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LET-OFF FOR LOOMS

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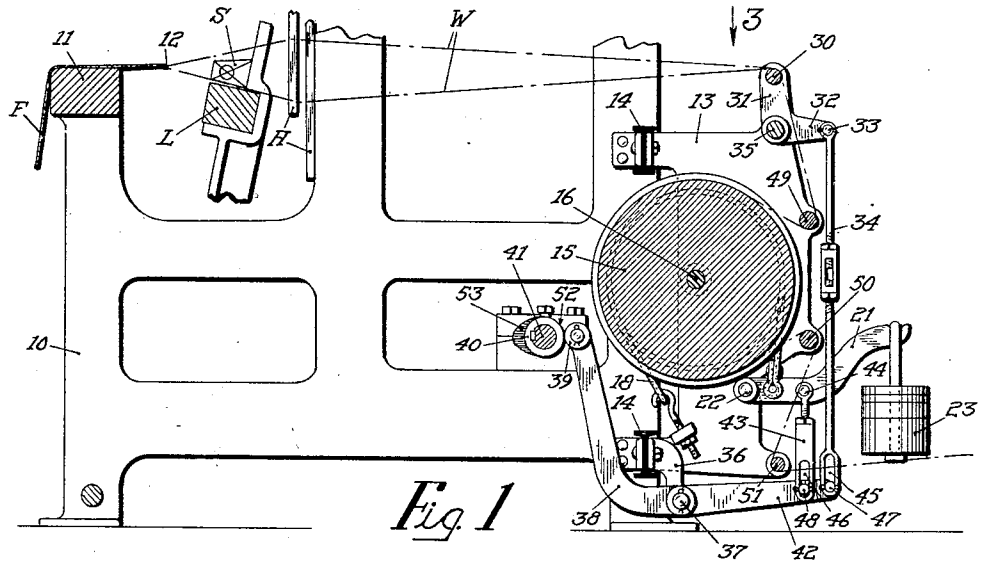


Fig. 1

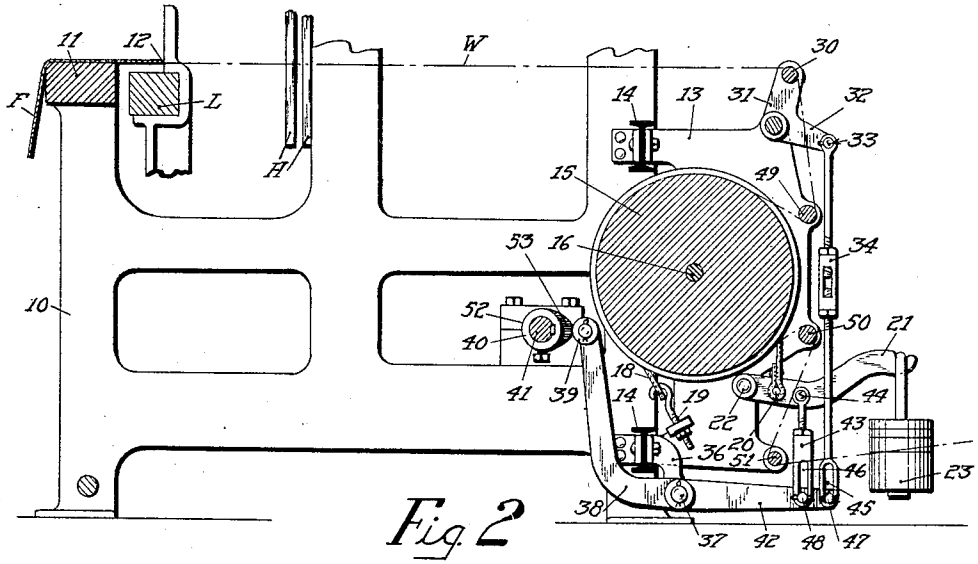


Fig. 2

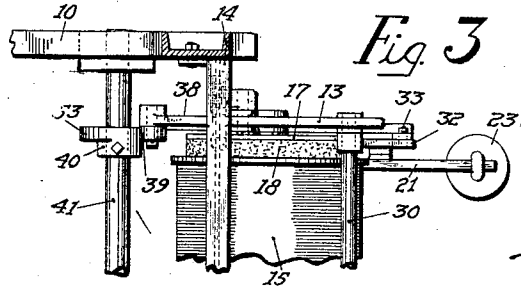


Fig. 3

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UNITED STATES PATENT OFFICE

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LET-OFF FOR LOOMS

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This invention relates to improvements in let-offs for looms and it is the general object of the invention to provide means for tightening the warp at the time of beat-up of the lay to hold the warp threads under sufficient tension to insure tight cloth.

In the weaving of multi-ply cotton straps or belting it is not uncommon to employ a so-called closed shed loom wherein all of the warp threads are brought to mid position at each beat-up of the loom. In such a loom the warp is slackened at the time of beat-up because of the central position of the warp threads. If the lay attempts to beat in filling under this condition of slackened warp it is found that the picks will not be incorporated into the cloth under the proper tension with the result that the fabric is soft and weak. It is an important object of my present invention to provide means for moving the warp threads rearwardly a slight amount on each beat-up of the lay so as to take up slackness in the warp threads.

