Sept. 24, 1929. W. I. SEYMOUR ET AL 1,729,130

LET-OFF FOR LOOMS

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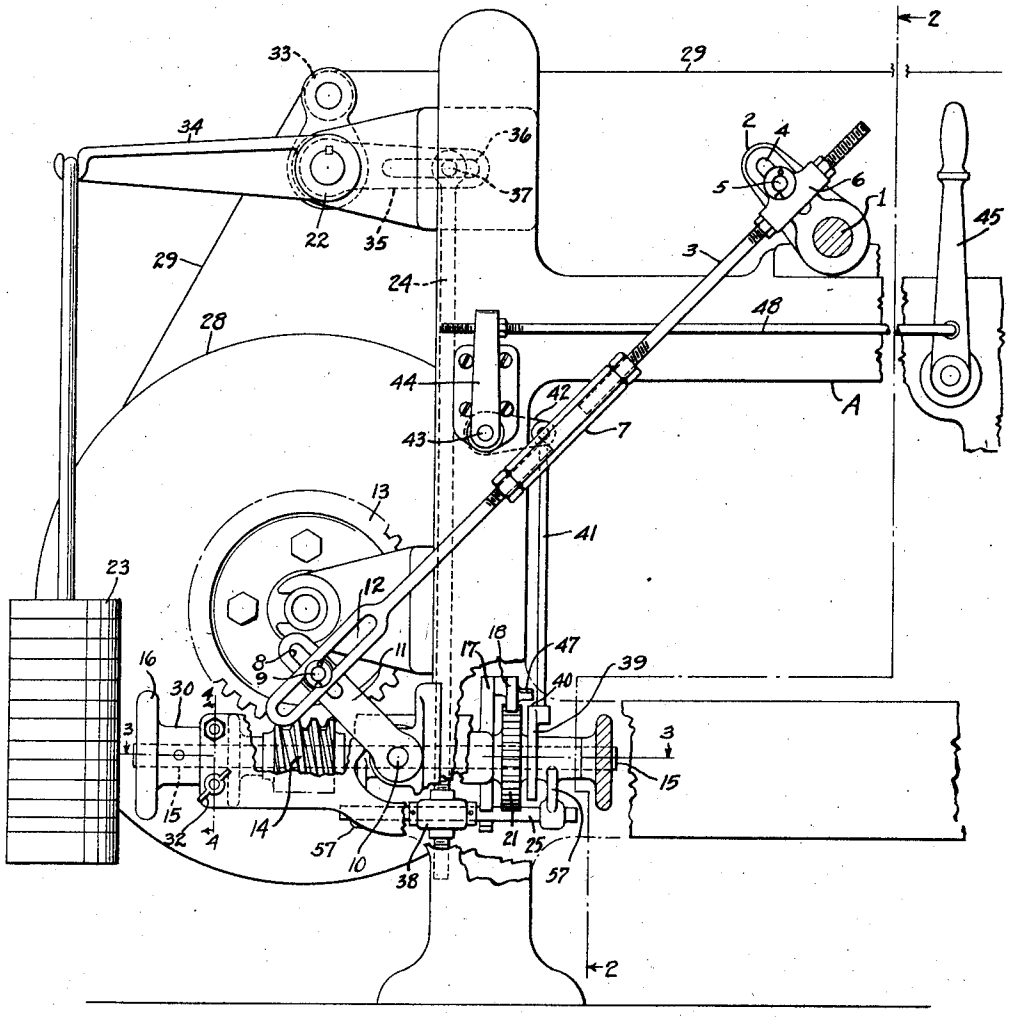


