Jan. 8, 1929. 1,698,497

W. GUNNING

LET-OFF MECHANISM FOR LOOMS

Filed Dec. 15, 1924

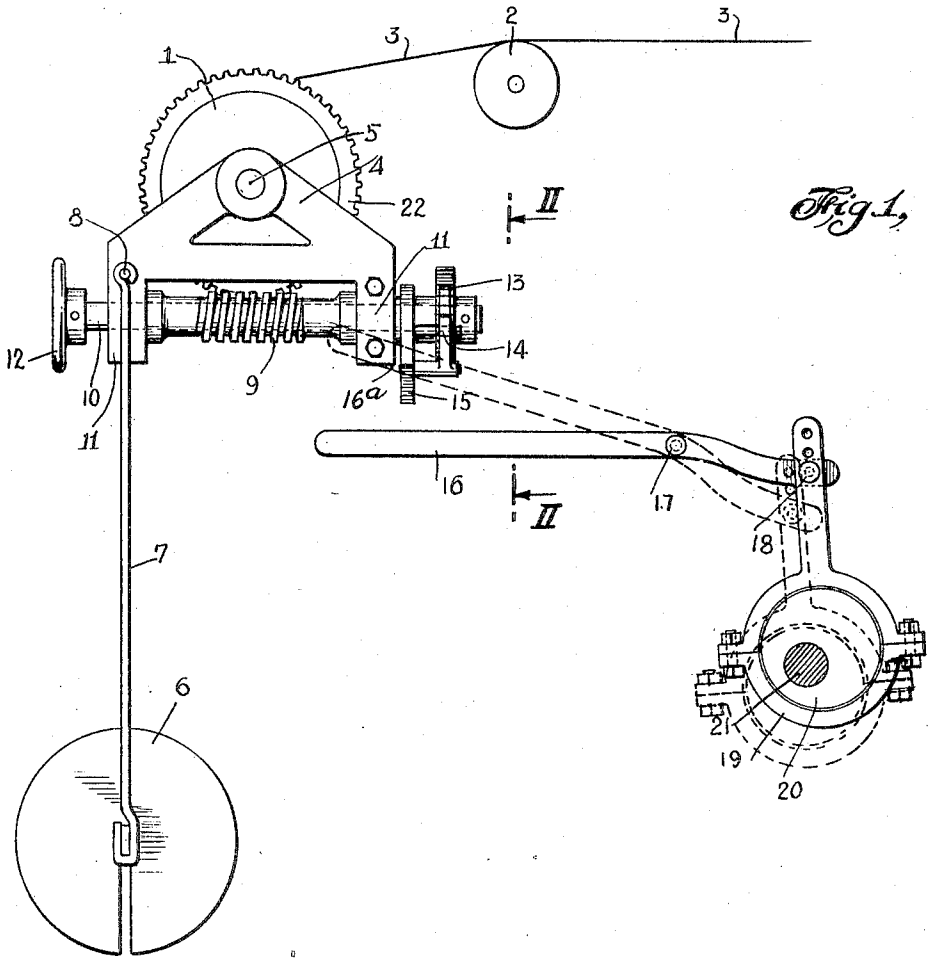


Fig. 1.

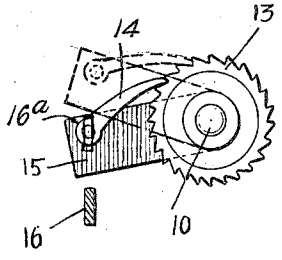


Fig. 2.

INVENTOR
William Gunning
BY
Frederick S. Duncan
ATTORNEY

Patented Jan. 8, 1929. 1,698,497

UNITED STATES PATENT OFFICE.

WILLIAM GUNNING, OF EASTON, PENNSYLVANIA, ASSIGNOR TO R. & H. SIMON CO., A CORPORATION OF NEW JERSEY.

LET-OFF MECHANISM FOR LOOMS.

Application filed December 15, 1924. Serial No. 755,295.

