April 16, 1946. A. MOESSINGER 2,398,547

DEVICE FOR TENSIONING MOVING CORDS OR STRIPS

Filed May 8, 1942

Fig. 1.

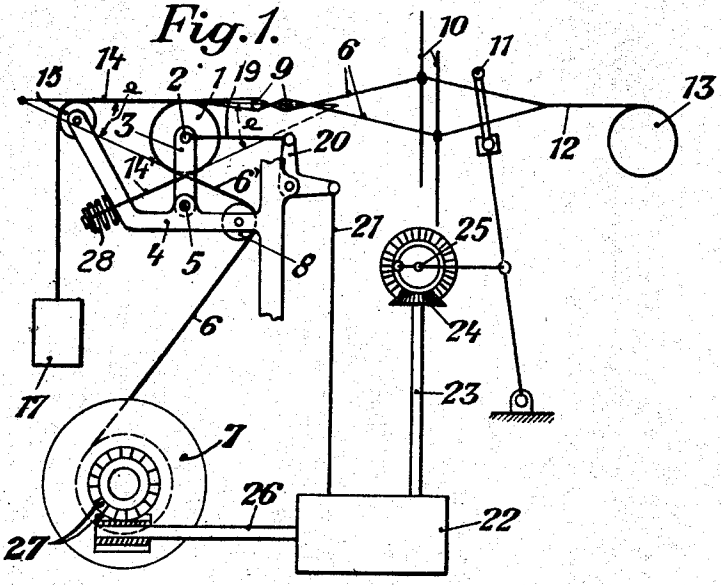


Fig. 2.

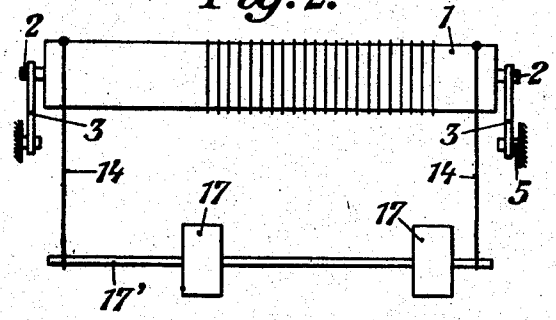


Fig. 3.

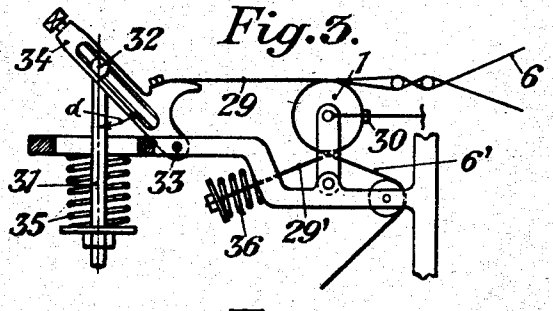
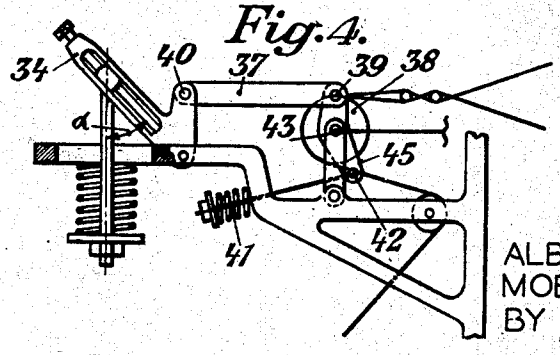


Fig. 4.



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Patented Apr. 16, 1946

2,398,547

UNITED STATES PATENT OFFICE

2,398,547

DEVICE FOR TENSIONING MOVING CORDS OR STRIPS

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Application May 8, 1942, Serial No. 442,171
In Switzerland August 16, 1941

10 Claims. (Cl. 139—114)

Automatically-working warp let-off motions are known in which the forward motion of the warp is adjusted in accordance with the position of a tension bar. All automatic warp let-off motions hitherto known, however, possess the drawback that each stopping and starting of the machine causes a difference in density of the weft, with the consequence that a visible line appears in the fabric.

