A tension device, comprising a rotating beam wherefrom warp threads are wound off, and a drum with inner radial blades that form separate sections. At least part of these sections accommodate loose, and the length of the blades is chosen so that between their free ends and the drum axle there remains an annular clearance sufficient for the weights to spill from one section into another during the drum rotation, to develop a torque opposing rotation. A casing is mounted in the drum within the annular clearance and a part of the casing can be selectively opened to allow loose weights to fall into the casing to reduce the counteracting torque.
WARPTHREAD TENSION DEVICE IN A LOOM

The present invention relates to looms, and more precisely to warp thread tension devices used in these looms.

This invention can be utilized in any looms, including shuttleless looms.

Widely known at present are warp thread tension devices, comprising a rotating beam with the warp threads wound thereon, and a warp weighting mechanism connected with the axle of this beam to develop a torque opposing the beam rotation. The weighting mechanism consists of a flexible element, say e.g. a chain, one end of which passes over a clutch mounted on the beam axle, the weight being attached to the other end. To regulate the warp tension in accordance with the variation of the beam diameter as thread is unwound therefrom, the magnitude of weight is manually changed. Although this device secures appropriate regulation of warp tension, it requires manual labor, which affects the loom productivity.

The elimination of manual labor is possible if the warp weighting mechanism is made in the form of a chain, one end of which passes over the clutch mounted on the beam axle, while the other end is fixed to a lever. Secured on one end of this lever is the weight, which can move along the lever, in accordance with the warp tension variation, when actuated by a feeler checking the beam diameter. However, such devices, though allowing of automatic regulation of the warp thread tension, do not maintain permanent tension at the starting and final moments of the beam unwinding.

When a fault occurs, part of the weft threads must be extracted from the fabric in this place. The formed gap is eliminated by winding the warp threads on the beam, to set the fabric selvage on the beating-up line, and restoring the initial warp tension. In the conventional devices this is difficult to realize, since it requires manually turning the beam back, and then checking the selvage position and the initial warp tension. Otherwise there will be additional defects, namely slack threads or a let-back.

An object of the present invention is to provide a warp thread tension device, that enables the initial warp tension to be rapidly and simply restored with minimum use of manual labor, after elimination of the fault.

Another object of the invention is to provide a device ensuring automatic regulation, and permanent tension, of warp threads.

With these and other objects in view, in a warp thread tension device, comprising a rotating beam wherein the warp threads are wound, and a warp weighting mechanism connected with the beam axle, to develop a torque for opposing rotation, according to the invention, the warp weighting mechanism comprises a drum having inner radial blades which form sections, at least part of these sections containing weights, while the length of the blades is so chosen, that between their free ends and the drum axle there remains an annular clearance which is sufficient for the weights spilling over from one section into another during the drum rotation. Such design enables the initial warp thread tension to be rapidly and simply restored with a minor use of manual labor, after elimination of a fault.

To provide for automatic regulation, and permanent tension, of the warp threads it is expedient to place on the drum axle, within the annular clearance, a casing with at least one port along its generatrix, which port is closed with a gate mounted on a swivel pin secured in the drum faces. Serving to turn the swivel pin of the gate is a spring-loaded arm, one end of which is fixed on the swivel pin, and the other end of which interacts with a detent moved forward by an electric magnet following a signal from a feeler pickup which checks tension of the warp threads or the fabric.

For a clearer comprehension of the invention there is described below a particular exemplary embodiment thereof with reference to the appended drawings, wherein:

FIG. 1 is a side elevation view of device according to the invention; and

FIG. 2 is a, rear elevation view thereof.

The proposed device comprises an axle 11 mounting a beam 2 with warp threads 3 wound thereon, and a drum 4, inside which there are radial blades 5. These blades form separate sections 6, part of which accommodate weights, for example in the form of beads 7. The length of the blades is chosen so, that between their free ends and an axle 8 of drum 4 there remains an annular clearance sufficient for the weights to spill over from one section into another in the course of rotation of drum 4. This provides a torque resisting the drum rotation, which is necessary to secure permanent tension of the warp threads 3.

Disposed on axle 8 within the annular clearance is a casing 9 with at least one port 10 serving to admit part of the weights from sections 6 inside casing 9, which should be done as the warp threads 3 are wound off beam 2, in order to maintain permanent tension in these threads.

Port 10 is closed with a gate 11 mounted on a swivel pin 12 (FIG. 2), which is secured in the face walls of drum 4. The swivel pin 12 is turned by an electric magnet 13, whose core 14 is connected by a push rod 15 with a detent 16 supported in guides 17. Interacting with detent 16 is a spring-loaded arm 18 fixed on the swivel pin 12. The electric magnet 13 is operated by a signal from a pickup, i.e. a feeler 19 (FIG. 1), which is electrically connected with the electric magnet, and checks tension of the warp threads 3, or the fabric 20.

