Nov. 29, 1927. 1,651,334

W. F. MINTEL

LET-OFF MECHANISM FOR LOOMS

Filed March 15, 1927 2 Sheets-Sheet 1

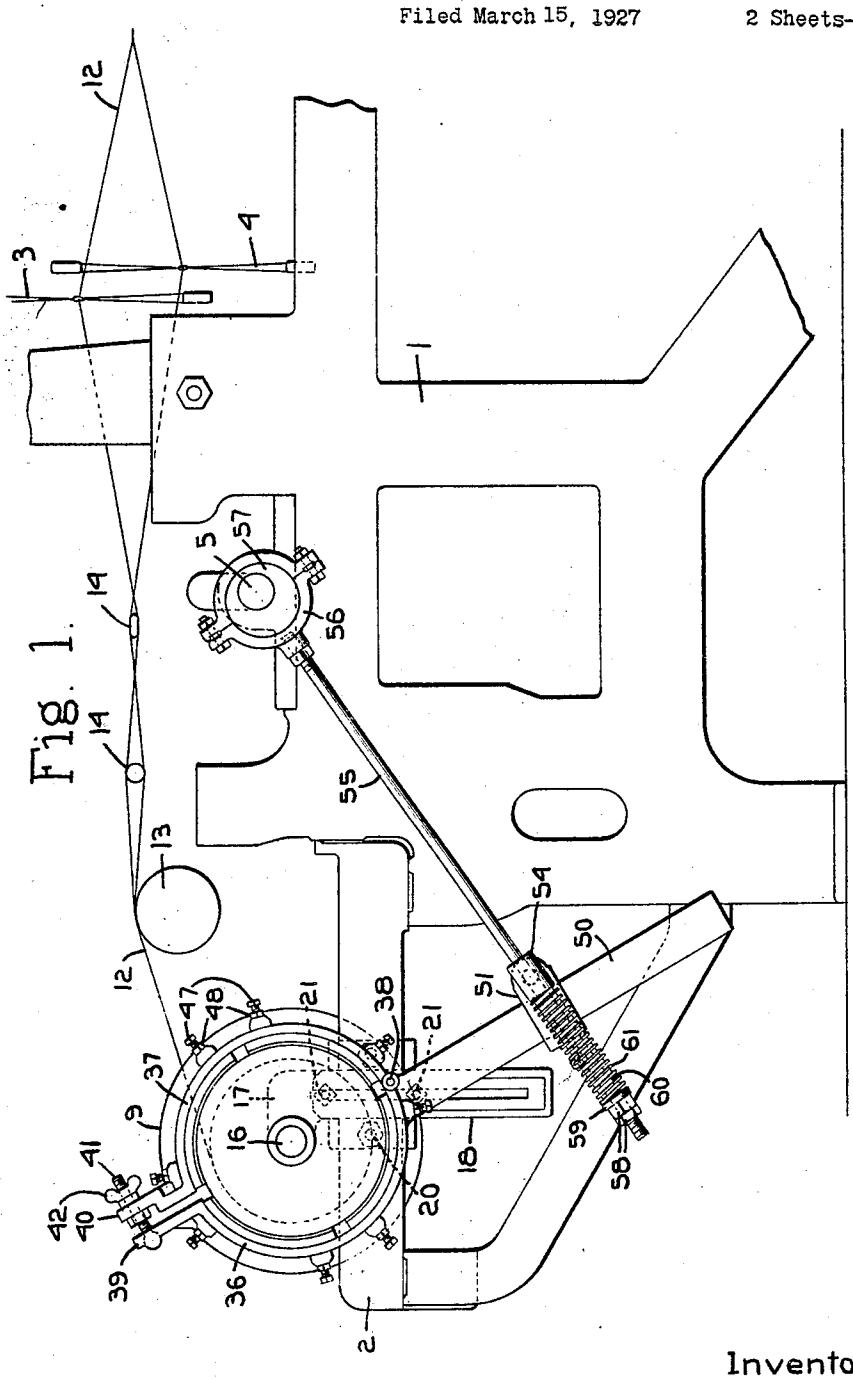


Fig. 1.