In most cases such errors are to be found in the supporting bearings of the tension beam. The warp tension is transmitted to the tension beam lever by a spring or by weights. This tensioning force is distributed over the parts of the warp running on to and off the tension beam. Through this tensioning force, and its reaction which comes from the warp, the bearings of the tension beam are loaded, thus causing friction. While the machine is working, the warp runs from the warp beam to the fabric. On the other hand, when the machine is brought to rest, the warp which now has a chance to contract, threads are generally so stretched that the warp moves, or tries to move, on the tension beam quite a small amount in the opposite direction, that is towards the warp beam.

When friction is present in the bearings of the tension beam, the tension between the tension beam and the fabric is less after the loom comes to rest than while it is working. This phenomenon is still more evident when using artificial silk, where the warp threads are made of relatively plastic material, and therefore are stretched and consequently contract comparatively more when the loom comes to rest. This defect makes itself much more apparent with artificial silk, in which finer threads are used with rather little distance between two weft threads; a difference of two or three tenths of a millimetre makes a very great difference in the density of the weft.

The invention relates to a device for tensioning moving cords or strips, especially warps on looms, where the material to be tensioned passes over a tension beam, the beam being pivotably supported and its axis of rotation being free to move in a direction substantially at right angle thereto. The invention consists in that at least two tensioning forces act on the tension beam, whereby at least one of these tensioning forces is in a plane formed tangentially to the tension beam by the cords or strip to be tensioned. One tensioning force may thereby be in the same plane as the running-on or running-off part respectively of the cords or strip to be tensioned.

The tensioning forces acting on the tension beam may be directed as a mirror image (at 180°) to the directions of the running-on or running-off cords or strip. They will preferably be transmitted by a flexible element, which passes over an arc on the tension beam equal to the arc made by the cords or strip to be tensioned. The flexible element which transmits the tensioning forces to the tension beam may slide on the tension beam or be firmly connected to it.

The tensioning forces may act on the tension beam over a sector of the same size as that covered by the cords or strip to be tensioned. The distances between the tensioning forces acting on the tension beam and the axis of rotation of the tension beam are preferably the same as those between the running-on and running-off part of the cords or strip to be tensioned and said axis.

At least the tensioning force which is in the same plane as the part of the cords or strip running off the tensioning beam and having to be kept at a constant tension, may be produced by weights, or by a tension spring which is adjustable in a slot inclined at 45° to the direction of the force of the spring. The magnitude of the forward motion of the cords or strip to be tensioned is adjusted by the position of the centre of the tension beam.

A few examples of executions of the subject matter of the invention are shown diagrammatically in the drawing.

Fig. 1 is a diagrammatic side view of a loom with a warp let-off motion device according to the invention and embodying the present invention.

Fig. 2 is a view of the tension beam and parts connected thereto of the loom shown in Fig. 1 and taken at a right angle to the axis of rotation of the beam.

Figs. 3 and 4 show modified arrangements of the tension beam counterbalancing system according to the invention.

The tension beam 1 is pivotably supported on its axis 2. The axis 2 is fixed to tension beam levers 3, which are pivoted so that they can swivel about an axis 5 fixed to a stationary frame 4. The warp 6 or 6' runs from the warp beam 7 over the guide roller 8, the tension beam 1, the dividing rails 9, then into the harness 10 and the reed 11 to the fabric 12, which winds onto the cloth beam 13. Ropes 14, 14' pass round the tension beam 1 and are guided round pulley 15

pivotably supported in the fixed frame 4 and kept in tension by weight 17 and spring 28.