This invention relates to looms and has for an object the provision of an improved mechanism to regulate the tension on the warp during the process of weaving, and also comprises an improved let-off mechanism, it being understood that while these improvements are of particular utility when embodied in the conventional looms for weaving, I contemplate the use of my improvements in any field for which they are adapted by their nature.

In carrying my invention into effect I prefer to combine the tension and let-off mechanism in an appliance mounted to oscillate bodily about the axis of the warp-beam or roll, and to provide means connecting said appliance with the beam to cause oppositely oscillating movements of the appliance by the beam and by a counterbalance, whereby when the beam is rotated by unwinding the warp, a moment of counter-rotation is developed by the gravitational resistance of the appliance to displacement from its normal position, thus causing the beam to exert tension on the warp, and I provide also preferably means to cause relative rotation between the beam and appliance at times, to vary the counter-rotative moment automatically, and relieve the tension, to let off the warp.

In practice, the appliance preferably takes the form of a carrier having a bearing journalled upon the beam-pin, and carrying a worm meshing with a worm-gear upon the beam-flange, the worm-shaft having a ratchet-and-pawl actuated by a lever caused to reciprocate by a suitable connection with the picker shaft or cam shaft of the loom.

When the warp wound upon the beam is placed under tension during and by the operation of weaving, and the beam is thereby rotated clockwise, for example, the worm-shaft carrier is swung from its lower position, which it assumes normally by gravity, around to a position where the weight of the carrier and the worm-shaft increases the tension upon the warp by reason of the fact that the weight of these parts resists the turning movement of the beam.

At the same time the ratchet-and-pawl mechanism is brought into a position where it is operated by its actuating lever to turn the worm-shaft and rotate the worm-gear and beam-flange, letting-off the warp, or reducing the tension thereon, until this action has been carried on sufficiently long to cause the return of the oscillating appliance to its normal position, at which it is in such relation to the actuating lever that the latter only engages the pawl sufficiently to maintain the parts in this normal position, letting-off the warp at the rate desired.

Conversely, if the warp is let-off too rapidly, so that it is too slack, the appliance is caused to rotate counter-clockwise around the axis of the beam by means of a weight attached to one side of the appliance, this oscillation of the appliance being in the opposite direction, so that the pawl is swung farther away from the actuating lever and the latter does not engage the pawl at all, or else operates the pawl with such a small throw as to reduce the speed of let-off, until the slack has all been taken up and the parts brought back to position for normal operation, which will then continue as already described.

Thus the warp is maintained under a steady tension and is let-off more regularly than by conventional mechanism, which is usually more complicated in structure, less compact and more expensive than my improved mechanism, both as to installation and maintenance.

Referring to the drawings:—

Figure 1 is a fragmentary view of a somewhat diagrammatic character in side elevation of the portions of a loom co-operating to carry my invention into effect.

Figure 2 is a view in section on the line II—II of Figure 1.

In the illustrated embodiment, the part designated by the reference character 1 is a roll, which for the sake of illustration may be considered as the warp-beam of a loom, the loom being indicated as of conventional structure in its general arrangement, having preferably a whip-roll 2 over which the warp 3 is led from the beam to the weaving mechanism, the latter not requiring illustration and description as it forms no part of my present invention.

In accordance with an important feature of my invention, I have shown an appliance 4 mounted to oscillate about the axis of the beam, for which purpose it may conveniently be journalled upon the beam-pin 5, this appliance being connected with the beam so that the appliance is caused to oscillate by rotation of the beam, whereby when the beam is rotated in a clockwise direction a moment of counter-rotation is developed by the re-

sistance of the appliance to displacement from the position shown in Figure 1, which it assumes normally by gravity, and in which position it maintains the desired tension upon the warp 3, the gravitational action being preferably enhanced by the provision of a suitable weight 6 suspended by a stirrup 7 from a pin 8 carried by a suitable part of the carrier 4.