Attached to drum 4 is a disk 21 (FIG. 2) with holes 22, which is fitted through a sleeve 23 on axle 8. This axle is made in the form of a pinion shaft engaged with a toothed wheel 24 fitted on axle 1 of beam 2. Entering one of holes 22 is an index pin 25 secured on one end of a lever 26, the other end of which carries a handle 27. This lever is mounted on axle 8.

Since during rotation of drum 4 blades 7 spill over, and thus cause noise, the inner surface of drum 4, casing 9, and blades 5 is covered with rubber or other noise-absorbing material.

The device operates as follows.

When the loom is, the warp threads 3 are stretched by a thread gathering arrangement (not shown), the tension of these threads forcing beam 2 into rotation about axle 1. The toothed wheel 24 mounted on this axle rotates the pinion shaft 8, and together therewith lever 26, whose index pin 25 is fixed in one of holes 22 of disk 21 secured on drum 4. As a consequence, drum 4 revolves, and beads 7 located in sections 6 due to the
clearance between casing 9 and blades 5 will concentrate in the right-hand part (as in the drawing) of drum 4. Owing to rotation of the drum, beads 7 from the upper sections 6 spill over into the lower sections, port 10 of casing 9 being closed by gate 11. Such a design develops a permanent weight load opposing rotation of beam 2, and thus provides the required tension of the warp threads 3.

As the warp threads 3 are wound off beam 2, the diameter of the latter will diminish. And if the weight load is not changed the warp tension will rise proportionally with the reduction of the beam diameter. To maintain permanent thread tension, part of beads 7 must be introduced into the inner casing 9. This is done by opening port 10 under the action of the electric magnet 13 which works from feeler 19. When this electric magnet is operated core 14 pushes rod 15 which moves detent 16 placing it in the path of movement of arm 18. As drum 4 revolves together with the swivel pin 12 of gate 11, arm 18 fixed on this pin will abut against detent 16, swing aside, and turn gate 11, thus opening port 10. At the end of contact of arm 18 with detent 16, the arm, under the action of spring 28 take its initial position, and turns gate 11 back to close port 10. After the electric magnet is disconnected detent 16 will take its initial position.

To spill beads 7 from casing 9 back into sections 6 at the start of unwinding a new beam 2, gate 11 is turned to open port 10 at the instant arm 18 is in its lowermost position. The accuracy of the permanence of warp tension depends on the sensitivity of the feeler pickup 19, and can be readily maintained within 2 to 3 percent.

To lessen warp thread tension when eliminating a fault, lever 26 is disengaged from disk 21, for which purpose index 25 is withdrawn from hole 22 of disk 21, and handle 27 is turned in either direction.

What we claim is:

1. A warp thread tension device in a loom, said device comprising: an axle; a beam mounted on said axle for rotation thereon and carrying wound warp threads; a drum drivingly connected with said axle; blades arranged radially within said drum to define sections therein, at least part of which accommodate loose weights, the length of the blades being such as to leave an annular clearance between the free ends of the blades and the drum in the region of the axis of rotation thereof to ensure free movement of said weights from section to section during drum rotation and thereby produce a torque counteracting the rotating of said drum; a swivel pin secured in said drum; a gate mounted on said swivel pin; and a casing secured within said drum and located within said annular clearance, said casing being provided with a port along the generatrix, said gate closing said port and being movable to open said port to allow loose weights to drop into said casing to reduce the torque counteracting rotation of the drum.

2. A device as claimed in claim 1 comprising means responsive to the tension in the warp threads being wound from the beam for rotating the swivel pin to open said port.

3. A device as claimed in claim 1 comprising a spring-loaded arm having one end secured to said pin to urge the same to a position in which the gate closes said port, and means for engaging said arm to open said port and thereby control the tension of the warp thread being unwound from the beam.

4. A device as claimed in claim 3 wherein said means for engaging the arm comprises a slidable detent adapted for being selectively positioned in the path of travel of said arm, and electromagnet means for acting on said dentent.

5. A device as claimed in claim 4 wherein said electromagnetic means comprises an electromagnet coupled to said dentent to move the same, and a feeler means coupled to the electromagnet for selectively activating the same, said feeler means including a pickup which is sensitive to the tension in the warp threads or the fabric formed thereof.

6. A device as claimed in claim 1 comprising a second axle carrying said drum and coupled to the first axle in driving relation, and means coupling the second axle and drum to permit selective disconnection therebetween for lessening tension in the warp thread when a fault is to be corrected.

* * * * *