Feb. 17, 1942. M. W. PHILLIPS 2,273,474

LETOFF MECHANISM FOR LOOMS

Filed Dec. 17, 1940

FIG. 1

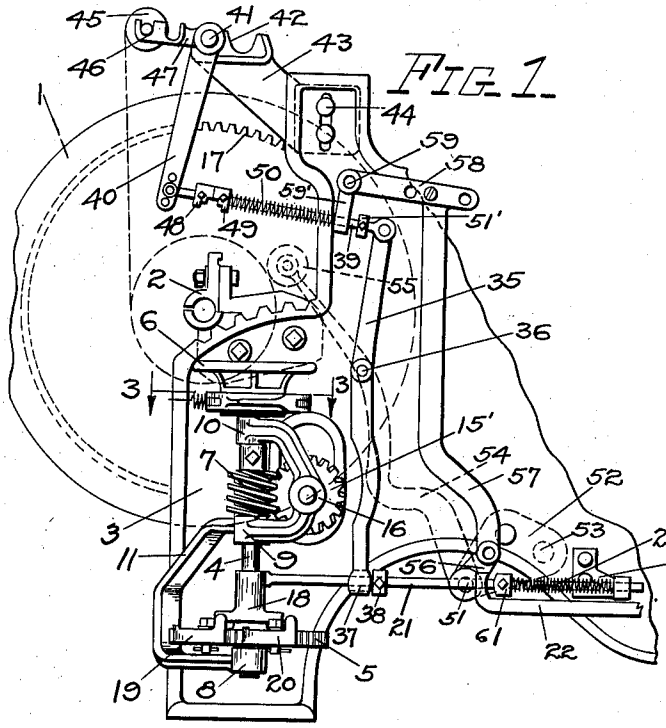


FIG. 2

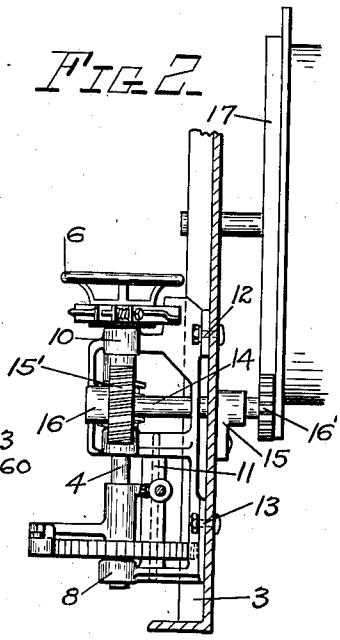
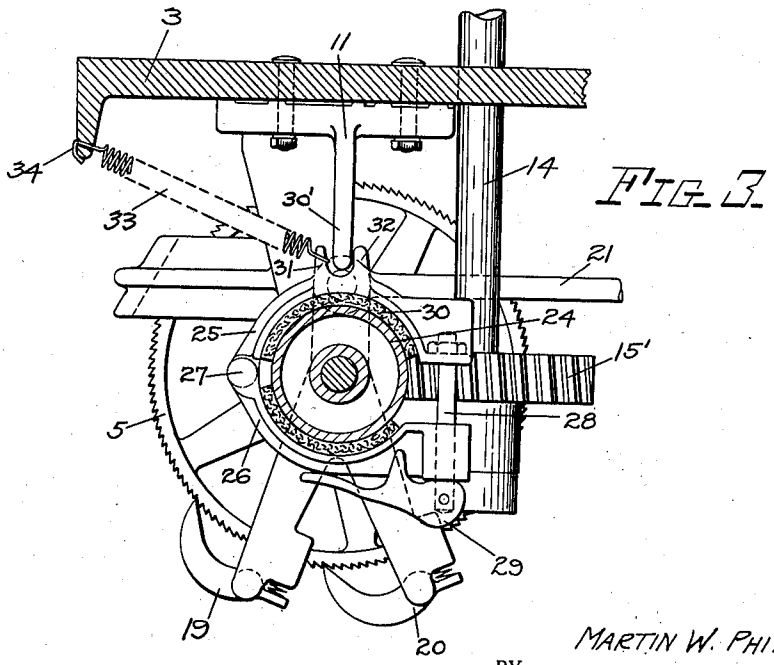


FIG. 3



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LETOFF MECHANISM FOR LOOMS

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6 Claims. (Cl. 139—109)

This invention pertains to let-off mechanisms for looms and more particularly relates to the "positive" type of let-off, wherein the warp beam is positively rotated to supply the warp.