The means by which the beam and appliance 4 are connected for co-rotation about the pin 5 preferably takes the form of a worm 9 carried by a worm-shaft 10 mounted in bearings 11 upon the carrier 4, the shaft 10 being provided preferably with a hand-wheel 12 for manual actuation when desirable, and having also a ratchet-wheel 13, for the actuation of which a pawl 14 is shown mounted upon a lever 15 which is centered upon the shaft 10 and is actuated by any suitable means, such for example as a lever 16 fulcrumed at 17 upon a suitable part of the frame of the loom, and connected adjustably at 18 with an arm forming part of an eccentric strap 19 co-operating with an eccentric 20 fast upon the picker-shaft or cam-shaft 21 of the loom. The hand-wheel 12 serves as a means to permit manual adjustment of the worm shaft 10 and worm 9 relatively to the worm 22 for the purpose of varying the relative position of the appliance rotatively about the axis of said roll, independently of the operation thereof by the levers 15 and 16, the ratchet wheel 13, and pawl 14.

As the cam-shaft 21 rotates, the end of the lever 16 under the pawl-carrier 15 rises and falls with each revolution of the shaft. The position of actuating contact is shown at 16^a. As the lever rises, it strikes and lifts the pawl-carrier, and the pawl 14 engages one of the teeth of the ratchet-wheel 13 and the wheel is turned as long as the lever moves upward. The worm-shaft 10 and worm 9 are also operated, and turn a co-operating worm-gear 22 upon the beam-flange, causing the beam to rotate in a clockwise direction and causing the warp 3 to be let-off. As the lever 16 falls, the pawl 14 slips over the teeth of the ratchet, becoming engaged again during the upward motion of the lever 16.

If the worm-shaft is turned at a speed lower than necessary to feed the warp as it is woven, the entire appliance, including the weight, will rotate clockwise about the beam-pin as the center, until the pawl-carrier, by reason of its lowered position, is engaged by the end of the lever 16 through a greater proportion of its arc of motion. This produces, at each stroke of the lever 16, a larger part of a revolution of the ratchet-wheel and a consequent increase in the speed of let-off.

As a preliminary to this increase of speed the operation of the worm causes the carrier to rotate relatively to the beam, gradually diminishing the moment of rotation of the beam and relieving the tension upon the warp gradually until the carrier reaches the normal position shown in Figure 1.

Conversely, if the warp is let-off too fast, the action of the weight will cause the beam and carrier to rotate counter-clockwise until the pawl 14 is less in the path of the lever 16 and so the ratchet is turned through a smaller part of a revolution at each stroke, and the speed of the let-off is decreased.

It will be noted that the normal position of the appliance is preferably below the axis of the roll shaft 5, and as the appliance is rotated clockwise the effective lever arm constituted by the portion of the appliance between the axis 5 and the point of suspension 8 is lengthened by the tendency of the point 8 to move outward in an arc which increases its horizontal displacement from the axis 5, so that the appliance develops gradually an increased moment of counter rotation as it turns clockwise, and conversely, the moment of counter rotation is decreased gradually when actuated by the lever 16.

Accordingly, by these gradual variations in the moment of rotation of the beam, the appliance tends to maintain automatically an even tension on the warp and to feed it smoothly at the proper rate, avoiding sudden changes of speed.

By mounting the appliance below the roll, it is not only possible to have the appliance itself hang in normally balanced position, subject to the action of the weight, but by such organization of the appliance it is entirely out of the way and the handle 12 is presented for ready operation manually.

Having described my invention, I claim:—

1. In a loom, the combination with a roll, adapted to receive a supply of flexible material, and mounted rotatively for unwinding said material, of a let-off appliance mounted to oscillate bodily about the axis of said roll, and means connecting said appliance with said roll and adapted to act positively to cause oscillating movement of said appliance by said roll, whereby when said roll is rotated by said unwinding, a moment of counter-rotation is developed and tension is placed upon said material by the resistance of said appliance to displacement from its normal position, said appliance normally occupying a position beneath the axis of said roll.