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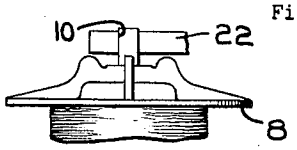


Fig. 2.

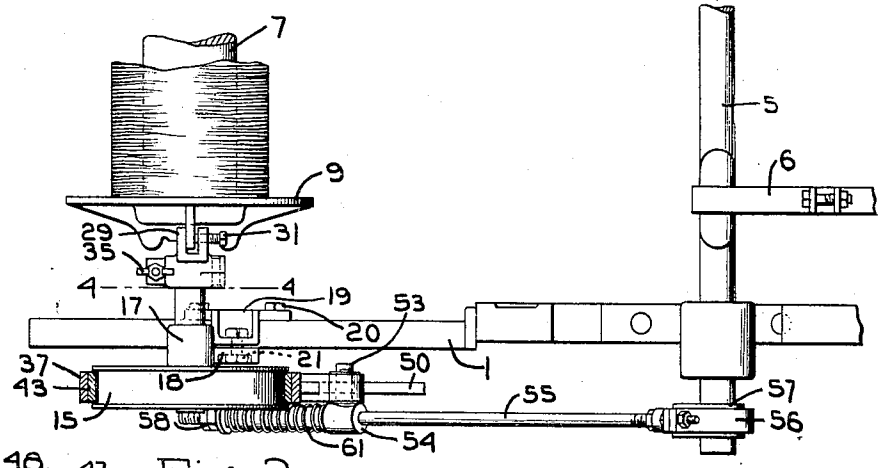


Fig. 3.

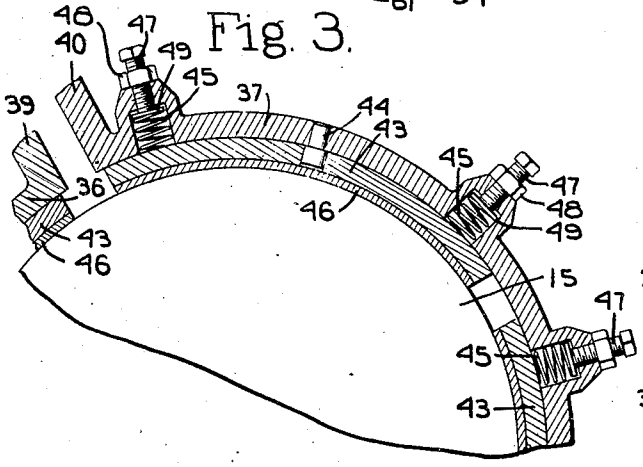


Fig. 4.

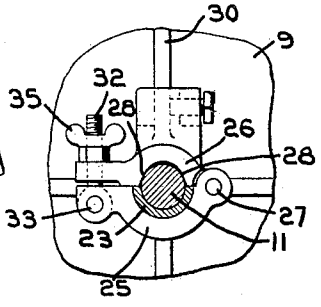


Fig. 5.

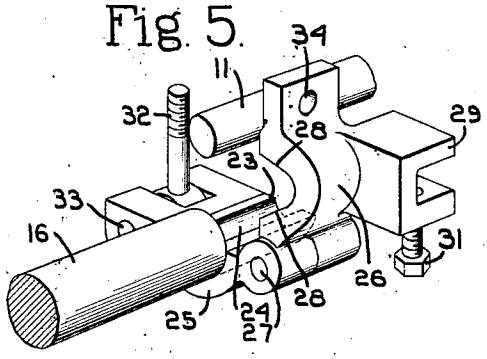
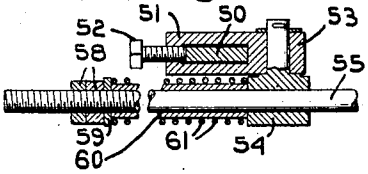


Fig. 6.



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UNITED STATES PATENT OFFICE.

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LET-OFF MECHANISM FOR LOOMS.

Application filed March 15, 1927. Serial No. 175,581.

