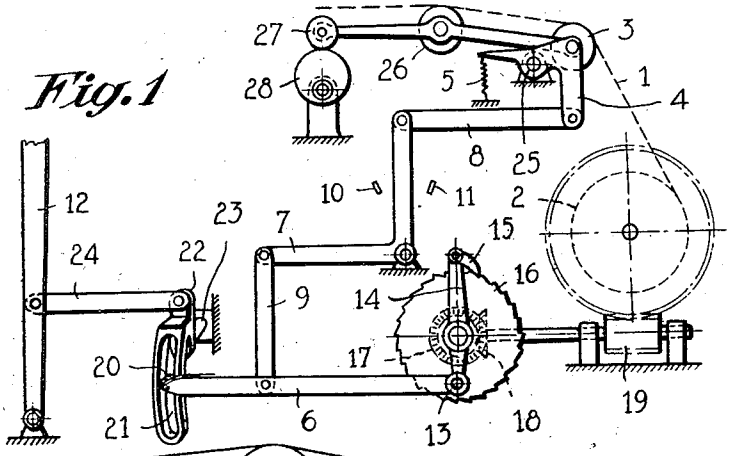
Feb. 12, 1952 J. PICANOL 2,585,167

LETOFF MECHANISM FOR LOOMS

Filed Sept. 30, 1947 2 SHEETS—SHEET 1

Fig. 1



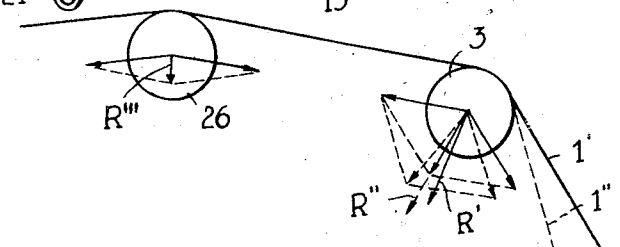


Fig. 2

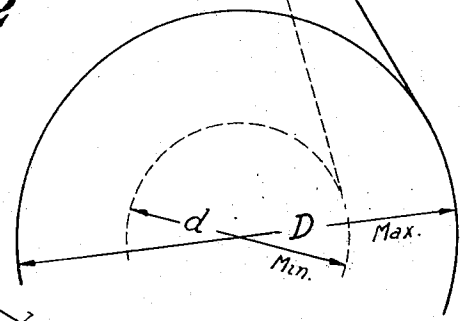
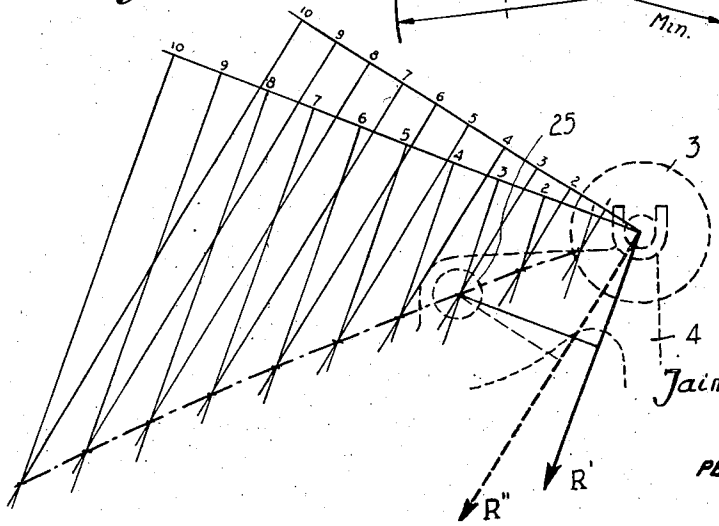