It is found, however, that it is insufficient merely to move the threads backwardly by means of a movable whip roll unless further provision be made to prevent an advance movement of the warp threads from the warp beam or delivery drum and it is accordingly a further object of my invention not only to move the whip roll rearwardly but at the same time to place additional tension on the warp delivery means to prevent rotation of the same.

It is a more detailed object of my present invention to accomplish the aforesaid results by the use of a lever oscillated every pick of the loom and connected to the whip roll and also the let-off and effective to act on these members when the lay beats up, the lever preferably being operated by a cam.

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 a vertical section of the loom looking from the center toward one side and showing my invention applied thereto with the parts in the position they assume when the lay is in rear position,

Fig. 2 is a view similar to Fig. 1 but with the parts moved to apply increased resistance to the movement of the warp delivery means and to move the whip roll rearwardly so that the warp is held against advance movement, and

Fig. 3 is a detailed top plan view of one end of the device taken in the direction of arrow 3, Fig. 1.

Referring to the drawings, the loom frame 10 has a breast beam 11 over which the fabric F extends. A lay L is moved by the usual mechanism not shown back and forth to beat the filling laid by the shuttle S into the fell of the cloth 12. The warp W is controlled by the harnesses H which may be driven in any manner preferably operated on the so-called closed shed principle, that is, come to mid position on each pick of the loom when the lay L is in its foremost position.

Secured to the rear end of the frame 10 at each side thereof are brackets 13 held in any manner to cross girts 14 of the loom only one bracket being shown and said brackets provide support for a warp delivery means which in the present instance is a drum 15 mounted on a shaft 16. Said drum is provided with a friction head 17 around which extends a flexible friction element 18 the forward end of which is adjustably held by an eye bolt 19 and the rear end of which is connected as at 20 to a lever 21 pivoted to one of the brackets as at 22. A weight 23 is mounted on the rear end of the lever 21 and acts normally to tension the flexible member 18. While the drawings show but one friction member 17 and its attendant parts yet it is within the scope of my present invention to employ two such devices, one at each end of the drum 15. The matter thus far described is the usual friction let-off and forms no part of my present invention.

In carrying my present improvements into effect I provide a whip roll 30 which is supported by the vertical arms of bell crank levers 31 one of which is shown in the draw-

ings. Each bell crank lever is provided with a substantially horizontal rearwardly projecting arm 32 to which is connected as at 33 the upper end of an adjustable link 34. Said levers 31 move about a rod 35 carried by the brackets 13.

A bearing stand 36 is secured to one of the girts 14 and has secured therein a pivot pin 37 on which is mounted for limited oscillation a tensioning lever 38. The upper forward end of said lever is provided with a roll 39 to cooperate with a cam 40 secured to the bottom shaft 41 of the loom. In the present instance the loom is of the so-called equal geared type so that the bottom shaft rotates once for each pick of the loom and a single point on the cam 14 is sufficient to oscillate the lever 38 for each beat-up of the lay.

The rearwardly projecting portion 42 of the lever 38 is connected with the lower end of link 34 and also with a second link 43 the upper end of which is pivoted as at 44 to the lever 21. The lower end of each of the links 34 and 43 are provided with slots 45 and 46, respectively, which receive studs 47 and 48, respectively, secured to the horizontal arm 42. It is to be understood that if two flexible bands 18 are employed there may also be employed two of the levers 38 and all the parts associated therewith.

The warp after passing around the whip roll 30, extends under a fixed rod 49 carried by the fixed structure of the loom frame, over the drum 15 and over a second fixed rod 50, and under the rod 51, extending rearwardly to the creel or other source of supply.

In operation, when the lay is in its rearward position, the shaft 41 will be so placed that the roll 39 will be on the low part 52 of the cam so that the horizontal arm 42 may be in its raised position and the flexible strap 18 is strained merely by the weight of the lever 21, weight 23 and the link 43. Under these conditions also the whip roll 30 will be in its forward position or to the left as viewed in Fig. 1. During the cycle of the loom the lay will move forwardly to beat in the filling. In the type of loom to which the invention more particularly relates the harnesses H will all be in mid or intermediate position when the lay is at its extreme forward position so that all of the warp threads are slack. At this time, however, the high point 53 of the cam 40 is operative to rock the lever 38 in a clockwise direction from the position shown in Fig. 1 to that shown in Fig. 2. The effect of this movement is twofold, namely, link 43 places lever 21 under an additional strain over that created normally by the weight 23, and link 34 moves the whip roll 30 to the rearward position shown in Fig. 2. The warps will therefore assume the substantially horizontal position shown in Fig. 2 with no slackness due to the fact that the whip roll has been moved rearwardly a sufficient distance to compensate for any slackness resulting from the leveling of the harnesses.