This invention provides a novel form of mechanism for controlling the tension on the warps in a loom, for letting off the warps as required in the weaving operation, for maintaining the tension on the warps during the opening and closing of the shed, and for permitting let-back of the warps when required.

The object of the invention is to provide a let-off mechanism or warp beam controlling mechanism for these purposes in which the control shall be by the rotation of the warp beam backward and forward as required, thus eliminating the use of chains, weights and other similar appliances.

The object of the invention is further to eliminate the usual vibrating whip roll and to provide for the oscillation of the warp beam itself to secure the required results.

The object of the invention is further to provide a let-off mechanism which will enable the warps to be let back at the front of the loom and to be taken up automatically by the warp beam, as, for example, when a "pick-out" is necessary.

The object of the invention is further to provide means for bodily and vertically adjusting the warp beam and the means directly concerned with the oscillation of the warp beam thus to enable the warp line to be maintained as required, particularly as required by the changing diameter of the warp mass.

The object of the invention is further to provide a simple and efficient friction let-off mechanism securing the desired results and preferably controlled from the crank shaft of the loom.

These and other objects and features of the invention will appear more fully from the accompanying description and drawings and will be particularly pointed out in the claims.

As the invention relates principally to the features of the loom concerned with the control of the warp beam, it is unnecessary here to illustrate and describe anything more than those features of a loom directly concerned with the present invention and it will be obvious that a construction embodying the present invention may be adapted to looms of a wide variety of design and construction.

In the drawings:

Fig. 1 is a side elevation of a portion of an ordinary type of loom, largely fragmentary, together with a preferred form of construction disclosing the invention embodied therein.

Fig. 2 is a top plan view of the main portions of the construction shown in Fig. 1.

Fig. 3 is a detail chiefly in transverse vertical section taken through the friction drum and friction member.

Fig. 4 is a detail in vertical cross section taken on the line 4—4 of Fig. 2.

Fig. 5 is a view in perspective to show the connection between the friction drum shaft and the warp beam gudgeon.

Fig. 6 is a detail in cross section to show the connection between the pitman and the arm of the friction member.

The loom shown is of a simple and ordinary construction. A portion of one side frame 1 is illustrated and each side frame has built out rearwardly therefrom a warp beam supporting bracket 2. The shed forming mechanism is shown as of a simple type comprising the two harness frames 3 and 4. The crank shaft 5 is driven in the usual manner and operates by suitable pitmans 6 the lay.

The warp beam is of the usual type comprising the core 7, the metal heads 8 and 9 and the gudgeons 10 and 11. The warps 12 are shown as extending from the warp beam over a roll 13, which may be omitted, through lease rods 14 and thence through the harnesses 3 and 4 forwardly. The warps pass to the usual take-up roll at the front of the loom which it is unnecessary to illustrate.

A friction drum 15 is rigidly secured to a short friction drum shaft 16 journalled in a bearing 17 having a depending leg 18 mounted to slide vertically in a bracket 19 bolted at 20 to the side frame of the loom. The leg 18 is slotted and bolts 21 in the bracket 19 passing through this slot enables the bearing 17 to be adjusted and locked in any desired vertical position. A similar vertically adjustable bearing 22 is provided for the gudgeon 10 at the opposite side of the loom.

The friction drum 15 is detachably connected to the warp beam so as to rotate in either direction therewith and to become, during the weaving operation, a unit with the warp beam. The detachable connection between the friction drum and the warp beam provided for this purpose also enables the warp beam to be placed in the loom