Fig 1

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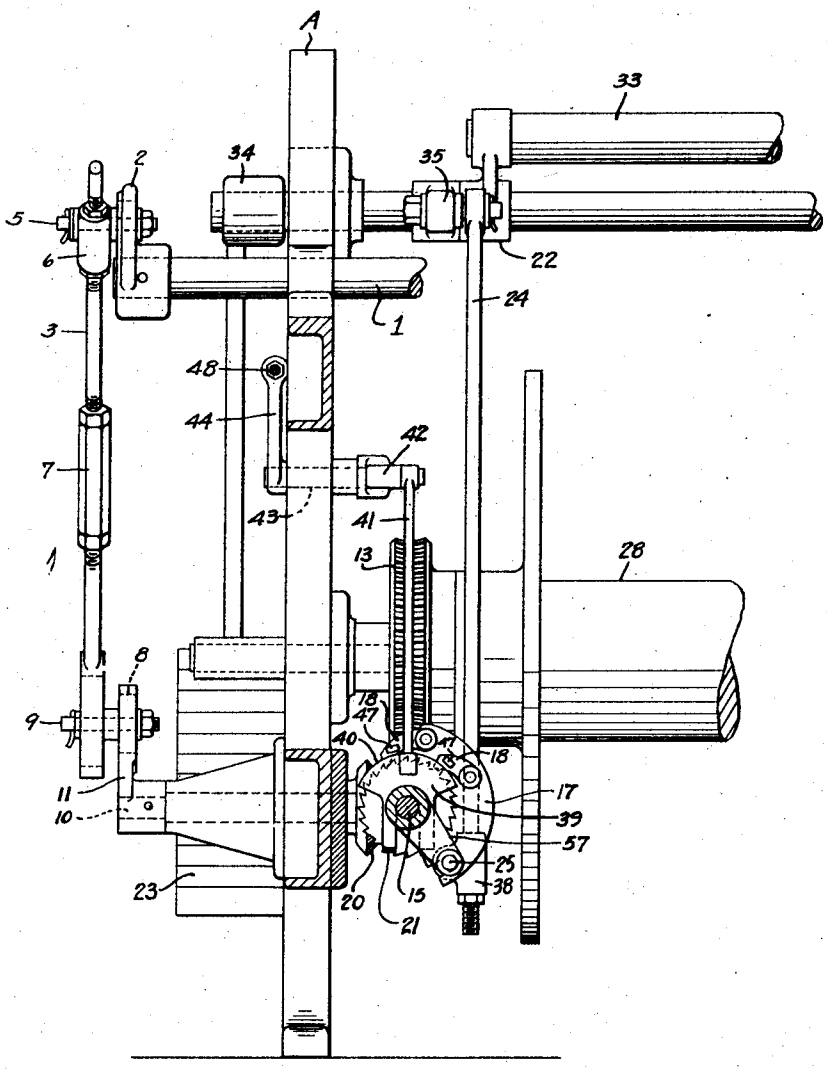


Fig 2

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Fig 3

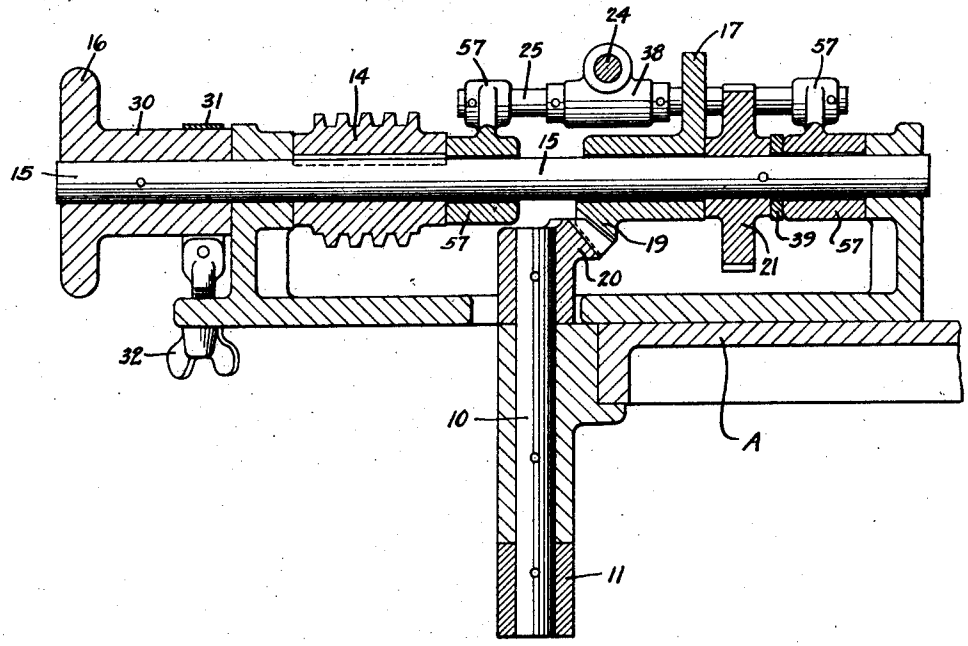
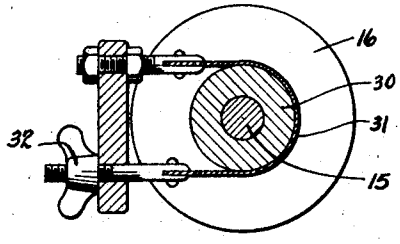


