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# UNITED STATES PATENT OFFICE.

GEORGE CROMPTON AND HORACE WYMAN, OF WORCESTER, MASSACHUSETTS, ASSIGNORS TO SAID CROMPTON.

## LET-OFF MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 266,351, dated October 24, 1882.

Application filed January 23, 1882. (No model.)

*To all whom it may concern:*

Be it known that we, GEORGE CROMPTON and HORACE WYMAN, of Worcester, county of Worcester, and State of Massachusetts, have invented an Improvement in Let-Off Mechanisms for Looms, of which the following description, in connection with the accompanying drawings, is a specification.

This invention in looms relates to improvements in the let-off mechanism, and has for its object the production of an organized mechanism whereby the whip-roll, in that class of looms wherein the let-off is made to depend upon the strain exerted on the warp by the lay as it beats up the filling, is operatively connected with and moves a lever which actuates the pawl and ratchet or equivalent mechanism of the let-off, the arms of the said lever being made variable automatically through the instrumentality of a pad which is held pressed against the mass of warp on the warp-beam.

By our invention we are enabled to let off the warp uniformly and avoid the greatly-increased strain thereon when the warp-beam is nearly empty, and are enabled to secure greater uniformity in the number of picks to the inch in the fabric being woven.

Figure 1 represents a partial rear side view of a sufficient part of a loom to illustrate one embodiment of our invention; Fig. 2, a right hand end view of Fig. 1, and Fig. 3 a section of Fig. 1 on the dotted line  $z z$ .

The loom-frame A, of any usual or suitable shape, has proper bearings for the journals of the warp-beam C, on which is a worm-gear, C<sup>2</sup>, which is engaged by a worm, C<sup>3</sup>, on the shaft C<sup>4</sup>, having at its top a hand-wheel, C<sup>5</sup>. The shaft C<sup>4</sup>, below the hand-wheel, has upon it a ratchet, c, which, to rotate the said shaft and warp-beam intermittently for the proper distance, is engaged by a pawl, c<sup>6</sup>, on a pawl-carrier, c<sup>7</sup>, having its fulcrum on the shaft C<sup>4</sup>. The opposite end of the pawl-carrier is connected with the lever p<sup>2</sup> by a link, c<sup>8</sup>. The lever p<sup>2</sup> is pivoted upon a bracket, a, attached to the loom-frame, and the short arm 3 of the said lever is connected by a rod, p<sup>12</sup>, with the outer end of a short longitudinally-slotted lever, b, loosely connected at c with the end of a rod, g, and a link, f, having its fulcrum at 4, the link serv-

ing to support both the rod and the end of the lever b. The other end of the rod g is connected with one end of a lever, h, pivoted at 5 on the loom-frame, and the opposite end of the said lever h is connected by link i with the pad k, the shank k<sup>2</sup> of which is extended through guides 6 in a plate secured to the loom-frame. The pad k in practice will rest directly against the mass of yarn or warp on the warp-beam C, and will be kept pressed against the warp by the spring m, one end of which is joined with the lever h and its other with a suitable fixed stud or eye, m<sup>2</sup>. We have not herein shown the warp-beam as having warp upon it.

The whip-roll G, of usual construction, is carried by a shaft having its ends journaled in suitable bearings of the loom-frame, and the said shaft has projecting backwardly from it an arm, d, upon which is hung the rod n of the mechanism to be described, which keeps the whip-roll pressed upward in a yielding manner in opposition to the strain exerted on the warp by the lay as it beats up the filling. In this our invention the amount of warp let off depends upon the diameter of the filling, as fully described in United States Patent No. 192,514, to which reference may be had. The take-up, to co-operate with this let-off, will in practice be substantially as in the said patent. At the lower end of the rod n are weights n<sup>2</sup>, more or less heavy, according to the class of fabric being woven. The descent of the arm d, and the rise of the whip roll to adapt it to the warp being employed, is adjusted by the stop 12 in the lug 13, as described and claimed in our application filed January 26, 1882. The lowermost piece of the weight n<sup>2</sup>, it being fixed to the rod n, has at its rear side a pin, p, (see Fig. 3, and dotted lines Fig. 1,) which enters the slot in the lever b. The pad k rises under the action of the spring m as the warp is unwound from the warp-beam, the diameter of the beam and its mass of yarn then decreasing, and as the pad rises it moves rod g in the direction of the arrow 10 and shifts the lever b over the pin p carried by the fixed part of the weight n<sup>2</sup>, so that the weight raised as the whip-roll is depressed by the strain of the yarn upon it (the lay then beating in the filling) will raise the outer end of lever b for a greater