Fig. 3



Jaime Picanol
INVENTOR
PER Richards & Geier
ATTORNEYS

Feb. 12, 1952 J. PICANOL 2,585,167

LETOFF MECHANISM FOR LOOMS

Filed Sept. 30, 1947 2 SHEETS—SHEET 2

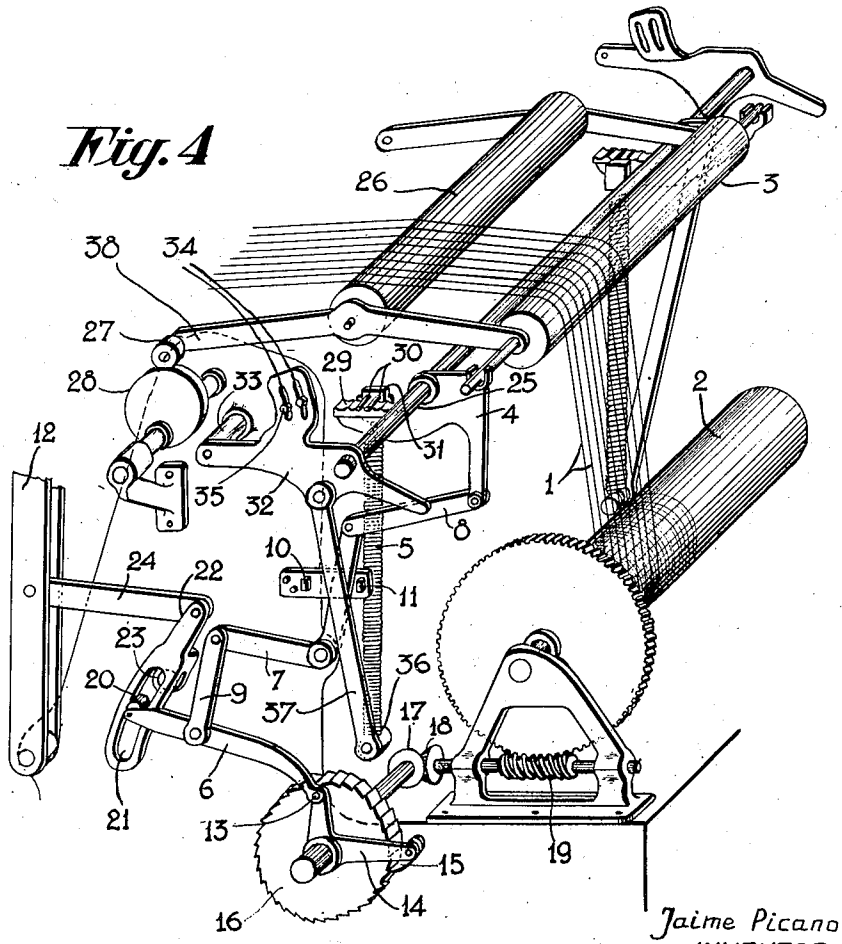


Fig. 5



Fig. 6

Fig. 4



Jaime Picanol,
INVENTOR
PER: Richards & Geier
ATTORNEYS

Patented Feb. 12, 1952 2,585,167

UNITED STATES PATENT OFFICE

2,585,167

LETOFF MECHANISM FOR LOOMS

Jaime Picanol, Ypres, Belgium

Application September 30, 1947, Serial No. 777,057
In Belgium December 3, 1940

3 Claims. (Cl. 139—110)

1

The present invention relates to a warp let-off mechanism for looms of the kind in which the warp leaving the beam is passed over a whip-roll mounted on a movable carrier, which carrier balanced by a spring or a counterweight, controls through suitable means the let-off motion of the beam, according to the tension changes of the warp.

It is essential for good weaving to maintain a constant tension in the warp-yarns.

Warp tension changes have so many different causes that it is practically impossible to foresee them and to build individual correcting devices for each of them.

An object of this invention is to provide a warp let-off mechanism of the above mentioned kind, through which a constant tension is maintained in the warp-yarns, irrespective of the diameter of the warp beam and of all other working conditions of the loom.

Another object of this invention is to provide means for adjusting the whip-roll position in height without causing any alteration in the balancing spring action.

The device, constituting the object of the invention, only uses the tension changes of the warp threads for operating the control mechanism of the unwinding of the warp from the warp-beam.

