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C. B. BENNETT.

AUTOMATIC REVERSING LET-OFF MOTION FOR LOOMS.

(Application filed Feb. 17, 1900.)

(No Model.)

Fig. 1

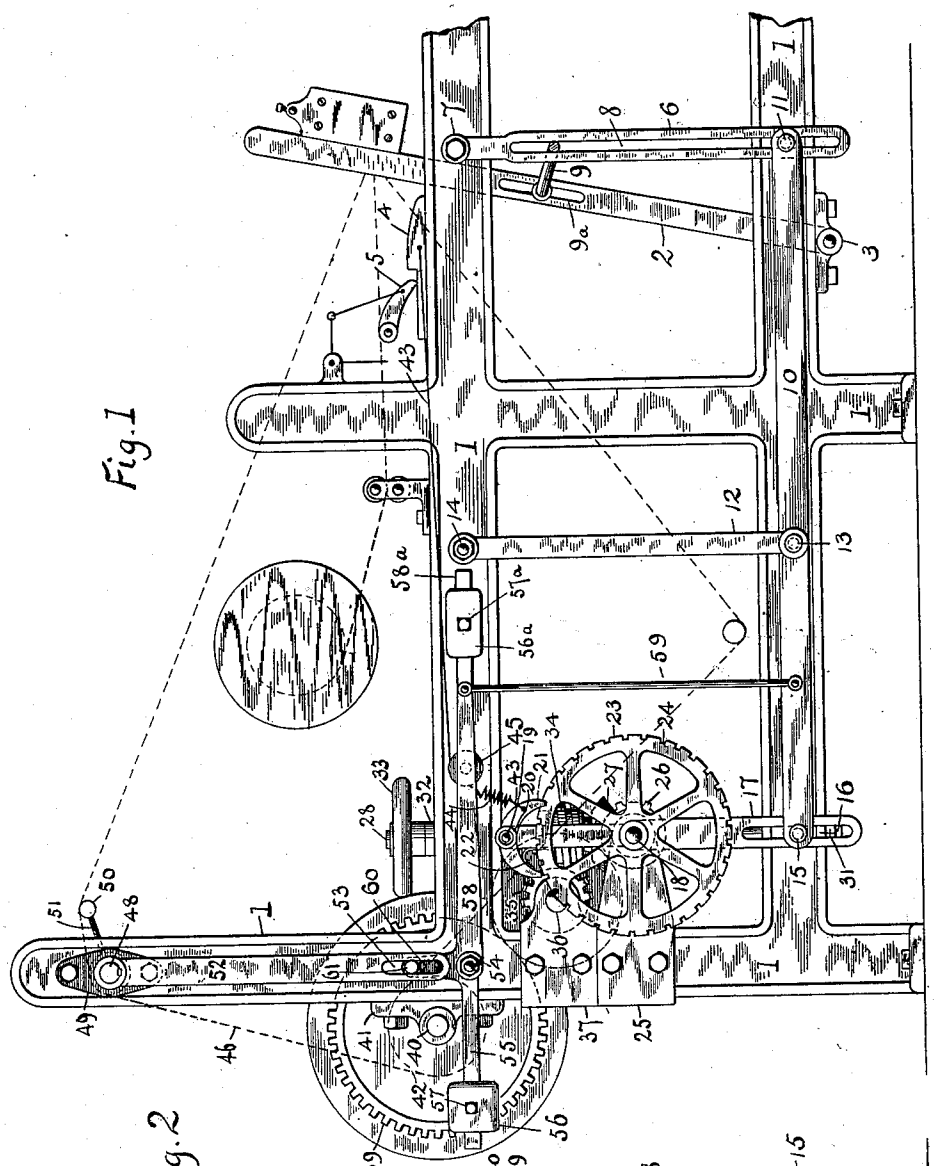
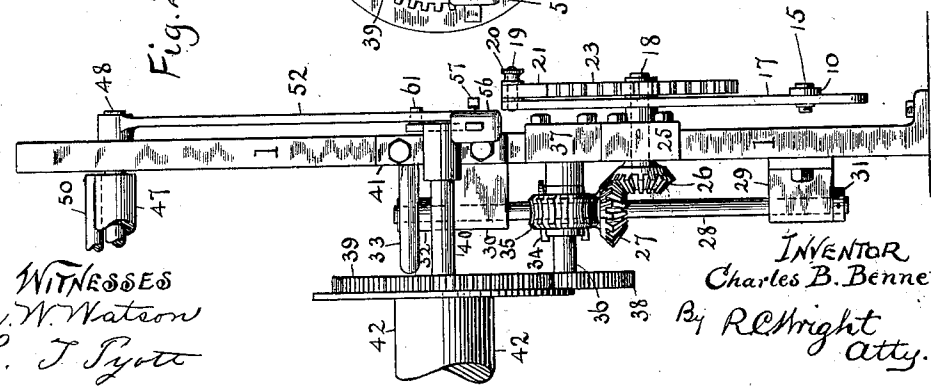