Fig 4



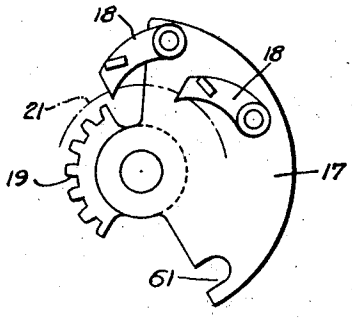


Fig 5

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UNITED STATES PATENT OFFICE

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LET-OFF FOR LOOMS

Application filed December 9, 1927. Serial No. 238,786.

The invention relates in general to the art of weaving, and more particularly, to let-off devices for looms.

The invention contemplates apparatus of the character described above having a positive, mechanical let-off movement for the warp beam which is controlled by the tension of the warp threads. The let-off may be controlled directly from the main shaft of the machine by an action which is reliable and constant. Suitable devices are provided for rendering the let-off apparatus ineffective and for adjusting the warp beam by hand without stopping the machine.

According to one form of the invention, a loom having the usual warp beam and the usual weaving apparatus is provided with a whip roll over which the warp threads pass. A worm and worm wheel operated by a ratchet and pawl arrangement is arranged for driving or letting-off the warp beam. The pawl is driven directly by a main shaft of the machine and has a positive reciprocating motion, the amplitude of which is accurately controlled by the position of the whip roll. A pawl lifter is provided whereby the pawls may be lifted clear of the ratchet wheel to stop the let-off motion when desired, and a suitable hand wheel is provided for adjusting the let-off by hand.

The invention also consists in certain new and original features of construction and combinations of parts hereinafter set forth and claimed.

Although the novel features which are believed to be characteristic of this invention will be particularly pointed out in the claims appended hereto, the invention itself, as to its objects and advantages, the mode of its operation and the manner of its organization may be better understood by referring to the following description taken in connection with the accompanying drawings forming a part thereof, in which

Fig. 1 is a side elevation of a loom equipped with the invention, parts being broken away for clarity of illustration;

Fig. 2 is a section in elevation taken on the line 2—2 of Fig. 1;

Fig. 3 is a section in plan taken on the line 3—3 of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 1 showing a detail of the braking device; and

Fig. 5 is a detail showing the pawl quadrant.

In the drawings accompanying and forming part of this specification, a practical commercial embodiment of the invention is shown, but as such illustration is primarily for purposes of disclosure, it will be understood that the structure may be modified in various respects without departure from the broad spirit and scope of the invention as hereinafter defined and claimed.

In the following description and in the claims parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Like reference characters denote like parts in the several figures of the drawings.