and removed therefrom readily and easily and without interference in any way with the warp beam controlling mechanism or let-off mechanism or the adjustment thereof. In the construction illustrated for this purpose, the friction drum shaft 16 at its inner end is cut away to provide an open segmental end portion 23 and the inner surface 24 of this segmental end of the drum shaft is of a size to form a bearing for the gudgeon 11 of the warp beam. A clamp, the construction of which in its preferred form is shown in detail in Figs. 2, 4 and 5, clamps the warp beam gudgeon 11 firmly to the segmental end portion of the friction drum shaft 16 and also clamps the drum shaft to the adjacent warp beam head so that motion imparted to the friction drum shaft 16 is not only transferred to the warp beam gudgeon, but directly to the warp beam head, thus insuring a strong connection and the accurate movement of the warp beam in either direction with the friction drum. The clamp illustrated comprises a base member 25 fitting against the exterior of the segmental end 23 of the friction drum shaft and a top member 26 hinged at 27 to the base member. This top member when closed, as shown in Fig. 3, not only abuts the bottom member, but also abuts the flat surfaces of the segmental end 23 of the friction drum shaft, thus causing the clamp to rotate with the drum shaft. The top member 26 of the clamp is also provided with bevelled surfaces 28 which, when the clamp is closed, cramp against the warp beam gudgeon 11 and thus lock it tightly to the segmental end 23 of the drum shaft. In addition, the top member 26 of the clamp is provided with an extended grooved section 29 adapted to fit over one of the flanges 30 of the beam head 9 and a set screw 31 in this grooved section 29 enables it to be locked firmly to the flange 30. The clamp members are locked together by a threaded pin 32 swivelled at 33 in the bottom member, passing through a hole 34 in the top member and a thumb nut 35 threaded on to the pin 32.

It will thus be seen that when the clamp is open, as shown in Fig. 5, and the bearing 22 at the other side of the loom is open, the warp beam may readily be dropped into position and removed therefrom. The clamp, after the screw 31 is unlocked, may be slid along the drum shaft 16, if necessary, to free it from engagement with the warp beam head. When the warp beam is in place and the clamp is locked in closed position, as shown in Fig. 4, it will be seen that the drive from the drum shaft is by means of this clamp imparted directly in either direction both to the warp beam gudgeon and to the warp beam head, thus insuring a positive rotation of the warp beam in either direction with the friction drum.

A friction member, preferably in the form of a two-part ring surrounds and cooperates with the friction drum 15. The parts 36 and 37 of this ring are shown as having adjacent ends hinged together at 38 and the opposite ends extended radially at 39 and 40 and detachably and adjustably secured together by a pin 41 and thumb screw 42 connection similar to that employed in the clamp just described. The required friction between the friction member and the drum is controlled to some extent by the thumb screw 42, but more completely and accurately by the provision of a plurality of friction shoes interposed between the friction member and drum, preferably forming a part of the friction member and preferably pressed yieldingly and radially against the friction drum. In the construction illustrated, each part of the friction member is provided with two of these shoes each of the same construction. As illustrated, each shoe comprises a ring segment 43 preferably of metal mounted on and guided radially of the friction member by a stud 44 riveted to the friction member. Springs 45 seated in pockets in the friction member press against the outer surface of these shoes and force them radially toward the friction drum. The engaging surface of the shoes is preferably formed of a suitable friction material such as a layer of leather 46. Set screws 47 threaded in the friction member, provided with the lock nuts 48 and with heads or washers 49 abutting the springs 45, enable the force of the springs to be adjusted and consequently the degree of friction between the friction member and the drum.

It will thus be seen that oscillation or rotary movement of the friction member takes place about the common axis of the friction drum and warp beam and any such movement of the friction member or friction engaging means is imparted by friction directly to the warp beam.

The required oscillation or rotation in opposite directions of this friction member is secured by a pitman reciprocated in timed relation to the operation of the loom preferably from the crank shaft thereof and having a yielding connection with the friction member. In the construction illustrated, one part of the friction member such as the part 36 is provided with a downwardly and radially extending rigid arm 50. A clamp 51 is connected to and is adjustable longitudinally of the arm 50, being held in adjusted position by a set screw 52. This clamp has swivelled therein at 53 a bearing head 54. A pitman rod 55 is mounted to slide in this bearing head 54. At one end the pitman rod 55 is provided with an eccentric strap 56 engaging an eccentric 57 on the crank shaft 5 of the loom. At its other end the pitman is provided with lock

nuts 58, a washer 59, a sleeve 60 between the washer 59 and the bearing head 54, and an expansion helical spring 61 surrounding the sleeve 60 and abutting at its ends the washer 59 in the bearing head 54.