With the foregoing objects in view, in a warp let-off mechanism of the kind referred to, made according to the present invention, there is provided at each loom side a spring balanced whip-roll carrier, over which whip roll the warp passes. These carriers are rotatably mounted on an axle which is disposed on the locus of all points for which the resultant of the variable forces acting on the whip-roll during the unwinding of the beam, provides a torque of constant value, one of said levers in combination with bell-crank levers and connecting rods, adjusts the amount of motion transmitted through the lay-sword to the operating pawl of the ratchet wheel, which controls the rotation of the warp beam.

In order to permit adjustment in height of the whip roll without causing any alterations in the balancing spring action, the common axle of the whip-roll carriers has been secured to two supports, adjustably fixed to each loom side, the balancing spring bearing with one end on the whip-roll carrier and its other end being connected by means of a rod to said adjustable support.

Other features accompanying the invention will become apparent from the following description

2

and drawings. In the accompanying drawings an illustrative embodiment of my invention is shown, in which:

Fig. 1 is a schematic view of the principal kinematic elements of the mechanism according to the invention.

Fig. 2 is an explanatory diagram.

Figure 3 is a diagram illustrating the manner of determining graphically the locus of the rotation centre of the whip-roll carrier.

Figure 4 is a perspective schematic view illustrating a constructional embodiment of a device according to the invention.

Figures 5 and 6 show a graphical manner of determining the resulting force acting on the whip-roll.

Referring to the drawings, the yarns 1, unwound from beam 2 bear on a whip-roll 3. This roll 3 bears at each loomside on one of the ends of a carrier 4, the other end of which is connected to a balancing spring 5. The yarns 1 exert on roll 3 a pressure proportional to their tension.

To any tension change corresponds an oscillation of the carrier 4. These movements are transmitted to a lever 6 by means of connecting rod 8, a bell-crank lever 7 and a second connecting rod 9.

The stroke of the bell-crank lever 7 has been limited by stops 10 and 11, the lever 6 is at one end connected by means of a pivot 13 to the pawl-carrier 14.

The pawl-carrier 14 bears one or more pawls 15 and operates a ratchet wheel 16, which through bevel gears 17 and 18 and a worm-drive 19, rotates the warp beam 2.

The other end of the lever 6 bears a roller 20 which projects into the arcuate slot 21 of a link lever 22 pivoted to a fixed pivot 23. This link lever 22 being connected to the lay sword 12 by means of a rod 24.

The arcuate slot of the link lever 22 enables the axis of the roller 20 to coincide with the oscillation axis 23, in such a way that when this happens, the motion of lever 6 is insignificant.

The arcuate slot 21 also allows lever 6 to move freely around its pivoting point 13, under the action of the whip-roll carrier 4, through the kinematic system 8, 7, 9.

Hence to each angular displacement of the whip-roll carrier 4, corresponds an angular displacement of the lever 6 around its pivot 23.

Any angular displacement of the lever 6 causes a corresponding change of the stroke of its horizontal motion. Indeed the distance between the axis of the roller 20 and the oscillating center 23

of the link lever 22, depends upon the angular displacement of lever 6.

According to the present invention the longitudinal stroke of said lever 6 can vary between zero and a maximum value according to the angular displacement of lever 6. As the stroke of the angular movement of the ratchet wheel depends upon the stroke of the longitudinal motion of lever 6, it could be stated that any change in tension of the warp yarns influences the whip-roll carrier which will consequently change the amplitude of the rotation motion of the warp beam.

Great care must be given to the selection of the position of the rotation axis 25 of the whip-roll carrier 4. Consideration has in fact to be given to the variations of diameter of the beam, whether on starting on a new beam or during the course of operation. As the whip-roll carrier 4 is balanced by an elastic device, in this case a coiled spring 5, it is necessary to arrange the components so that the spring action is substantially constant under all working conditions.

Now, as is indicated in the diagrams of Figures 2, 5 and 6 with a beam of diameter D, the layer of yarns will be in the position l' while with a beam of diameter *d*, the layer of yarns will be in the position l''.