or less distance, and by the rod  $p^{12}$  and lever  $p^2$  link  $e^4$  and pawl-carrier  $e^5$  will cause the pawl  $e^6$ , in engagement with the ratchet  $e$ , to turn the shaft  $C^4$  and warp-beam for a greater or less distance, the distance increasing as the yarn is unwound. When the pawl-carrier  $e^5$ , having the pawl  $e^6$  for moving the ratchet  $e$  on the shaft  $C^4$  which, by its worm  $C^3$  actuates the let-off, is moved directly from an arm fixed to the shaft of the whip-roll  $G$ , as in our application filed January 26, 1882, the whip-roll, when the warp-beam is nearly empty, is obliged to descend so low to insure the delivery of a proper amount of warp that the strain on the warp is made much greater in proportion than when the warp-beam is nearly full and the whip-roll does not descend so low. The taking up of the cloth also depending, as stated, upon the pressure of the lay or its reed against the filling at the fell, any increased strain upon the warp by reason of the whip-roll occupying a lower position will, it is obvious, affect the number of picks to the inch, other things being equal; but to obviate this difficulty and insure greater uniformity in the fabric as to the number of picks to the inch we have devised mechanism whereby the pawl derives its movement from a lever which is variable as to its throw, according to variations in the quantity of warp on the warp-beam.

The power to lift the lever  $b$  and actuate the pawl  $e^6$  more or less is applied to the lever by the pin  $p$  as it is raised and lowered by the rod  $n$  and whip-roll, and the lever is gradually moved longitudinally with relation to the pin  $p$  as the yarn is unwound. The whip-roll is herein shown as the source of motion for the lever  $b$  to actuate the pawl  $e^6$ ; but by the intervention of the lever  $b$ , as described, and sliding it on the pin  $p$ , the point to which the whip-roll has to descend when the warp-beam is nearly empty to thus secure the delivery of the proper amount of warp need not be so low as in the patent and application referred to, and consequently the strain on the warp will be more uniform and the number of picks to the inch be maintained substantially the same, notwithstanding variation in the amount of warp on the warp-beam.

Instead of the toothed pawl and ratchet  $e^6 e$ , we might use a friction-pawl and ratchet of any usual construction as equivalents. Instead of the slotted lever  $b$  and pin  $p$  as a connection between the rod  $n$  and the lever  $b$ , it is obvious that the lever might be a round rod and enter or slide through a hole in the pin  $p$ .

We claim—

1. The whip-roll, means to keep it pressed up in a yielding manner against the strain of the warp on the whip-roll, and a lever the fulcrum of which is changeable in its position, and connecting means between the said whip-roll and lever, combined with a pad adapted to bear against the warp on the warp-beam, and suitable connecting devices between the said lever and pad, whereby decrease in the amount of warp on the warp-beam enables the outer end of the said lever to be raised a greater distance, substantially as described.

2. The whip-roll, means to keep it pressed up in a yielding manner against the strain of the warp on the whip-roll, and a lever the fulcrum of which is changeable in its position, and connecting means between the said whip-roll and lever, a pad adapted to bear against the warp on the warp-beam, suitable connecting devices between the said lever and pad, the warp-beam, the shaft  $C^4$ , and gearing between it and the warp-beam, combined with a pawl and ratchet and means between the said lever and pawl to actuate said pawl, substantially as described, whereby decrease in the amount of warp on the warp-beam enables the outer end of the said lever to be raised a greater distance and makes the said pawl and ratchet turn the shaft  $C^4$  and warp-beam a greater distance by the automatic change of position of the fulcrum of the said lever, as set forth.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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Witnesses:

J. B. SYME,  
J. A. WARE.