According to the invention the directions of motion of the ropes 14, 14' are directed from the tensioning beam in mirror image to the directions of the running-on and running-off warp 6, 6'. The arc of contact of the warp 6, 6' round the tension beam 1 is consequently the same as the arc of contact of the tensioning ropes 14, 14' round that beam. By this arrangement almost all external forces which act on the tension beam through the warp and through the ropes 14, 14' are counterbalanced and, depending on the angle formed by ropes 14' and 14 and the warps 6' and 6, act very little on the bearings 2. The resistance of the tension beam 1 to rotation is therefore reduced to a minimum. The sum of the moments which act on the tension beam through the warp threads 6, 6' and of those which act through the ropes 14, 14' in opposite direction amounts substantially to zero.

If the distances shown in Fig. 1 between the tensioning forces and the axis of rotation of the tension beam are as great as the distances between the running-on and running-off parts of the warp 6 and the axis of rotation 2 of the tension beam, the tensioning force which is exercised by the rope 14 will be exactly as great as the tensioning force of the running-off part of the warp 6, and the tensioning force which is exerted by the rope 14' will be exactly as great as the warp tension of the running-on parts of the warp 6'. The magnitude of the weight 17 will consequently give the exact value of the tension of the warp 6 between the tension beam 1 and the fabric 12.

The axle 2 of the tension beam is further connected to a driving mechanism 22 by a rod 19, an angle lever 20 and a rod 21. This driving mechanism receives a rotating motion from the main shaft 25 of the loom through the shaft 23 and the bevel wheel 24. According to the position of the tension beam 1 or of the rod 21 respectively, the warp beam is rotated more or less quickly by the shaft 26 which connects the mechanism 22 to the warp beam 7 through a worm gear drive 27.

Fig. 2 shows the tension beam 1 seen from the rear. It can be seen how the tension beam axle 2 is held by the two tension beam levers 3. At the tension beam 1, ropes 14 are provided which are kept in tension by a rod 17' on which weights 17 are arranged. Rope 14 runs to the tension beam 1 with the same angle of contact α round the beam as the warp 6.

With the arrangement according to Fig. 3, the rope 14 (Figs. 1 and 2) is replaced by a flexible element, for instance a steel strip 29. The steel strip 29 is fixed by a screw 30 on the tension beam. The upper part of the steel strip 29 is kept in tension by a spring 35, and in order that this may remain constant under all operating conditions, the following arrangement is provided:

The angle α between the spring holding device 31 and the connecting line of the spring holding point 32 with the point of rotation 33 of the lever 34 is about 45°. The dimensions of the spring are such that its length is equal to the distance of the fulcrum of the lever 34 perpendicularly from the spring holding device 31.

If the warp 6 lengthens, the lever 34 will turn to the left. Consequently the spring 35 will then expand and exercise less force on the lever 34. The distance between the spring supporting device 31 and the fulcrum of the lever 34 will, however, increase, so that the torque exercised by the spring 35 on the lever 34 remains unchanged. In that way the force exerted on the tension beam 1 by the steel strip 29 is maintained.

The lower part 29' of the steel strip 29 is simply held in tension by a spring 36, since it is not necessary that the tension force of the running-on part of the warp 6', which is just as great as the tension force of the lower part of the steel strip 23', be kept constant.

In the embodiment shown in Fig. 4 the steel strip 29 (Fig. 3) is replaced by a fixed connecting rod 37 which is connected to the tension beam 38 through a joint 39 and a lever 45. The connecting rod 37 is connected to the lever 34 by a joint 40. Instead of the part 29' of the steel strip 29 of Fig. 2, a rod 41 is provided in Fig. 4, whose end 42 is connected revolvably to the lever 45, which lever is connected to the tension beam 38. The distance between the joint 39 and the axis of rotation 43 of the tension beam 38 is equal to the radius of the tension beam.

I claim:

1. A mechanism for tensioning the warp threads in looms for weaving, said mechanism comprising a tensioning beam, axle means rotatably supporting said beam and being free to move on an imaginary surface substantially parallel to the center plane of the portion of the warp threads running off said beam, tension means engaging said beam and comprising a member disposed in the same plane as the center plane of the warp threads running off said beam and extending from said beam oppositely to the warp threads running off said beam, and comprising a member counterbalancing said first mentioned member and forming with said center plane the same angle as the portion of said warp threads running on said beam and extending in opposite direction from said beam.

