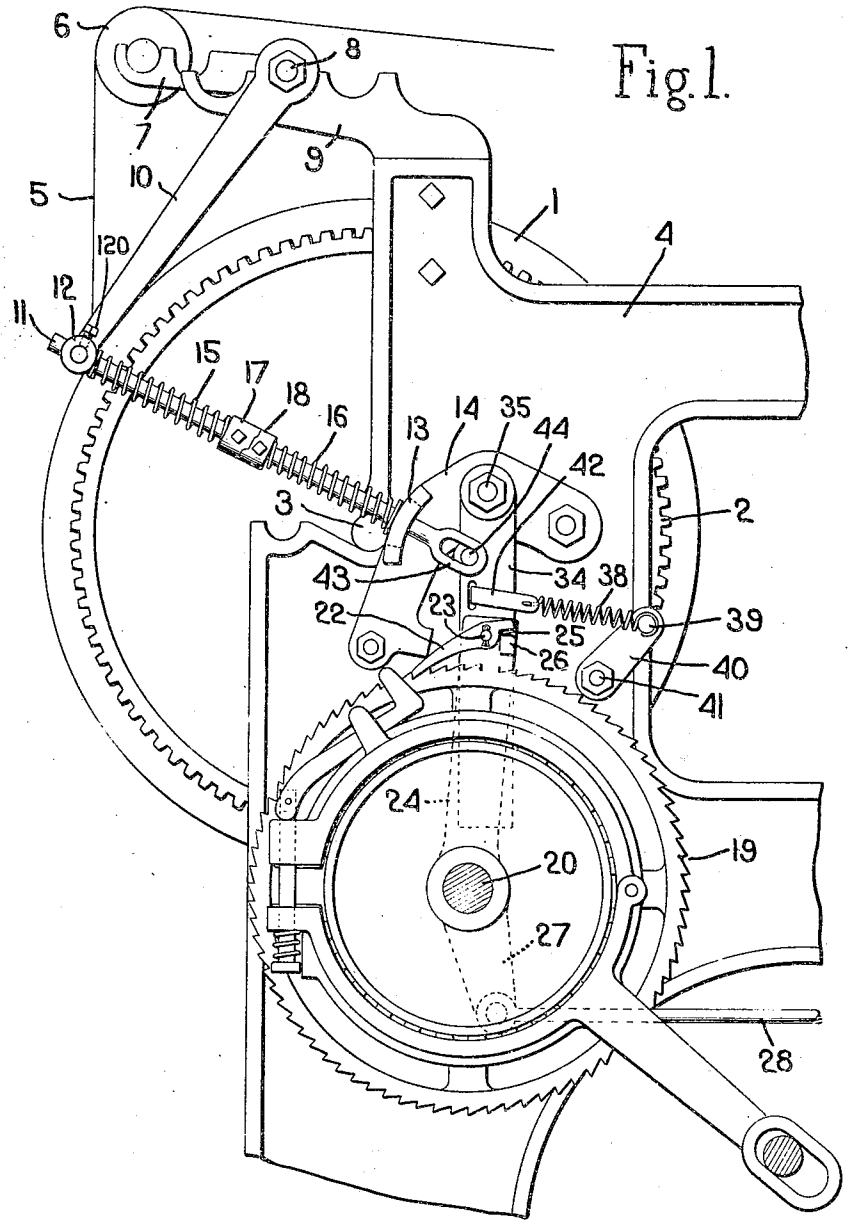
May 13, 1930. C. H. DRAPER 1,758,738

LET-OFF MECHANISM FOR LOOMS

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Fig. 1.



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Fig. 2.