According to the positions l' and l'' of the layer of yarns, there are exerted on roller 3 pressures which are variable in direction and size, the resultants of which are denoted respectively R' and R'', these two resultants being different both in direction and in size. In the diagram of Figures 2, 5 and 6, consideration has been given to the additional force produced by a second roller 26, which is necessary in order that, co-operating with roller 27 and the eccentric 28, consideration may be given to the length of the yarn in the course of the alternation of the shed. On whip-roll 3 is thus introduced a resultant R''' of the pressures exerted on roll 26. Resultants R' and R'' force into consideration resultant R''' if use is made of such a roll 26. Hence, it is necessary that the rotation centre 25 of the whip-roll carrier 4 be located in such a way that the torque originated by the pressure of yarns l, is practically constant, whatever be the diameter of the beam. The diagram of Figure 3 shows how a geometrical locus has been established of all the points around which resultants R'', R', provide a constant torque. On this geometrical locus will be selected the point most suitable to the mechanical layout of the loom. Thus, once this rotation centre 25 is established, the spring 5 will work in conditions nearly identical, whatever be the diameter of the beam, which means whatever be the inclination of the layer of yarns on roll 3.

The above are the essential elements of the automatic let-off. Complementary or accessory devices may of course be added, in order to ensure accuracy of operation of the kinematic system. More particularly it will be necessary to provide means for varying the initial tension of the compensatory spring 5 for altering the initial position of the rotation axis 25 of the whip-roll carrier 4, and the like.

An embodiment is shown diagrammatically in perspective view in Figure 4. In this device, the layer of yarns l unwound from beam 2, presses as shown on the whip-roll 3; the spindle of the latter bears on the end of a carrier 4 secured on a spindle 25. The other end of this carrier 4 is provided with a series of grooves 29 engaged by two fingers 30 fixed in a member 31, to which is connected the compensating spring 5. The other end of this spring is secured to a fixed point. Hence by varying the position of the member 31, the position and consequently the tension of spring 5 is varied. The spindle 25 around which the carrier 4 oscillates is mounted on a support 32, which is rotatable around a fixed spindle 33. Slots 34 in the support 32 are engaged by fixing bolts 35, which hold the support 32 firmly in the desired position relatively to the frame. By these means it is possible to modify the initial position of the spindle 25, and, consequently of the whip-roll 3. The inclination of the warp can thus be modified. The fixed point 36 to which is attached the compensating spring 5, is connected to the support 32 by a rod 37. By means of this arrangement the characteristics of the compensating spring in relation to the whip-roll carrier 4, are constant, whatever be the position of the spindle 25.

A secondary roll 26 is supported by a lever 38, ending in a roller 27. The latter is in permanent contact with an eccentric 28 mounted on the crankshaft of the loom or connected in an appropriate manner to said crankshaft. This arrangement provides for stretching the yarn in such a manner that the tension remains practically constant, whatever be the position of the shed. It will be understood that the necessary length of yarns is greater for the extreme positions, i. e., for the more inclined positions, than for the median position, viz, when the yarns form an extension of the woven material. For this purpose, roll 26 stretches the yarn when the latter is approaching the intermediate position, in such a manner that a constant draft is maintained.

The whip-roll carrier 4 is connected to lever 6 by a connecting rod 8, a bellcrank lever 7 and a second connecting rod 9. The latter is connected at its other end to an intermediate point of lever 6, which can rotate around the end 13, its other end being provided with a roller 20 in the manner described above. Lever 6 is connected with the pawl-carrier 14. In this case three pawls are provided (only one of which is shown in the drawings) which respectively engage the ratchet wheel, one over the whole length of a ratchet tooth, another over the two-thirds and the third over a third of the length of the same tooth. In this manner the ratchet-wheel 16 can be displaced through a minimum angle corresponding to one third of a tooth length or any multiple of a third of a tooth length. This minimum angle could of course be diminished by increasing the number of pawls and the number of teeth of the ratchet wheel. The ratchet wheel 16 drives the beam 2 through any suitable mechanical means.