Fig. 2



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UNITED STATES PATENT OFFICE.

CHARLES B. BENNETT, OF PHILADELPHIA, PENNSYLVANIA.

AUTOMATIC REVERSING LET-OFF MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 660,834, dated October 30, 1900.

Application filed February 17, 1900. Serial No. 5,560. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. BENNETT, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Automatic Reversing Let-Off Motions for Looms; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in looms, especially for those used for manufacturing plush or double-pile fabrics, and has for its objects, first, a perfect control of the warp, to the end that my mechanism positively moves the beam and advances the warp for a uniform weave; second, the providing of a means whereby the operator can unassisted reverse the motion of the warp-beam and turn it backward to rewind the backing warp when necessary to search for an imperfect pick and while doing so preserve the tension on the warp ready, without any adjustment whatever, to at once commence to weave; third, the means to enable the operator to turn the warp-beam either forward or backward at will without operating the loom; fourth, to provide a governor which secures an advance of the warp suited to its tension by controlling the speed of the warp-beam, and, fifth, to provide a means to regulate the amount of yarn let off to supply the weave in goods of different numbers of wefts per inch. I also secure by my mechanism an even tension on all warps at all times, without which in pile fabrics goods of even surface cannot be produced, as an uneven let-off will produce an unparallel distance between the two backing webs, which when the webs are cut apart will produce an uneven pile, and, if the tension is not preserved, when the weaver searches for an imperfect pick an imperfection will occur, which in plushes is very readily noticed, even if only a very slight error in the weave is produced.

I attain the objects of my invention by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation view of the loom, and Fig. 2 is an end view of a portion of the same.

Similar figures of reference indicate similar parts throughout the views.

1 is the framework of the loom to which my mechanism is attached. 2 is the sword of the lay, 3 the bearing to which the sword is fulcrumed. 4 is the stop-motion slide. 5 is the stop-motion pawl, all of these parts being old and somewhat modified in different constructions of looms; but to any of these constructions my mechanism is adapted to be attached and coöperate, as their functions are the same, although the construction is varied. A pendulum-lever 6 is attached to frame 1 at 7 and reaching downward has a slot 8. A "monkey-tail" 9 is secured in sword 2 in slot 9^a and reaching outward has its outer end curved to enter slot 8, so that whenever the sword is moved in or out the lever 6 is swung from its fulcrum 7. Near the lower end of lever 6 a rod 10 is attached to it by a pin 11 through slot 8 for free vertical movement in the slot 8. The rod 10 is carried back, and about midway of its length it is secured for free movement about a pin 13 in a suspension-fulcrum 12, the fulcrum being secured at its upper end to frame 1 for pendulous movement by bolt 14. At the other end of rod 10 it is secured for free movement by a pin 15 in slot 16 of ratchet-lever 17, which embraces shaft 18 and is fulcrumed thereon, and thereafter extending upward has at its upper end a pin 19, with a thumb-nut 20, and a double-ended pawl 21 is placed on pin 19, and under nut 20 a spring 22 is secured to lever 17 and lies under the back or left-hand end of pawl 21 to cause it to normally be engaged at its front or right-hand end to ratchet-wheel 23, tightly secured on the outer end of shaft 18. Wheel 23 is provided with notches 24 (which in practice are about three-sixteenths of an inch pitch) and into which the pawl 21 enters at its right-hand end when weaving and at its left-hand end when the filling breaks and a pick must be searched. Shaft 18 is secured for revolving in bracket-bearing 25, secured to frame 1, and on this shaft, inside of the frame and bearing, is placed bevel-gear 26, engaging bevel-gear 27 on upright shaft 28, running in bearings 29 30, having a collar 31 below 29