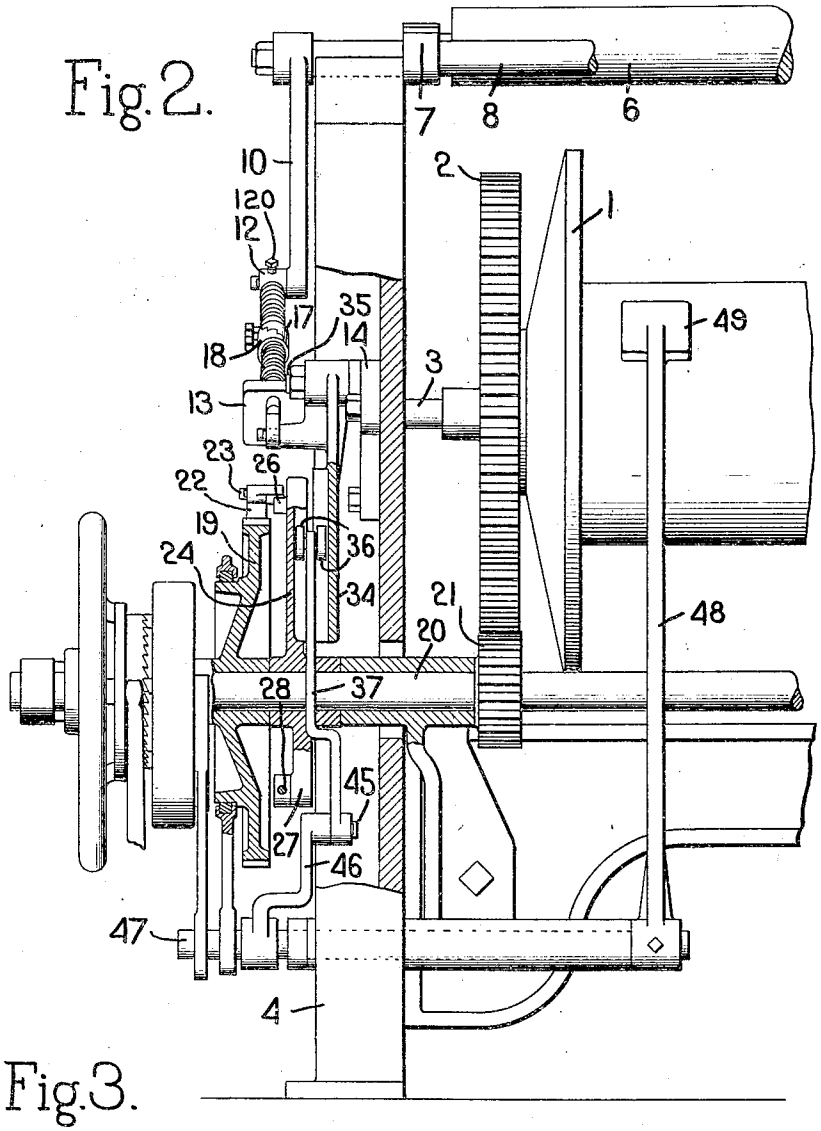
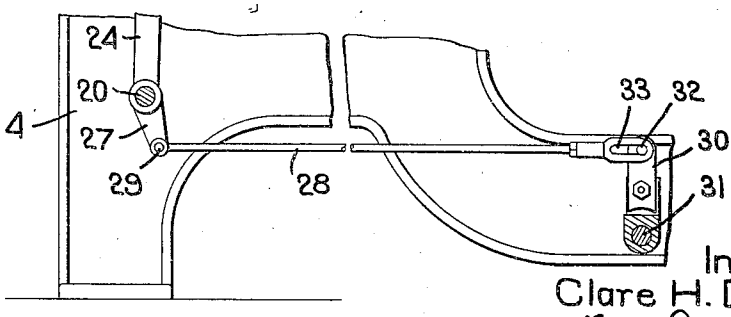


Fig. 3.



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UNITED STATES PATENT OFFICE

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LET-OFF MECHANISM FOR LOOMS

Application filed February 23, 1928. Serial No. 256,087.

This invention relates to a let-off mechanism for looms of the type disclosed in the patents to Haynes, No. 741,661, October 20, 1903, and Roper, No. 647,815, April 17, 1900. In such a let-off mechanism, the warp beam is positively rotated by a pawl and ratchet mechanism operated from some regular moving part of the loom such as the lay to advance the warps the required distance at each beat-up. The extent of this advancing movement is determined by the extent to which the actuating pawl is retracted prior to each advance, the advance of the pawl being positive and terminating at the same point. This retracting movement of the pawl is usually effected, as in the aforesaid patents, through the medium of an arm connected to the pawl carrier, or forming therewith, as it is sometimes termed, a compound pawl carrier and this arm is directly moved to effect this retracting movement by a connection with the whip roll which holds the warps under a predetermined tension.

The connection from the pawl carrier to the whip roll usually includes one or more springs, the purpose of which is to balance and to maintain uniform, so far as possible, the tension of the warps. But when the lay beats up and advances the pawl to effect let-off, such a connection as described acts to raise the whip roll either positively, as in the Roper construction, or suddenly through the springs, as in the Haynes construction, thus undesirably straining the warps and preventing the maintenance of a uniform tension therein.