In the drawing so much of a loom is shown as is necessary for an understanding of the invention. The loom comprises in general a suitable frame A having mounted thereon the usual weaving apparatus (not shown). The frame A journals a shaft 1 which may be one of the main shafts of the machine and which rotates at constant speed. It has a crank arm 2 to which is pivoted a connecting rod 3. The crank arm 2 has a slot 4 in which is adjustably clamp a stud shaft 5 for regulating the throw or amplitude of the connecting rod 3. The connecting rod 3 has a sleeve 6 journalled on the stud shaft 5 and has a suitable turn buckle 7 for regulating its length.

At the lower part of the machine is journalled a quadrant shaft 10 (Fig. 3) having an arm 11. The arm 11 has a slot 8 in which is adjustably clamped a stud shaft 9 for controlling the amplitude of oscillation of arm 11, and the connecting rod 3 has a long slot 12 working on shaft 9 for allowing a certain amount of lost motion (explained in detail hereinafter) between the connecting rod 3 and the arm 11.

A warp beam 28 having all of the warp threads 29 wound thereon, say 30 threads to

the inch, is suitably journalled in the frame of the machine, and has a worm wheel 13 mounted thereon. A worm 14 mounted on shaft 15 meshes the worm wheel. On the shaft 15 is mounted a hand wheel 16 for feeding the warp beam by hand, if desired. The hand wheel 16 has a hub drum 30 around which is wrapped a brake band 31 mounted on an adjacent part of the frame and having a wing nut 32 for adjusting the braking action.

Loosely mounted on the shaft 15 is a pawl quadrant 17 having pawls 18 pivoted thereto. The pawl quadrant 17 has a bevel quadrant gear 19 meshing with the bevel quadrant gear 20 on the quadrant shaft 10.

Fixed to the shaft 15 is a ratchet wheel 21. It will be understood that rotation of the main drive shaft 1 causes oscillation of the arm 11 even though there is some lost motion at the slot 12, the arm 11 oscillating shaft 10, the shaft 10 oscillating the pawls 18 to cause the warp beam to be driven or released through the worm 14 and worm wheel 13.

The throw or movement of the pawl quadrant 17 is controlled by the tension of the warmp threads 29 through mechanism which will now be described. The warp 29 is led from the warp beam 28 over a tension or whip roll 33, as shown, which is journalled on an arm of a T-shaped lever 22 mounted on a shaft journalled in the frame of the machine. The T-lever 22 has a horizontal arm 34 from which is hung weights 23 and a second horizontal arm 35 having a slot 36 therein. A stud shaft 37 is adjustably clamped in this slot to regulate the movement of the control rod 24 which is journalled on shaft 37. The lower end of control rod 24 is pivoted by sleeve 38 to swing rod 25 which is swingably hung from the shaft 15 by arms 57 (Fig. 3). Swing rod 25 engages in a notch 61 in pawl quadrant 17 to limit its downward motion, as shown in Fig. 2.

The action of the pawl quadrant 17, lost motion slot and swing rod 25 will best be understood by referring to Figs. 1 and 2. As the connecting rod 3 reciprocates upwardly, it will be understood that the arm 11 (Fig. 1) and hence pawl quadrant 17 (Fig. 2) will be always pulled to a definite upper position. As the connecting rod moves downwardly, due to the slot 12 the arm 11 and pawl quadrant 17 will drop back by gravity to a position depending upon the position of swing rod 25. The lower the swing rod 25 the greater the throw or stroke of the pawl quadrant 17 with each reciprocation or throw of the connecting rod 3 and vice versa.

It will be seen that weights 23 operate to tension the warp threads 29. If the warp threads 29 tend to get too tight, the control rod 24 will be moved downwardly, allowing the throw of the pawl quadrant 17 to be increased, this causing a quicker feed in the warp beam to rectify the over-tension condition. Similarly, if the warp threads tend to be too loose, the control rod 24 rises, thereby decreasing the throw of the pawl quadrant 17 and decreasing the rate of feed of the warp beam.