and a collar 32 above 30. A hand-wheel 33 is secured to shaft 28 at its upper end. Above gear 27 on shaft 28 is secured a worm 34, engaging a worm-wheel 35, secured on shaft 36, carried on bracket-bearing 37. A pinion 38 is secured on the inner end of shaft 36, and it engages gear 39 on shaft 40, running in bearings 41, (one being on each side frame 1,) and on this shaft 40 is secured warp-beam 42. Attached to pawl 21 is a cord 43, having a spiral spring 44, the cord passing over a wheel 45, secured to frame 1, and thence forward where it is attached to stop-motion slide 4. Warp-yarn 46 is wound on beam 42 and is carried upward and over roller 47 on shaft 48, secured in bearings 49 at the upper part of framework 1 and thereafter over feeler 50, attached to roller 47 by rods 51, this construction being old. Attached to shaft 48 is firmly secured vibrator 52, which reaches down therefrom and has at its lower end a slot 53. Fulcrumed on frame 1 directly below vibrator 52 by stud 54 is the governor-lever, consisting of an outer end 55, on which is placed a balancing-weight 56, secured by set-screw 57, having an inner end 58, which reaches forward and has secured thereto a lifter-rod 59, which reaches downward and is attached to rod 10 between suspension-fulcrum 12 and ratchet-lever 17 and a part 60 of the governor-lever, which reaches directly upward from stud 54 and has a pin 61, which projects outward therefrom at its upper end and enters slot 53. By reference to lever extension 58^a, weight 56^a, and set-screw 57^a (shown in Fig. 1) will be seen the main governing means of the let-off mechanism. When the loom is stopped and it is desired to move the warp either forward or back, the pawl 21 is secured for non-engagement at either end by tightening thumb-screw 20 after the pawl has been placed central, and then by revolving hand-wheel 33 in either direction the beam is moved as desired.

Ratchet-wheel 23 is made of large diameter to enable the placing of a large number of notches 24 in its periphery and to have them of very fine pitch to enable the ratchet to respond to the delicate movements of the governor and to graduate the movement of the beam to suit any desired number of picks per inch.

For the regulation of the amount of yarn let off for goods of different picks per inch I have provided a slot 9^a in sword 2, so that monkey-tail 9 may be so placed in the slot as to move lever 6 in amount to properly rotate the ratchet-wheel 23 and the beam to supply the desired amount of warp-yarn to suit the number of picks of the weave. Sword 2 vibrates with every beating in of the weft or filling and through monkey-tail 9 operates vibrating lever 6, rod 10, and ratchet-lever 17, which while the loom is running engages the ratchet-wheel 23 by means of the pawl 21, as seen in Fig. 1, which is correctly shown for the unrolling of the warp while weaving. The spring 44 permits the engagement of pawl 21 and wheel 23 without disturbing stop-motion slide 4, while spring 22 yields enough to allow the rear end of pawl 21 to pass notches 24 without engaging them. By revolving wheel 23 gears 26 27 are made to revolve shaft 28, moving worm 34, its wheel 35, shaft 36, and pinion 38, which revolves gear 39 and beam 42. Whenever the filling breaks, the stop-motion shoe 4 moves forward, actuates the belt-shifter, and stops the loom. The forward movement of shoe 4 operates cord 43, which overcomes spring 22 and engages the pawl 21 and wheel 23 at its back or reverse end. The broken pick must now be searched, and heretofore it has been necessary for the weaver to obtain assistance to back off the warp; but with my mechanism the weaver by operating the lay, and thereby the sword 2 and the mechanism which I have attached thereto and which I have already described, will now work the beam reversely, rewind the warp, move the weave back, and permit the search for the imperfect pick, and while doing so maintain perfect tension of the warp, so that when the right pick is found the loom is immediately ready to weave, and when the power is again applied shoe 4 resumes its normal position and pawl 21 is set for unwinding the warp.