2. In a loom, the combination with a roll, adapted to receive a supply of flexible material, and mounted rotatively for unwinding said material, of a let-off appliance mounted to oscillate bodily about the axis of said roll and normally occupying a position beneath said axis; means connecting said appliance with said roll and acting positively to cause oscillating movement of said appliance in one direction by said roll, when said material is unwound; means tending constantly to maintain said appliance in said

normal position and acting to impart tension to said material independently of the counter-rotative movement developed by displacement of said appliance from its normal position; means to permit manual adjustment of said connecting means to vary the relative position of said appliance rotatively about the axis of said roll; and means acting positively to cause relative rotation between said roll and appliance at times to decrease said counter-rotative moment automatically, and to restore said appliance to its normal position, so that said instrumentalities co-operate to maintain automatically an even tension on said flexible material and to feed it smoothly at the proper rate of speed.

3. In a loom, the combination with a roll, of a let-off appliance mounted to oscillate bodily about the axis of said roll and means connecting said appliance with said roll and adapted to act positively to cause oscillating movement of said appliance by said roll, whereby when said roll is rotated an increased moment of counter-rotation is developed by the gravitational resistance of said appliance to displacement from its normal position, and means including an adjustable lever, acting positively to cause relative rotation between said roll and appliance at times to decrease said counter-rotative moment automatically.

4. In a loom, the combination with a warp-beam, of a let-off appliance mounted to oscillate bodily about the axis of said beam; means connecting said appliance with said beam and adapted to act positively to cause oscillating movement of said appliance by said beam, whereby when said beam is rotated, an increased moment of counter-rotation is developed by the gravitational resistance of said appliance to displacement from its normal position, and means acting positively to cause relative rotation between said beam and appliance at times to decrease said counter-rotative moment automatically, said appliance comprising a carrier journalled rotatively upon the axis of said beam, and said connective means including a worm-gear upon said beam and a manually adjustable co-operating worm upon said carrier, said worm and worm-gear serving also as means to cause relative rotation between said beam and appliance, in conjunction with operating devices actuated by a source of power connected with the loom.

5. In a loom, the combination with a warp-beam provided with a worm-gear, of a combined tension and let-off appliance comprising a carrier mounted to oscillate about the axis of said beam and normally occupying a position below said axis, said appliance having a worm meshing with said worm-gear and movable bodily with said carrier about said axis, whereby when said beam is rotated in one direction by unwinding of the warp therefrom in weaving, a moment of counter-rotation is developed by the gravitational resistance of said appliance to displacement from its normal position, thereby causing said beam to exert tension upon said warp; means to augment said gravitational tension; and means to actuate said worm and worm-gear to relieve said tension and let-off said warp automatically by causing relative rotation between said beam and carrier.

6. In a loom, the combination with a warp-beam provided with a worm-gear, of a combined tension and let-off appliance comprising a carrier mounted to oscillate about the axis of said beam and normally occupying a position below said axis, said appliance having a worm meshing with said worm-gear and movable bodily with said carrier about said axis, whereby when said beam is rotated in one direction by unwinding of the warp therefrom in weaving, a moment of counter-rotation is developed by the gravitational resistance of said appliance to displacement from its normal position, thereby causing said beam to exert tension upon said warp; means to augment said gravitational tension; and means to actuate said worm and worm-gear to relieve said tension and let-off said warp automatically by causing relative rotation between said beam and carrier, said actuating means comprising a pawl-and-ratchet mechanism connected with said worm and adapted to oscillate bodily with said carrier, and in conjunction therewith an actuating lever mounted upon said loom and driven thereby to reciprocate in fixed adjustive relation to said pawl-and-ratchet mechanism; and acting to engage the same actuatively in varying degree proportionately to the extent of displacement of said carrier rotatively from its normal position, tending constantly to restore said carrier and its associated parts to said normal position, so that said instrumentalities co-operate to maintain automatically an even tension on the warp and to feed it smoothly at the proper rate of speed.

In testimony whereof, I have signed this specification.

WILLIAM GUNNING.