By means of the device above described, the means explained previously can thus be applied with precision, to provide a practically constant tension on all the yarns, whatever be the causes which tend to vary this tension, making provision for the different numerous requirements of the weaving industry and to the different characteristics of the yarns, or of the woven material.

I claim:

1. In a loom having a lay sword, and a lever transmitting motion, a positive warp let-off mechanism having a whip-roll, a warp-beam with a pawl and ratchet wheel mechanism, a

whip-roll carrier at each loom side, spring means for balancing said whip-roll carriers, an axle rotatably supporting said whip-roll carriers, said axle being located at the geometrical locus of all the points for which the resultant of the variable forces acting on the whip-roll during the unwinding of the warp-beam provides a practically constant torque, a bell crank lever having a fixed pivot pin, a connecting rod transmitting the oscillations of one whip-roller carrier to said bell crank lever, and a second connecting rod pivoted to an end of said bell crank lever, and controlling the adjustable stroke of the lever transmitting motion from the lay sword to the operating pawl of the warp-beam ratchet wheel.

2. In a loom having a lay sword, a positive warp let-off mechanism having a whip-roll, a warp-beam with a pawl and ratchet wheel mechanism, a whip-roll carrier at each loom side, spring means for balancing each of said whip-roll carriers, an axle rotatably supporting said whip-roll carriers, said axle being located at the geometrical locus of all the points for which the resultant of the variable forces acting on the whip-roll during the unwinding of the warp-beam provides a practically constant torque, a bell crank lever having a fixed pivot pin, a connecting rod which transmits the oscillations of one whip-roller carrier to said bell crank lever, a second connecting rod which is pivoted to an end of said bell crank lever, a link lever pivoted to a fixed pivot and having an arcuate slot formed therein, a lever pivoted at one end to the lay sword and at its other end to said link lever, an intermediate lever pivoted to the pawl carrier, and a roller projecting into said arcuate slot and fixed to an end of said intermediate lever, the position of said roller in said arcuate slot being controlled through said second connecting rod under the action of the warp-tension.

3. In a loom having a lay sword and a frame, a positive warp let-off mechanism having a whip-roll, a warp-beam with a pawl and ratchet wheel mechanism, a whip-roll carrier at each loom side, spring means for balancing each of said whip-roll carriers, an axle rotatably supporting said whip-roll carriers, said axle being located at the geometrical locus of all the points for which the resultant of the variable forces acting on the whip-roll during the unwinding of the warp-beam provides a practically constant torque, a bell crank lever having a fixed pivot pin, a connecting rod which transmits the oscillations of one whip-roller carrier to said bell crank lever, a second connecting rod which is pivoted to one end of said bell crank lever, a link lever pivoted to a fixed pivot and having an arcuate slot formed therein, a lever pivoted at one end to the lay sword and at its other end to said link lever, an intermediate lever pivoted to the pawl carrier, a roller projecting into said arcuate slot and fixed to an end of said intermediate lever, the position of said roller as to said arcuate slot being controlled through said second connecting rod under the action of the warp tension, a support adjustably fixed to the loom frame, said axle of the whip-roll carriers being secured to said support, said spring means comprising a balancing spring having a fulcrum pin, and a rod connected with said fulcrum pin and linked to said support, whereby the adjustment in height of the whip-roll position, and consequently of the warp yarns, causes no alteration in the balancing spring action.

JAIME PICANOL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
660,834	Bennett	Oct. 30, 1900
1,463,966	Northrop	Aug. 7, 1923
1,626,573	Davis	Apr. 26, 1927
1,689,506	Toyoda	Oct. 30, 1928
1,749,120	Baker	Mar. 4, 1930
1,758,738	Draper	May 13, 1930

FOREIGN PATENTS

Number	Country	Date
8,225	Great Britain	Oct. 17, 1905
33,199	Sweden	Oct. 20, 1910
103,201	Switzerland	Jan. 16, 1924
274,473	Great Britain	Dec. 1, 1927
876,944	France	Aug. 24, 1942