One object of the present invention is to provide a connection between the whip roll and pawl carrier which shall allow the spring or springs to control the tension of the warps when the pawl is advanced to effect let-off, while at the same time determining the amount of let-off in accordance jointly by the tension of the warps and the diameter of the warp mass on the beam.

A further object of the present invention is to provide a form of mechanism in which the retraction of the pawl carrier is effected by a separate relatively light spring and in which the point to which the pawl carrier is retracted is determined jointly by the position to which the connection to the whip roll is moved and by the diameter of the warp mass on the beam at the time.

A further object of the invention is to provide a very accurate means for determining the extent of each advancing movement of the actuating pawl and thus the amount of the warps let off at each beat-up.

These and other objects and features of the invention will appear more fully from the accompanying description and drawings and will be particularly pointed out in the claims.

The drawings illustrate a let-off mechanism of the type disclosed in the aforesaid patents, together with a preferred form of the present invention embodied therein. As this general type of let-off mechanism is fully disclosed in the said patents and is well known and familiar to those skilled in the art, it will only be necessary to illustrate and describe in detail those parts with which the present invention is particularly concerned.

In the drawings:

Fig. 1 is a side elevation of a portion of a loom emboding the let-off mechanism.

Fig. 2 is a front elevation partially in vertical cross section of the construction shown in Fig. 1.

Fig. 3 is a side elevation partially broken away and on a smaller scale of a portion of the loom to show the operating connection with the lay rocker shaft.

The warp beam 1 is shown with the usual attached gear 2 and trunnions 3 seated in bearing sockets in the side frames 4 of the loom. The sheet of warps 5 extends from the beam over a whip roll 6 forwardly through the usual mechanisms to the front of the loom. The whip roll 6 is journalled in arms 7 secured to a shaft 8 journalled in brackets 9 mounted on the loom frame. An arm 10 is secured to the shaft 8 and extends downwardly therefrom. A rod 11 is mounted to slide at one end through a stud 12 on the lower end of the arm 10 and at the other end through a lug 13 projecting from a bracket 14 bolted to the loom frame. Springs 15 and 16, as described in the aforesaid Haynes pat-

ent, are mounted on this rod, the former between the stud 12 and a collar 17 adjustably secured to the rod and the latter between the lug 13 and a collar 18 adjustably secured to the rod. Thus it will be seen that the tension on the warps is maintained by the springs 15 and 16 and that when this tension becomes sufficient to compress both of these springs, the rod 11 is moved forwardly through the lug 13.

A set screw 120 in the stud 12 enables the rod 11 to be locked against sliding movement therein when desired and thus the tension of the warps may be controlled by the spring 16 with the spring 15 inactive, as is frequently done in practice.

A ratchet wheel 19 mounted on the shaft 20, through the medium of an interposed clutch and other mechanism of a familiar type and not necessary here to describe in detail, serves to rotate the said shaft 20 and therewith the pinion 21 which meshes with the gear 2 on the warp beam. Thus an advance of the ratchet wheel 19 effects the advancing rotary movement of the warp beam and the let-off of the warps, all in a familiar manner.

A pawl carrier in the form of a lever is journalled on the shaft 20 adjacent the ratchet wheel. The actuating pawl 22 is pivoted at 23 to the upper end of the longer arm 24 of this pawl carrier lever. The pawl is held in engagement with the ratchet wheel by a spring 25 seated in a lug 26 on the pawl carrier. The shorter arm 27 of the pawl carrier lever extends downwardly beneath the shaft 20 and a link 28 is pivoted thereto at 29 and extends forwardly to a suitable regularly moving part of the loom such as an arm 30 extended upwardly from the lay rocker shaft 31. The connection between the link 28 and the arm 30 is of the pin 32 and slot 33 type so arranged that upon each forward movement of the arm 30 the pawl carrying lever 24, 27 is positively moved to effect the positive advancing movement of the actuating pawl 22 and always to the same position and so arranged that upon each rearward movement of the arm 30 the pawl carrying lever, and with it the actuating pawl, may be retracted independently of this connection and to any required extent.