2. A mechanism as set forth in claim 1 in which the distances of the points of engagement of said members and said beam from the center of said beam are respectively the same as the distances of the points of engagement of said warp threads and said beam from the center of said beam.

3. A mechanism for tensioning the warp threads in looms for weaving, said mechanism comprising a tensioning beam, axle means rotatably supporting said beam and being free to move on an imaginary surface substantially parallel to the center plane of the warp running off said beam, flexible tension means extending over said beam and comprising a portion disposed in the same plane as the center plane of the warp running off said beam and extending from said beam in opposite direction to the warp threads running off said beam, and comprising a portion counterbalancing the before mentioned portion of said tension means and forming with said center plane the same angle as the portion of said warp threads running on said beam and extending in opposite direction from said beam.

4. A mechanism for tensioning the warp threads in looms for weaving, said mechanism comprising a tensioning beam, axle means rotatably supporting said beam and being free to move on an imaginary surface substantially parallel to the center plane of the warp running off said beam, flexible tension means extending around said beam by the same length as said warp threads extend around said beam, and com-

prising a portion disposed in the same plane as the center plane of the warp running off said beam and extending from said beam in opposite direction to the warp threads running off said beam, and comprising a portion forming with said center plane the same angle as the portion of said warp threads running on said beam and extending in opposite direction from said beam.

5. A mechanism for tensioning the warp threads in looms for weaving, said mechanism comprising a tensioning beam, axle means supporting said beam and being free to move on an imaginary surface substantially parallel to the center plane of the warp running off said beam, flexible tension means slidably disposed on said beam and comprising a portion disposed in the same plane as the center plane of the warp running off said beam and extending in opposite direction thereto from said beam, and comprising a portion forming with said center plane the same angle as the portion of the warp threads running on said beam and extending in opposite direction from said beam.

6. A mechanism for tensioning the warp threads in looms for weaving, said mechanism comprising a tensioning beam, axle means supporting said beam and being free to move on an imaginary surface substantially parallel to the center plane of the warp running off said beam, tension means rigidly connected with said beam and comprising a part disposed in the same plane as the center plane of the warp running off said beam and extending in opposite direction thereto from said beam, and comprising a part forming with said center plane the same angle as the portion of the warp threads running on said beam and extending in opposite direction from said beam.

7. A mechanism as set forth in claim 1, in which one of said members is of the rigid link type and is pivotally connected with said beam.

8. A mechanism as set forth in claim 1, said loom having a stationary part, said tension means comprising an elbow member pivoted at its elbow to said stationary part, a spring means having one end connected with said stationary part and the other end connected with one arm of said elbow member and forming an angle of substantially 45° therewith, said first mentioned member having one end connected with the other arm of said elbow member.

9. A mechanism as set forth in claim 1, said loom having a stationary part, said tension means comprising an elbow member pivoted at its elbow to said stationary part, a spring means having one end connected with said stationary part and the other end connected with one arm of said elbow member and forming an angle of substantially 45° therewith, said first mentioned member being of the link type and having one end pivotally connected with the other arm of said elbow member and the other end pivotally connected with said beam.

10. A mechanism for tensioning the warp threads in looms for weaving having a stationary part, said mechanism comprising a tensioning beam, support means for said beam free to move on an imaginary surface substantially parallel to the center plane of the warp running off said beam, tension means engaging said beam and comprising a part disposed in the same plane as the center plane of the warp running off said beam and extending in opposite direction thereto from said beam, and comprising a part forming with said center plane the same angle as the portion of the warp threads running on said beam and extending in opposite direction from said beam, spring means having, individually, one end connected with said stationary part and the other end individually connected with the ends of said parts not engaging said beam.

ALBERT MOESSINGER.