Let-offs of the type above referred to usually comprise a warp beam geared to a transmitting shaft, which shaft carries a pinion driven from suitable mechanism connected with the loom, which pinion, when connected to the transmitting shaft, acts thereby to transmit the required rotary movement to the warp beam. Let-off mechanisms of this type positively rotate the warp beam with an intermittent forward motion to let off the warp. The rate of let-off is controlled by mechanism connected to the whip roll and other mechanism actuated by the variation in diameter of the warp supply on the warp beam. I have found that by providing means for oscillating the warp beam of a let-off of the "positive" type a more even and constant tension in the warp sheet is provided thereby increasing the quality of the cloth.

Accordingly it is a principal object of this invention to provide in a loom, a let-off mechanism including a rotatable warp beam, mechanical means for positively rotating the warp beam in one direction to let-off the warp and resilient means for positively rotating the warp beam in the opposite direction to take up the warp, said means acting intermittently and in succession whereby the warp beam will oscillate and at the same time have a positive step by step rotation to let-off the warp.

This and other objects of the invention are accomplished by the construction illustrated on the accompanying drawing, of which:

Fig. 1 is a side elevation of a portion of a loom having the improved let-off mechanism attached thereto;

Fig. 2 is a front elevation of a portion of the mechanism shown in Fig. 1; and,

Fig. 3 is a view taken on line 3—3 of Fig. 1.

The drawing shows only a part of a loom with my improved let-off mechanism attached thereto, parts of the loom not shown being of usual construction and forming no part of the present invention.

The improvement forming my invention is adapted to be used with any of the so called "positive" types of let-off which include a warp beam geared to a transmitting shaft, which shaft is driven from suitable mechanism connected with the loom and in which brake means are employed to prevent unintentional movement of the transmitting shaft. Of such "positive" types of let-offs, the Roper and Bartlett are the two best known and universally used.

The drawing shows a portion of the rear right hand side of a loom. The parts shown include a warp beam 1 rotatably mounted in a bearing 2 attached to the right hand side frame 3 of the loom. A similar bearing is provided on the left hand side frame (not shown).

For the purpose of illustration, the improvement of my invention is shown as applied to a let-off similar to the Bartlett type of let-off. The let-off may comprise a vertical worm shaft 4 having a ratchet wheel 5 fixed thereto adjacent its lower end, a hand wheel 6 fixed thereto adjacent its upper end and a worm 7 fixed thereto intermediate its ends. The worm shaft 4 is mounted in three vertically spaced bearings 8, 9 and 10 carried by a bracket 11 which is attached to the side frame 3 as at 12 and 13.

A horizontal shaft 14 has one end mounted in a bearing carried by a bracket 15 attached to the side frame 3 and the other end mounted in a bearing 16 carried by the bracket 11. Shaft 14 has a worm wheel 15' on one end adapted to engage the worm 7 on worm shaft 4 and a pinion 16' on the other end adapted to engage a gear 17 fixedly attached to the warp beam 1.

Loosely mounted on worm shaft 4 is a pawl carrier 18, having pawls 19 and 20 mounted thereon. A rod 21 pivoted to the pawl carrier 18 is adapted to be pulled forwardly by a reciprocating link 22 to thereby rotate the ratchet wheel and worm shaft 4 in the direction to effect let-off of the warp sheet from the warp beam. The return stroke of rod 21 is effected by a compression spring 23. Link 22 may be actuated by a moving part of the loom (not shown).

A friction brake to hold worm shaft 4 from unintentional movement is provided. The friction brake may comprise a brake drum 24 fixedly mounted on shaft 4 and a brake band mounted on the drum, comprising a pair of semi-circular members 25 and 26 pivotally connected together at one end as at 27 and adjustably connected together at their other ends by means of bolt 28 and cam 29. The brake band may be lined with leather 30 or other suitable friction material.

Laterally extending from member 25 of the brake band are a pair of spaced apart lugs 31 and 32. Extending into the space between the lugs 31 and 32 is a stop or flange 30' formed as an integral part of bracket 11. A coiled spring 33 has one end attached to the loom frame as at 34 and the other end attached to lug 31.

