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FRICTION LET-OFF MECHANISM FOR LOOMS.

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1,061,500.

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Fig. 1.

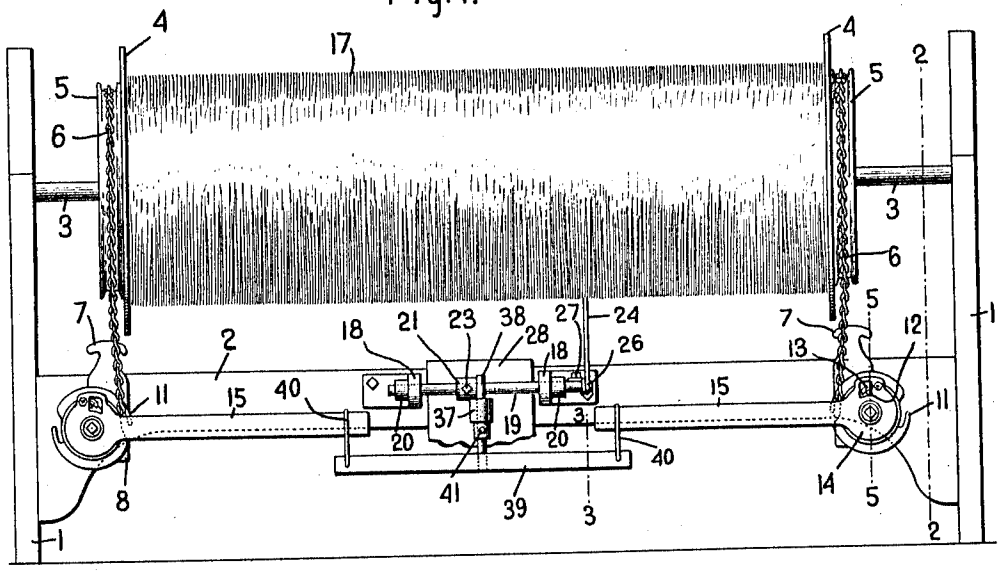


Fig. 2.

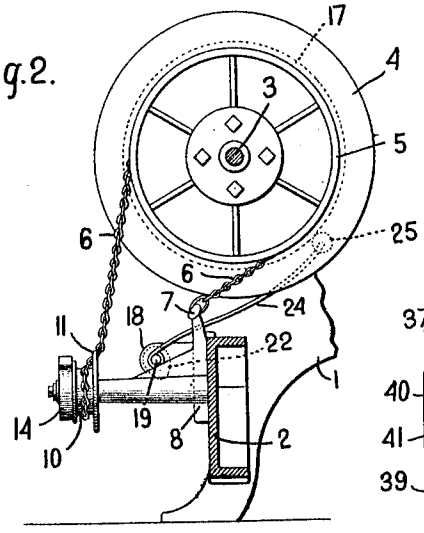


Fig. 3.

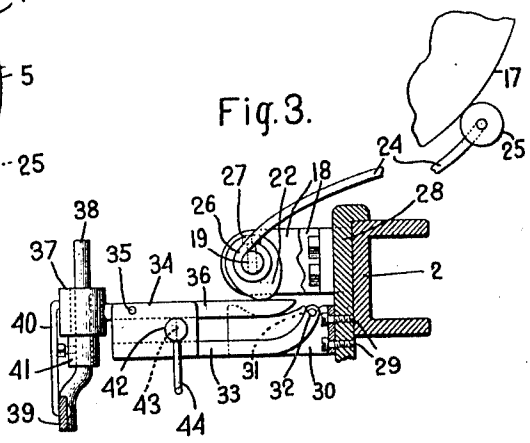


Fig. 4.

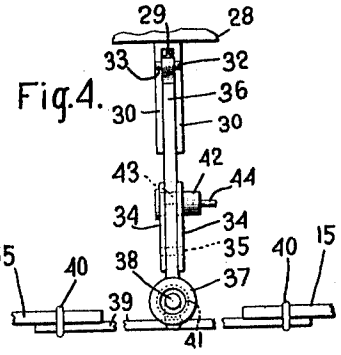
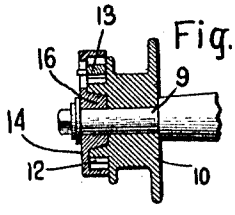


Fig. 5.



Witnesses.

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FRICTION LET-OFF MECHANISM FOR LOOMS.

1,061,500. Specification of Letters Patent. Patented May 13, 1913.