It will thus be seen that by adjusting the clamp 51 along the arm 50 the degree of oscillation imparted to the warp beam by the pitman connection from the crank shaft may be varied as desired and may also be adjusted as the mass of yarn on the warp beam decreases in diameter. It will also be remembered that by adjusting the nut 42 and the set screws 47, the degree of friction between the friction shoe and the friction drum which is connected to the warp beam may be adjusted as required to permit the warp beam to rotate forward with respect to the friction engaging means under the normal advance of the warps in the weaving operation.

As the shed closes, it is necessary to rotate the warp beam rearward to maintain the tension on the warps and this is done positively because, as the eccentric 57 rotates to the position opposite to that shown in Fig. 7, the pitman rod 55 pulls the sleeve 60 up against the bearing head 54 and thus a positive movement is imparted to the friction member 37. Forward movement of the warp beam, or that movement by which the warps move forward to the take-up roll, is always opposed yieldingly, as by the spring 60, so that the tension in the warps is opposed by the force of the spring 60. Accordingly when the pitman connection is moving toward the position shown in Fig. 1, the forward rotation of the warp beam is permitted by the tension on the warps rotating the warp beam forwardly against the tension of the spring 60. Accordingly also, if at any time the warps are let back at the front of the loom, as for the purpose of a "pick-out" or for any other reason, the force of the spring 60 reacting against the washer 59 on the pitman slides the bearing head 54 forwardly on the pitman and thus rocks the friction member and the warp beam rearward to maintain the tension on the warps and keep the warps taut. Consequently it is unnecessary for the operative to go to the rear of the loom to let back the warp beam when the warps are to be let back at the front of the loom because this mechanism automatically rotates the warp beam rearward under such circumstances.

In the operation of the loom, the operative from time to time adjusts the clamp 51 along the arm 50 as the diameter of the warp mass on the warp beam decreases. With certain kinds of warps it is undesirable to have rolls such as 13 or other guides than necessary in contact therewith. In such cases the warp line will extend directly from the top of the warp mass forwardly through the harness frames and this warp line may be maintained as the warp mass decreases in diameter by raising the yarn beam, the friction drum and the friction engaging means as a unit because all these parts are supported by the vertically adjustable bearing frames 18 and this vertical adjustment does not interfere to any material extent with the timing or operation of the pitman connection.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is:

1. A loom comprising a warp beam, shed forming mechanism, means frictionally engaging the warp beam acting to rotate the warp beam rearward as the shed closes and permitting the warp beam to rotate forward as the shed opens, and a yielding connection in said means acting to rotate the warp beam rearward when the warps are let back at the front of the loom.

2. A loom comprising a warp beam, shed forming mechanism, means frictionally engaging the warp beam, means for rotating said engaging means to rotate the warp beam rearward as the shed opens and for permitting said engaging means and warp beam to rotate forward as the shed opens, and a yielding connection in said rotating means acting against the tension in the warps and acting to rotate said engaging means and thereby the warp beam rearward when the warps are let back at the front of the loom.

3. A loom comprising a warp beam, shed forming mechanism, a friction drum detachably connected to the warp beam to rotate in either direction therewith, a friction member engaging the drum and oscillatory about the common axis of the warp beam and drum, an arm extending radially from the friction member, a pitman yieldingly connected to and adjustable longitudinally of said arm, and means for reciprocating the pitman in timed relation to the operation of the loom to rotate the warp beam rearward as the shed closes and to permit the warp beam to rotate forward as the shed opens.

4. A loom having the construction defined in claim 3, together with means for adjusting bodily and vertically as a unit the warp beam, friction drum, friction member and arm to position the warp line as required.

5. A loom comprising a warp beam, shed forming mechanism, a friction drum detachably connected to the warp beam to rotate in either direction therewith, a friction member engaging the drum and oscillatory about the common axis of the warp beam and drum, an arm extending radially from the friction member, a clamp connected to and adjustable longitudinally of said arm, a pitman rod mounted to slide in said clamp

transversely of said arm, a spring interposed between the clamp and pitman rod and acting to oppose the tension in the warps, and means for reciprocating the pitman in timed relation to the operation of the loom to rotate the warp beam rearward as the shed closes and permit the warp beam to rotate forward as the shed opens.

