protector mechanism, of momentum-absorbing means controlling the respective levers capable of arresting the lay without shock before completion of the beating-up movement of the lay.

4. In a loom, the combination with the lay, protector-mechanism including daggers and frogs at both sides of the loom, a warp-beam mounted at the rear of the loom, a swing-frame at the rear of the loom comprising a rock-shaft and levers affixed to said rockshaft at opposite sides of the loom, with the respective frogs connected with the respective levers, and a warp-guide connected with said levers, whereby the warp is slackened through movement of the swing-frame induced by the action of the protector-mechanism, of momentum-absorbing means combined with said swing-frame capable of arresting the lay without shock before completion of the beating-up movement of the lay.

5. In a loom, the combination with the lay, protector-mechanism including a dagger and a frog, a warp-beam mounted at the rear of the loom, a swing-frame at the rear of the loom comprising a rock-shaft and levers affixed to said rockshaft at opposite sides of the loom, with said frog connected with said swing-frame, and a warp-controller carried by the levers of the said swing-frame and around which the warp extends on its way from the warp-beam to the front of the loom, of momentum-absorbing means combined with said swing-frame holding the latter and the warp-controller in normal position substantially unaffected by the warp-strains incident to shedding and beating-up said momentum-absorbing means capable of arresting the lay without shock before completion of the beating-up movement of the lay.

6. In a loom, the combination with the lay, a warp support at the rear of the loom, and a warp stop motion, of protector mechanism controlling the warp support and warp stop motion and when the shuttle is improperly boxed or not boxed acting to cause operation of said warp support for warp slackening and also forward movement of the warp stop motion synchronous with the beating-up movement of the lay.

7. In a loom having warp stop motion mechanism, the combination with the lay thereof, a warp support at the rear of the loom, and the drop-wires of the warp stop motion, of protector mechanism operatively combined with said warp support and drop-wires and acting when the shuttle is improperly boxed or not boxed to operate the warp support for warp slackening and move the drop-wires forward in unison with the lay.

8. In a loom, the combination with the lay, and a warp stop motion, of shuttle-detecting protector mechanism acting on failure of the shuttle to box properly to move the warp stop motion forward synchronously with the beat-up of the lay.

9. In a loom having a warp stop motion, the combination with the lay, a warp-controller at the rear of the loom, and the drop-wires of the warp stop motion, of shuttle-detecting protector mechanism operatively combined with the warp-controller and warp stop motion and acting when the shuttle is improperly boxed or not boxed to produce operation of the controller to slacken the warp, and forward movement of the drop-wires synchronously with the beat-up of the lay.

10. In a loom, in combination, a warp stop motion, shuttle-detecting mechanism, and means whereby the warp stop motion is moved forward in the loom in consequence of detection of failure of the shuttle to box properly.

11. In a loom, in combination, a warp stop motion, shuttle-detecting mechanism, and means, actuated independently of pull exerted through the warp threads, to move the warp stop motion forward on detection of failure of the shuttle to box properly.

12. In a loom, in combination, a warp stop motion, shuttle detecting mechanism, and means, actuated independently of pull exerted through the warp threads, to move the warp stop motion drop-wires forward on detection of failure of the shuttle to box properly.

13. In a loom, having warp stop motion mechanism, the combination with the lay, and with the warp stop motion, of shuttle-detecting protector mechanism operatively combined to move the warp stop motion drop-wires forward synchronously with the lay when the shuttle is improperly boxed or not boxed.

14. In a loom having warp stop motion mechanism, the combination with the lay, and with the warp stop motion, of mechanism operative upon failure of the shuttle to box properly to connect the drop-wire supporting means of the warp stop motion with the lay for movement forward with the latter.

15. In a loom having warp stop motion mechanism, the combination with the lay, and with the warp stop motion, of mechanism which on failure of the shuttle to box properly acts to slacken the warp and move the warp stop motion drop-wires forward synchronously with the beating-up of the lay.

16. In a loom having a warp stop motion, the combination with the lay, a warp-controller at the rear of the loom, the drop-wires of the warp stop motion, and shuttle detecting protector mechanism operatively combined with the warp-controller and

warp stop motion and acting when the shuttle is improperly boxed or not boxed to produce operation of the controller to slacken the warp, and forward movement of the drop-wires synchronously with the lay, of yielding means which normally positions the warp-controller and drop-wires, capable of quickly absorbing the momentum of the lay and bringing the same to rest before completion of the beat and without shock to the loom.

17. In a loom, the combination with the lay, a warp support at the rear of the loom, and a warp stop motion, of shuttle-detecting protector mechanism acting when the shuttle is improperly boxed or not boxed to operate the warp support for warp slackening and move the warp stop motion forward synchronously with the lay, and yielding means to normally position the warp support and warp stop motion, adapted also to quickly absorb the momentum of the lay and bring the same to rest before completion of the beat and without shock to the loom.

18. In a loom, the combination with a lay, of a movably mounted warp stop motion, and a movably mounted whip roll, and means to connect both the whip roll and stop motion with the lay for movement thereby in the event of a shuttle being improperly boxed or not boxed.

19. In a loom, the combination with a lay and a warp supporting and tensioning element and a warp stop motion, of means to connect the warp supporting element and stop motion for movement with the lay in the event of a shuttle being improperly boxed or not boxed, whereby the stop motion will be actuated to move in the same direction and at the same speed as the warp.

20. In a loom, the combination with a lay, of means to release a warp for movement with the lay upon failure of a shuttle to be properly boxed, a warp stop motion, and means to move the stop motion in the same direction and at the same speed as the warp upon failure of a shuttle to be properly boxed.

21. In a loom, in combination, a lay, mechanism including a protection rod adapted to be partially rotated upon boxing of a shuttle, a movably mounted warp stop motion, and means carried by the protection rod connectable with the warp stop motion upon failure of a shuttle to be properly boxed to impart lay movement to the stop motion.

22. In a loom, the combination with a whip roll and a lay, movable supports for the ends of the whip roll, members connected at one end with the whip roll supports, and guiding means for said members, of a warp stop motion connected to said members, and means operable upon failure of a shuttle to be properly boxed to establish connection between said members and the lay to move the whip roll and stop motion with the lay.

23. In a loom, the combination with a whip roll and a lay, movable supports for the ends of the whip roll, members connected at one end with the whip roll supports, a warp stop motion connected with said members, and means operable upon failure of a shuttle to be boxed properly to establish connection between said members and the lay to move the whip roll and stop motion with the lay, of means normally determining the position of the whip roll and warp stop motion, yieldable upon said establishment, and capable of repositioning the whip roll and warp stop motion upon severance of the connection.

24. In a loom, the combination with a whip roll and a lay, movable supports for the ends of the whip roll, members connected at one end with said supports, a warp stop motion connected with said members, and means operable upon failure of a shuttle to be boxed properly to establish connection between said members and the lay to move the whip roll and stop motion with the lay, of yieldable means serving to position the whip roll and warp stop motion normally and capable upon such establishment of rapidly absorbing the momentum of the lay and bringing the same to rest a material distance short of the end of its beat.

In witness whereof, I have hereunto set my hand.

WILLIAM H. BAKER.