It would be insufficient to move the whip roll 30 rearwardly if it were also possible for the warp to slip around the drum 15 and it is to prevent this undesirable slipping that I provide the means for placing the friction band 18 under additional strain at the time of beat-up. This insures holding the warp threads against advance movement. The cam causes the flexible band 18 to stretch somewhat but not sufficiently to cause a permanent set therein. After the beat-up while the lay is moving rearwardly the point 53 will turn away from the roll 39 and the whip roll 30 may move forwardly and the strain on the drum be reduced to normal so that the necessary advance of the warp due to the take-up mechanism not shown may be provided for.

From the foregoing it will be seen that I have provided a simple means for moving the whip roll to take up slack in the warp of a closed shed loom and at the same time provide means for preventing advance movement of the warp threads when the lay beats in the filling. It will also be seen that I have provided means whereby a single lever is effective to move the whip roll to take up slack and at the same time apply additional tension to the warp delivery means.

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 let-off motion for a loom having a lay to beat in the filling, a lever oscillated each pick of the loom when the lay is in its beating-up position, a whip roll movable toward and from the lay, a normally resisted warp delivery means acting independently of the whip roll at all times, and connections between said lever and the whip roll and between said lever and the warp delivery means to move the whip roll rearwardly and also to increase the resistance offered to the movement of the warp delivery means when said lever oscillates at the time of beat-up of the lay.

2. In a let-off motion for a loom having a lay to beat in the filling, a lever, a cam to rock said lever each pick of the loom, a warp delivery means subjected to a given resistance throughout the major part of the cycle of the pick, a whip roll movable toward and from the lay, connections between the lever and the whip roll to move the latter rearwardly at the time of beat-up of the lay, and additional connections acting independently of the whip roll between the lever and the warp delivery means to offer additional

resistance to the movement of the latter at the time of beat-up of the lay.

3. In a let-off motion for a loom having a lay to beat in the filling, a warp delivery means, a flexible frictional element cooperating with the warp delivery means tending to resist movement of the latter at all times, means to place said flexible resilient means under a given tension throughout the greater part of the cycle of the pick of the loom while the lay is in its rearward position, a whip roll mounted for movement toward and from the lay, a lever, a cam to rock the lever when the lay is in its extreme forward position, connections between the lever and the whip roll to move the latter rearwardly when the lay is in its extreme forward position, and additional means connecting the lever and the flexible frictional element to place the latter under additional strain when the lay is in its extreme forward position, said additional means acting independently of the whip roll.

4. In a let-off motion for a loom having a lay to beat in the filling, a warp delivery means, a whip roll movable toward and from the lay, a tensioning lever having a regularly recurring operative movement in a given direction, connections between the whip roll and the tensioning lever whereby the latter is effective to move the whip roll away from the lay and whereby the whip roll when acted upon by the warp to move toward the lay tends to move the tensioning lever in a direction opposite to the given movement, means independent of the tensioning lever to exert a normal tension on the warp delivery means, and connections between the latter and the tensioning member to decrease the tension on the warp delivery means when the tensioning lever moves in a given direction.

5. In a let-off motion for a loom having a lay to beat in the filling, a whip roll movable toward and from the lay, a warp delivery means, a tensioning lever having a positive movement in a given direction at the time the lay moves to its forward position, connections between the tensioning lever and the warp delivery means to increase the resistance offered the warp when the lever moves in the given direction, and other connections between the tensioning lever and the whip roll to cause the latter to move away from the lay when the tensioning lever moves in the given direction, and said other connections tending to move the lever in a direction opposite to the given movement when the whip roll is acted upon by the warp threads to move toward the lay, the first named connections being ineffective to transmit a force from the tensioning lever to the warp delivery means when said lever is moving in a direction opposite to the aforesaid given direction.

6. In a let-off motion for a loom having a lay to beat in the filling, a tensioning lever movable positively in a given direction when the lay is in forward position, a warp delivery means, a second means to exert a normal resistance to movement of the warp delivery means, a whip roll movable toward and from the lay, connections between the lever and the second named means capable of increasing the normal resistance when the lever moves in the given direction and ineffective to lessen the normal resistance offered by said second named means when the lever moves in the opposite direction, and connections between said lever and the whip roll to move the latter rearwardly when the lever moves in the said given direction.

7. In a let-off for a loom having a lay movable to beat in the filling, a whip roll movable toward and from the lay, means to offer a normal resistance to the feeding movement of the warp threads over the whip roll and toward the lay, a regularly moving member having a motion in a given direction at the time the lay approaches its forward position, connections between said member and the whip roll to move the latter rearwardly and also to increase the normal tension of the warp threads when said member moves in a given direction, said member being movable in a direction opposite the given direction of movement under influence of the whip roll without lessening the normal tension of the warp threads.

In testimony whereof I have hereunto affixed my signature.

ELBRIDGE R. HOLMES.