6. A loom comprising the construction defined in claim 5, in which the means for reciprocating the pitman rod comprises an eccentric on the crank shaft of the loom.

7. A loom comprising a warp beam, shed forming mechanism, means frictionally engaging the warp beam to permit the warp beam to rotate forward with respect thereto under the normal advance of the warps in weaving, and means for positively rotating said engaging means a predetermined extent as the shed closes to rotate the warp beam rearward and maintain the warp tension and for causing said engaging means, at any time the tension on the warps is relaxed as by letting back at the front of the loom, to rotate the warp beam rearward, and for permitting said engaging means and the warp beam to rotate forward as the shed opens.

8. A loom comprising the construction defined in claim 7, together with means for adjusting bodily and vertically the warp beam and frictionally engaging means to position the warp line as required.

9. A loom comprising a warp beam having heads and gudgeons, a shaft having a segmental end to receive and support a gudgeon of the warp beam in axial alignment therewith, a friction drum mounted on the shaft and means for clamping said gudgeon in and to the segmental drum shaft.

10. A loom comprising the construction defined in claim 9, together with means for bodily and vertically adjusting the warp beam gudgeons and the said shaft.

11. A loom comprising a warp beam having heads and gudgeons, a shaft having a segmental end to receive and support a gudgeon of the warp beam in axial alignment therewith, a friction drum mounted on the shaft and means for clamping the friction drum shaft to the warp beam head with the gudgeon seated in the segmental end of the said shaft.

12. A loom comprising a warp beam having heads and gudgeons, a shaft having a segmental end to receive and support a gudgeon of the warp beam in axial alignment therewith, a friction drum mounted on the shaft and means for clamping the friction drum shaft to the warp beam head and to the gudgeon seated in its segmental end.

13. A loom comprising a warp beam, shed forming mechanism, a friction drum connected to the warp beam to rotate in either direction therewith, a friction member rotatable about the common axis of the warp beam and drum, friction shoes on the friction member yieldingly forced radially into engagement with the drum, and oscillating means for rotating said friction member to rotate the warp beam rearward as the shed closes and for permitting said friction member and the warp beam to rotate forward as the shed opens.

14. A loom comprising a warp beam, shed forming mechanism, a friction drum connected to the warp beam to rotate in either direction therewith, a friction member rotatable about the common axis of the warp beam and drum, a plurality of friction shoes on the friction member movable radially thereof into engagement with the drum, springs acting to force said shoes toward the drum, and oscillating means for rotating said friction member to rotate the warp beam rearward as the shed closes and for permitting said friction member and the warp beam to rotate forward as the shed opens.

15. A loom having the construction defined in claim 14, together with means for adjusting the force of the springs thereby to adjust the degree of friction between the friction member and drum.

16. A loom comprising a warp beam, shed forming mechanism, a friction drum connected to the warp beam to rotate in either direction therewith, a friction member engaging the drum and rotatable about the common axis of the warp beam and drum, and oscillating means for rotating said friction member to rotate the warp beam rearward as the shed closes and for permitting said friction member and the warp beam to rotate forward as the shed opens, the said oscillating means including a yielding connection acting against the tension in the warps to rotate the friction drum and therewith the warp beam rearward when the warps are let back at the front of the loom.

17. A loom comprising a warp beam, shed forming mechanism, a friction drum connected to the warp beam to rotate in either direction therewith, a friction member rotatable about the common axis of the warp beam and drum and consisting of a two-part ring surrounding the drum periphery with the parts hinged together at adjacent ends and adjustably connected together at the other ends, friction shoes on the ring parts yieldingly forced radially into engagement with the drum, and oscillating means for rotating said friction member to rotate the warp beam rearward as the shed closes and for permitting the said friction member and the warp beam to rotate forward as the shed opens.

In testimony whereof, I have signed my name to this specification.

WILLIAM F. MINTEL.