The mechanism for determining the length

of the forward stroke of rod 21 and thereby the amount of warp let off by the warp beam on each positive forwardly rotative movement thereof, may comprise a lever 35 pivoted to the right hand side frame 3 as at 36. The lower end of lever 35 slidingly embraces rod 21 as at 37. A collar 38 is fixedly attached to rod 21 forwardly of the point of connection 37 between rod 21 and lever 35. Lever 35 at its upper end is pivotally connected to a rod 39 which in turn is pivotally connected to the lower end of an arm 40. Arm 40 is fixedly attached to a shaft 41 which is mounted in a bearing 42 on a bracket 43 attached to the right hand loom side 3 as at 44. A similar bracket and bearing (not shown) supports shaft 41 on the left hand side of the loom. A whip roll 45 is mounted in a bearing 46 on an arm 47 fixedly attached to shaft 41. A similar bearing and arm (not shown) supports the whip roll on the left hand side of the loom. A pair of adjustable collars 48 and 49 are mounted on rod 39 for adjusting the compression of a coiled spring 50 mounted on rod 39.

A short shaft 51 is mounted in a bearing on a bracket 52 attached to the right hand loom side frame 3 as at 53. A lever 54 carrying a roller 55 at its upper end is fixedly attached to one end of shaft 51. The roller 55 is pressed against the warp supply on the warp beam by a spring (not shown). A short lever 56 is fixedly attached to the other end of shaft 51.

The upper end of lever 56 is pivotally connected to the lower end of a lever 57. The upper end of lever 57 is pivotally connected to the long arm 58 of a bell crank lever which is pivotally mounted on the loom side frame 3 as at 59. The short arm 59' of the bell crank lever slidingly embraces the rod 39 between spring 50 and an adjustable collar 51' mounted on rod 39.

Rod 21 is pivotally connected to the pawl carrier 18 at one end and is supported by bracket 60 at its other end. An adjustable collar 61 is fixedly secured on rod 21 and a coiled compression spring 23 is mounted thereon between collar 61 and bracket 60. The link 22 actuated by a moving part of the loom (not shown) slidingly engages the rod 21 rearwardly of the collar 61.

As the link 22 moves to the right as viewed on Fig. 1 it engages the collar 61 and pulls the rod 21 to the right compressing the spring 23 and moving the pawls 19 and 20 with the ratchet wheel 5 to positively rotate the warp beam in a direction to effect let-off of the warp sheet. The amount of let-off on each positive feeding stroke of rod 21 depends upon the position of collar 61 when engaged by the link 22. The position of collar 61 is determined by lever 35, the lower end of which slidingly embraces rod 21. As the lower end of lever 35 moves to the right as seen on Fig. 1 it engages collar 38 and moves rod 21 to the right thereby causing a shorter feed stroke and a smaller let-off of warp. As the lower end of lever 35 moves to the left, the spring 23 will move the rod 21 to the left until the collar 38 abuts the lever 35 and the feeding stroke will be lengthened thereby increasing the amount of let-off.

The movements of lever 35 are effected by the variation of warp tension caused by shedding or other means and by the variation in the diameter of the amount of warp upon the warp beam. As the tension on the warp increases as for instance upon the opening of the shed, the whip roll 45 is moved downwardly as seen on Fig. 1, thereby moving the lower end of lever 35 to the left thereby increasing the amount of let-off. As the diameter of the warp on the warp beam decreases the lever 54 moves to the left as viewed on Fig. 1 causing the bell crank lever to reduce the compression on spring 50 thereby moving the lower end of lever 35 to the left and increasing the amount of let-off. The movement of the whip roll and the lever 54 in the opposite direction decreases the amount of let-off.

The operation of the device is as follows:

When the rod 21 is moved to the right by link 22, the worm shaft 4 is rotated in the direction to rotate the warp beam to let-off the warp sheet. The amount of positive motion given to the ratchet wheel by rod 21 is controlled by the mechanisms previously described. When the pawls act to turn the worm shaft 4 to let-off the warp, the brake band will turn with shaft 4 against the pull of spring 33 until lug 31 abuts the flange 30', thereafter as shaft 4 continues to turn the brake drum will slip in the brake band.

Upon completion of the driving stroke of the pawls, the rod 21 is moved rearwardly by the compression spring 23 thereby moving the pawls into position for another driving stroke. At the same time the spring 33 will move the brake band counter-clockwise as seen on Fig. 3 thereby rotating shaft 4 and through shaft 14 turn the warp beam in a direction to take up the warp sheet, this motion continues until the lug 32 abuts the flange 30' or until the tension of the warp equals that of spring 33 depending upon which of these conditions occurs first.

Thus it is seen that the pawls positively turn the warp beam in one direction with an intermittent motion and the spring 33 positively turns the warp beam in the opposite direction with an intermittent motion.