The apparatus for rendering the pawls 18 inoperative will now be described. A suitable hand lever 45 is mounted on the frame of the machine. A forked pawl lifter 39 straddles the shaft 15 and is provided with an upper cylindrical surface 40. A rod 41 is connected to the pawl lifter 39 and is pivotally connected to a lever 42 mounted on a shaft 43 journalled in the frame A of the machine. A second lever 44 mounted on the shaft 43 is connected to the hand lever 45 by a link 48. The pawls 18 are provided with lugs 47 which are engaged by the pawl lifter 39 when the lifter is raised. It will be understood that the movement of the handle 45 toward the back of the machine raises the pawl lifter, which in turn raises the pawls 18 clear of the ratchet wheel 21, whereby rendering the let-off mechanism ineffective even though the machine is still in operation. Suitable manual adjustment may then be made by rotating the hand wheel 16.

Thus a let-off mechanism has been provided which gives a positive intermittent feed to a warp beam. The amplitude of the feed increments is varied accurately according to the tension of the warp threads. Convenient means are provided for rendering the pawls inoperative and the warp beam may be adjusted by means of the hand wheel in case any adjustments of the threads are necessary, such as, for instance, picking out a defective thread. This may be done without stopping the machine. The apparatus has great reliability and gives close regulation of the let-off, being responsive to the slightest change in tension of the warp threads.

While certain novel features of the invention have been shown and described and are pointed out in the annexed claims, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. In a loom, a warp beam, a shaft, gearing between said shaft and beam, a ratchet wheel fixed to said shaft, a pawl holder loosely mounted on said shaft, a pawl mounted on said holder and engaging said ratchet wheel, means for oscillating said pawl holder, a forked lifter straddling said shaft, interengaging means on said lifter and pawl, and

means for moving said lifter to lift said pawl from said wheel.

2. In a loom, a warp beam, a shaft, gearing between said shaft and beam, a ratchet wheel fixed to said shaft, a pawl quadrant loosely mounted on said shaft, pawls pivoted on said quadrant and engaging said ratchet wheel, means for oscillating said pawl quadrant, said pawls having laterally projecting lugs, a forked lifter straddling said shaft and having a cylindrical upper surface, means for raising said lifter to cause said lugs to engage said surface, and a hand wheel on said shaft.

3. In a loom, a warp beam, a horizontal shaft, gearing between said shaft and warp beam, a ratchet wheel on said shaft, a ratchet engaging said wheel, means for raising said ratchet repeatedly to a predetermined level to feed said beam, a stop member to limit the backward movement under gravity of said ratchet, a whip member, an arm connected to said whip member, and a rod connecting said arm and stop member, whereby movement of said whip member is communicated to said stop member.

4. In a loom, a warp beam, a shaft substantially perpendicular to said beam, said beam and shaft being substantially horizontal, a worm on said shaft, a worm wheel mounted to rotate with said beam and meshing said worm, a ratchet wheel affixed to said shaft, a pawl holder loosely mounted on said shaft, a pawl pivoted on said holder and engaging said wheel, a first arm on a second shaft perpendicular to said first shaft, meshing bevel gears on said first and second shafts respectively, a connecting rod, means imparting a reciprocating motion to one end of said rod lengthwise thereof, a lost motion connection between the other end of said rod and said first arm, a whip member having a control arm, a stop member loosely mounted on said first shaft to limit the backward movement of the pawl, and a control rod pivotally connecting said control arm and stop member.

5. In a loom, a warp beam, a shaft substantially perpendicular to said beam, said beam and shaft being substantially horizontal, a worm on said shaft, a worm wheel on said beam meshing said worm, a ratchet wheel affixed to said shaft, a pawl holder loosely mounted on said shaft, a pawl pivoted on said holder and engaging said wheel, a first arm on a second shaft perpendicular to said first shaft, meshing bevel quadrant gears on said first and second shafts respectively, a pin on said first arm, a drive shaft parallel to said warp beam and having a crank arm, a connecting rod pivoted at one end to said crank arm and at its other end having a lost motion slot working on said pin, a whip member having a control arm, a stop member loosely mounted on said first shaft to limit the backward movement of said pawl, and a control rod pivotally connecting said control arm and stop member.

In testimony whereof we have hereunto set our hands.

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