While I have especially designed my mechanism for plush or double-pile fabrics, it is at the same time adapted to be readily attached, to great advantage, to any loom, with possible minor changes.

The governor mechanism which I have shown and described is connected to the feeler 50, over which the warp runs and over which the warp is put in proper tension to suit the weave and connected to the feeler by a system of compound-lever movements which are very sensitive to any variations of pressure on the feeler by the warp. The above-described part of the governor is connected to the rod 10, operated by the sword 2, so that if the tension becomes greater than the weight is set to balance the arm 58 will be raised. This will pull up rod 59 and raise pin 15 of rod 10 in slot 16, shortening the leverage of ratchet-lever 17, and will lower pin 11 in slot 8 of lever 6, lengthening the leverage and thereby increasing the movement of ratchet-wheel 23 and all of the mechanism thereto connected and moving the beam 42, and by revolving the beam faster will let off more warps, and thus equalize the tension. In case the tension is less than the governor is adjusted for, the arm 58 will be depressed, carrying down rod 59, and a reversal of movements from that just described will result and beam 42 will be retarded.

The compounding of levers in my governor system makes a mechanism extremely sensitive to any variations from its normal position and the tension the governor is intended for when adjusted to the work the loom is to do.

I claim—

1. In a loom, the combination with its lay-sword, its warp-beam and stop-motion, of a ratchet-wheel, a ratchet-lever and a double pawl, and a connection therefrom to the stop-motion, a pendulum-lever and means for its movement by the sword, having changeable attachment thereto, and means connected to the stop-motion whereby a reverse shifting movement is effected when the filling breaks, and means from the ratchet-wheel to revolve the beam in either direction, in manner and form substantially as set forth.

2. In a loom, the combination with its lay, its stop-motion, and its warp-beam, of a ratchet-wheel, a shaft therefor, a ratchet-lever fulcrumed upon the shaft, a double pawl upon the lever and having reversing means therefor, connected with the stop-motion, a pendulum-lever moved by the lay-sword, a suspension-fulcrum, a rod carried thereby which connects the pendulum-lever and the ratchet-lever, means to move the rod from the lay-sword, means to connect the rod for a reverse-shifting vertical movement at each end, and means from the ratchet-wheel to revolve the beam in either direction, in manner and form substantially as set forth.

3. In a loom, the combination with its lay, its lay-sword, its warp-beam and stop-motion, of a ratchet-wheel, a ratchet-lever and a double-acting pawl adapted to move the ratchet-wheel in reverse directions by mechanism connected to the lay-sword, means connected to the ratchet-wheel to move the beam, and means connecting the loom stop-motion and the pawl whereby the beam-moving mechanism is reversed when the loom-power is cut off by the breaking of the weft, substantially as and for the purposes specified.

4. In a loom, a lay, a lay-sword and a connected pendulous lever, a warp-beam, a stop-motion a ratchet-wheel having a lever and a double-acting pawl having operative connection with said stop-motion, a pivotally-suspended rod having pin-and-slot connections with the pendulum-lever and the ratchet-lever, a pendulous fulcrum for the pivotally-suspended rod and attached about midway thereof, means to move the beam from the ratchet-wheel, a feeler over which the warp is drawn, a governor connected to the feeler and attached to the pivotally-suspended rod, and operated by the pressure of the warp to move the rod aforesaid in manner to accelerate the motion of the ratchet-wheel, the beam and the warp when the warp is too taut, and reversely, when the warp is too loose to retard the motion of the ratchet-wheel, the beam, and the warp, in manner and form substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES B. BENNETT.

Witnesses:

SAMUEL G. BENNETT,

CHARLES E. WINKLER.