When the spring 33 turns the warp beam in the direction to take up the warp, the downward pressure on the whip roll 45 is increased, thereby causing the lower end of lever 35 to move to the left, as seen on Fig. 1. Thus the rotation of the warp beam by spring 33 affects the automatic means for controlling the amount of let-off, the effect being to increase the amount of let-off.

As the pawls on each feeding stroke turn the worm shaft a distance greater than the distance between the two lugs 31 and 32 and as the spring 33 can only turn the worm shaft a distance equal to the distance between the lugs 31 and 32 it will be seen that the positive forward motion of the warp beam to let-off the warp on each stroke of the pawls is greater than the rearward motion to take up the warp caused by the spring 33 with the result that the warp beam in addition to oscillating will have a positive forwardly step by step rotary motion to let-off the warp. This oscillating motion of the warp beam eliminates the necessity of a vibratory whip roll and the combined oscillating motion and the positive forward let-off motion insures a constant even tension on the warp sheet at all times.

By use of the device of my invention I find that it is possible to eliminate the need of a vibratory whip roll as the device will take care of the variation of warp tension caused by harness movement and will prevent binding of the warp threads.

While I have described my invention as applied to a let-off of the Bartlett type and show a particular mechanism for controlling the rate of let-off on each positive forward rotation of the warp beam it should be understood that my invention

is adapted to be used with any positive type of let-off employing any suitable mechanism for controlling the rate of let-off.

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

1. In a loom let-off, a warp beam rotatable to let-off warp, a horizontal shaft geared to said warp beam for turning same, means for rocking said shaft with a greater movement in one direction than the other, the direction of greater movement being such as to effect let-off of the warp whereby said warp beam is oscillated and at the same time rotated in a direction to let off warp.

2. In a loom let-off, a warp beam rotatable to let off warp, a horizontal shaft geared thereto, mechanical means for moving said shaft in one direction with an intermittent motion, resilient means for moving said shaft in a reverse direction upon completion of each motion of said shaft caused by said mechanical means, each mechanical motion being larger than each resilient motion whereby said warp beam in addition to its oscillating motion is positively rotated in a direction to let off warp.

3. In a loom let-off, a warp beam rotatable to let off warp, a horizontal shaft geared to said warp beam, mechanical means actuated by a moving part of the loom to positively rotate said shaft in a direction to effect let-off of the warp beam and resilient means for positively rotating said shaft in the opposite direction to take up warp, said rotation to take up warp occuring after each rotation to let off warp and being of lesser amount, whereby said warp beam is oscillated and at the same time positively rotated to let off warp.

4. In a loom let-off, a rotatable warp beam, a horizontal shaft geared to said warp beam, a vertical shaft geared to said horizontal shaft, means for positively rotating said vertical shaft in one direction with an intermittent motion, a brake drum fixedly attached to said vertical shaft, a brake band mounted on said brake drum, said brake band having a pair of spaced lugs extending laterally therefrom, a stop fixed to the loom and extending into the opening between said lugs, a spring connected at one end to the loom frame and at the other end to one of said lugs, said spring normally acting to turn said brake band and thereby said vertical shaft in a direction opposite to said first named direction.

5. In a loom let-off, a warp beam rotatable to let off warp, a horizontal shaft geared to said warp beam, mechanical means for giving said shaft a positive step by step rotary motion in a forward direction, automatic means for controlling the amount of motion of each step, resilient means acting upon said shaft upon the completion of each forward movement to turn said shaft in a reverse direction and thereby affect said automatic means to increase the amount of forward movement of said shaft so that each forward movement of said shaft is greater than each reverse movement of said shaft by an amount to insure a constant even tension on the warp sheet at all times.

6. In a let-off for a loom including a frame having a warp beam rotatably mounted thereon, the combination of a bracket attached to the loom frame, bearings on the bracket, a vertical shaft mounted in the bearings and having a ratchet wheel fixed thereto adjacent its lower end and a worm fixed thereto intermediate its ends, a pawl carrier losely mounted on said shaft and having a pair of pawls, means connected to a moving part of the loom for moving said pawl carrier in one direction to rotate said ratchet wheel, resilient means for moving said pawl carrier in the opposite direction, a brake drum fixed to said shaft adjacent the upper end thereof, a brake band mounted on said drum and having a pair of laterally extending spaced lugs, a stop mounted on said bracket and extending between said lugs, a resilient spring having one end attached to the loom frame and the other end attached to one of said lugs and a horizontal shaft having a worm wheel on one end engaging said worm and a gear on its other end engaging said warp beam.

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