One feature of this invention has to do with the means for effecting the retracting movement of the actuating pawl and controlling the limit of this retracting movement jointly by the tension on the warp and by the diameter of the warp mass on the beam.

An arm 34 is pivotally mounted at 35 on the bracket 14 and extends down alongside the arm 24 of the pawl carrying lever. These arms 34 and 24 are longitudinally slotted facing each other and in these opposed slots ride rollers 36 journalled on the end of a bar 37. Thus the two arms 34 and 24 by reason of this interposed connection swing together. The retracting movement of the actuating pawl is effected by a spring or yielding connection 38 extending from a fixed part of the loom, such as the stud 39 mounted on the bracket 40 bolted at 41 to the loom frame, to a strap 42 secured to the arm 34. Thus the arm 34 is swung forwardly directly by the spring 38 and through the roller connections 36 swings forwardly with it the pawl carrying arm 24 and therewith effects the retracting movement of the pawl 22. The spring 38 is shown connected to the arm 34, but as the arms 34 and 24 swing together, it might be connected to either. The rod 11 is provided at its forward end with a slotted portion 43 engaging a stud 44 on the arm 34. Under normal running conditions the stud 44 will remain in engagement with the forward end of the slot in the rod 11, but as the tension increases, the arm 10 will compress first the spring 15 and then the spring 16 and move the rod 11 forwardly or, if the set screw 120 be tightened, will directly move the rod 11 forwardly in either case to an extent dependent upon the tension. Thus the tension on the warp will determine the forward position of the rod 11 and consequently the position to which the stud 44 and hence the arm 34 may swing under the action of the spring 38. The position to which the arm 34 swings will in turn, owing to the roller 36 connection, determine the extent to which the pawl carrying arm 24 and therewith the pawl 22 is retracted. But as the roller connection 36 between the arms 24 and 34 is shiftable, the extent to which the arm 24 is retracted by the arm 34 in turn depends upon the position of this connection.

The position of the roller connection 36 is determined in the usual way. The rod 37 is pivoted at 45 to an arm 46 secured to the shaft 47 journalled in the loom frame. This shaft at the other end is provided with an arm 48 having a head 49 resting upon the warp mass on the warp beam 1. Consequently, according to the diameter of the mass, the roller connection 36 is positioned up or down.

Thus it will be seen that the retracting movement of the arm 34 is limited by the position of the rod 11 as determined by the tension on the warp and that the retracting movement imparted by this arm 34 to the pawl carrying arm 24 is controlled by the diameter of the warp mass on the beam. Thus there is provided means controlled by the tension of the warp and means controlled by the diameter of the warp mass acting jointly for limiting the retracting movement of the pawl carrier, while the actual retracting movement of the pawl carrier is effected by the independently acting spring 38 extending to a fixed part of the loom.

When now beat-up occurs and, through such connections as thus described, the pawl

carrying arm 24, the arm 34 and the pawl 22 are positively advanced to effect let-off, the stud 44 cannot act directly either positively to raise the whip roll or suddenly to compress the springs 15 and 16 and thus raise the whip roll. Instead, by reason of the slot in the rod 11, the stud will swing rearward and the rod 11 will move rearward solely under the influence of the spring 16. Thus the whip roll will be raised either by the spring 16 alone, if the set screw 120 be locked, or by the springs 15 and 16, if it be unlocked, and consequently the rearward movement of the stud 44 cannot impart movement to the whip roll to increase the tension of or strain the warps. It may even prevent a sudden rearward movement of the rod 11 because the rod can move no faster than the stud.

The bodily movable whip roll the rod 11 constitute an element engaging the warps through the interposition of the spring 16 or both the springs 15 and 16, which element is moved by a difference between the tension of the warp and the spring or springs and in this phase of the invention the stud 44 and its cooperating slot illustrated constitute a loose connection between this element and the pawl carrier which acts in conjunction with a means movable in accordance with the varying diameter of the warp mass on the beam to limit the retracting movement of the actuating pawl and which also acts to prevent the pawl carrier on its advancing movement from imparting movement to the warp engaging element.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

1. In a loom a warp beam, mechanism including a ratchet wheel and actuating pawl for rotating the warp beam to let off the warp, a pawl carrier for said pawl, means for advancing the pawl carrier to a fixed position at regular intervals, a movable arm having a retracting movement with the pawl carrier, means connected to a fixed part of the loom acting yieldingly to effect the retracting movement of the arm and pawl carrier, means controlled by the tension of the warp for limiting the retracting movement of the arm and means controlled by the diameter of the warp mass for limiting the retracting movement of the pawl carrier with respect to the arm whereby the actuating pawl after each advancing movement is yieldingly retracted to an extent determined both by the tension of the warp and by the diameter of the warp mass.

2. In a loom a warp beam, mechanism including a ratchet wheel and actuating pawl for rotating the warp beam to let off the warp, a pawl carrier for said pawl, means for advancing the pawl carrier to a fixed position at regular intervals, a movable arm for retracting the pawl carrier, means connecting the movable arm to a fixed part of the loom acting yieldingly to effect the retracting movement of the arm, means controlled by the tension of the warp for limiting the retracting movement of the arm, and means controlled by the diameter of the warp mass for limiting the retracting movement imparted by the arm to the pawl carrier whereby the actuating pawl after each advancing movement is yieldingly retracted to an extent determined both by the tension of the warp and by the diameter of the warp mass.

3. In a loom a warp beam, mechanism including a ratchet wheel and actuating pawl for rotating the warp beam to let off the warp, a pawl carrier for said pawl, means for advancing the pawl carrier to a fixed position at regular intervals, means connected to a fixed part of the loom acting yieldingly to effect the retracting movement of the pawl carrier, means controlled by the tension of the warp and means controlled by the diameter of the warp mass acting jointly for limiting the retracting movement of the pawl carrier whereby the actuating pawl after each advancing movement is yieldingly retracted to an extent determined both by the tension of the warp and by the diameter of the warp mass.

4. In a loom a warp beam, mechanism including a ratchet wheel and actuating pawl for rotating the warp beam to let off the warp, a pawl carrier for said pawl, means for advancing the pawl carrier to a fixed position at regular intervals, means to effect the retracting movement of the pawl carrier, means controlled by the tension of the warp and means controlled by the diameter of the warp mass acting jointly to limit the retracting movement of the pawl carrier after each advancing movement to an extent determined both by the tension of the warp and by the diameter of the warp mass.

5. In a loom a warp beam, mechanism including a ratchet wheel and actuating pawl for rotating the warp beam to let off the warp, a pawl carrier for said pawl, means for advancing the pawl carrier to a fixed position at regular intervals, means to effect the retracting movement of the pawl carrier, a spring, an element engaging the warps through the interposition of said spring and moved by a difference between the tension of the warp and of the spring, means movable in accordance with the varying diameter of the warp mass on the beam and a loose connection between said eelment and pawl carrier acting in conjunction with said movable means to limit the retracting movement of the actuating pawl and acting to prevent the pawl carrier on its advancing movement from imparting movement to said element.

6. In a loom a warp beam, mechanism including a ratchet wheel and actuating pawl for rotating the warp beam to let off the warp, a pawl carrier for said pawl, means

for advancing the pawl carrier to a fixed position at regular intervals, means to effect the retracting movement of the pawl carrier, a bodily movable whip roll engaging the warps, a rod mounted to slide longitudinally through a fixed part of the loom, a spring and a connection between said rod and said whip roll acting upon increase in the tension of the warps to slide the rod in the direction of the retracting movement of the pawl carrier, means movable in accordance with the varying diameter of the warp mass on the beam and a stud and slot connection between the rod and pawl carrier acting in conjunction with said movable means to limit the retracting movement of the actuating pawl and acting to prevent the pawl carrier on its advancing movement from imparting movement to the rod.

7. In a loom a warp beam, mechanism including a ratchet wheel and actuating pawl for rotating the warp beam to let off the warp, a pawl carrier for said pawl, means for advancing the pawl carrier to a fixed position at regular intervals, a movable arm for retracting the pawl carrier, means connecting the movable arm to a fixed part of the loom acting yieldingly to effect the retracting movement of the arm, means moved by increase in the tension of the warp and including an element having a stud and slot connection with said arm for limiting the retracting movement of the arm, the said connection acting to prevent the pawl carrier on its advancing movement form imparting movement through said arm to said element, and means controlled by the diameter of the warp mass for limiting the retracting movement imparted by the arm to the pawl carrier whereby the actuating pawl after each advancing movement is yieldingly retracted to an extent determined both by the tension of the warp and by the diameter of the warp mass.

In testimony whereof, I have signed my name to this specification.

CLARE H. DRAPER.