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To all whom it may concern:

Be it known that I, ANDREW J. RILEY, a citizen of the United States, and resident of Alabama City, county of Etowah, State of Alabama, have invented an Improvement in Friction Let-Off Mechanism for Looms, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention has for its object the production of an improved friction let-off mechanism for looms, so constructed and arranged that as the warp mass on the beam decreases the friction-controlled retardation of the warp beam will be correspondingly diminished, in order that the tension exerted upon the warp may be substantially uniform throughout, from full to empty beam.

My improved let-off also comprehends simple means for releasing temporarily the beam from the control of the retarding means, so that the weaver may turn the beam readily when necessary, without disturbing the general adjustment of the mechanism.

The various novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a rear elevation of a portion of a loom, showing the warp beam in place, and with one practical embodiment of my novel let-off mechanism applied thereto; Fig. 2 is a transverse sectional detail and side elevation thereof, on the line 2—2, Fig. 1, looking toward the left; Fig. 3 is an enlarged detail, partly in section on the line 3—3, Fig. 1, of a portion of the let-off whereby the frictional retardation of the beam is governed by the decrease in the diameter of the yarn mass; Fig. 4 is a top plan view of the mechanism shown at the central portion of Fig. 1, omitting the friction-controlling member; Fig. 5 is an enlarged sectional detail on the line 5—5, Fig. 1, to be referred to.

The loom sides 1, 1, connected by the cross-girth 2, have usual bearings for the journals 3 of the warp beam, the heads 4 of the latter having external annular sheaves 5 fixed thereon, for coöperation with the flexible friction members 6, herein shown as chains, the sheaves being grooved or concaved peripherally for the better engagement with said chains. One end of each chain is fixedly held or anchored by a hook 7 forming a part of a casting 8 bolted to the cross-girth 2, each casting having a horizontal rearward extension terminating in a stud 9, Fig. 5, on which is mounted rotatably a double flanged drum 10, one flange having hooks, as 11, either of which is adapted to engage a link of the free end of the chain 6.

The front face of the drum has a ratchet ring 12 with which coöperates a pawl 13 carried by the casing-like hub 14 of a lever 15, said hub having a central boss 16 which seats within the ratchet ring and rotates on the stud 9, a washer and nut retaining the parts in position on the stud, as shown. Obviously, by lifting the free end of the arm 15 the pawl 13 will engage a fresh tooth of the ratchet ring, and when the said arm is depressed the drum 10 will be turned to tighten the chain 6 and thereby effect frictional engagement between it and the sheave 5, the friction being increased according to the extent the drum is turned to take up the chain. Now if the inner ends of the arms 15, (which extend toward each other, as shown in Fig. 1) be held fixedly after the described adjustment it will be manifest that the rotation of the warp beam by the pull of the warp during the weaving operation will be retarded, and that the friction exerted will be the same throughout, irrespective of the quantity of yarn on the beam. It is well known, however, that the frictional retardation of the beam should be at its maximum when the beam is full, and that it should diminish gradually as the diameter of the yarn mass 17 decreases, for otherwise there will be too much tension on the warp as the yarn mass diminishes.

Herein I have provided novel and efficient means to govern the friction-controlling members or arms 15 so that as the diameter of the yarn mass diminishes the free ends of the said members will be permitted to rise gradually and thereby diminish correspondingly the frictional retardation of the beam. Bearings 18 near the central part of the girth 2 support rotatably a horizontal shaft 19 provided with positioning collars 20, and between said bearings the hub 21 of a controlling cam 22 is fixed on the shaft adjustably by a suitable set-screw 23, see Fig. 3. An arm 24, carrying at its upper end a follower roll 25 to bear against the periphery of the yarn mass 17, is secured at its lower

end to the shaft 19, said arm in practice being a metal bar having some resiliency, and I have shown it coiled at 26 around the shaft and held fast thereon by a bolt 27.

By reference to Figs. 2 and 3 it will be seen that if, as the diameter of the yarn mass on the beam diminishes, the roll 25 is moved toward the axis of the beam, the arm 24 will cause rotation of the shaft 19 and the extent of such rotation will be governed by the arc through which said roll moves.

I will now describe the means between the controlling cam 22 and the friction regulating members 15, for through such means the lifting tendency of the said members is transmitted to the cam, the latter in turn acting through the shaft 19 and arm 24 to press the roll 25 against the periphery of the yarn mass. Thus it will be understood that as the diameter of the yarn mass decreases the roll will move toward the beam axis, and the cam will be moved angularly very slowly to change the acting part thereof from the high point, Fig. 3, when the beam is full, to the low point when the beam is empty, the face of the cam decreasing gradually in radius from the high to the low point thereof.

A plate 28 fixedly secured to the back of the girth 2 between the bearings 18 has secured to its lower part by screw bolts 29 a bifurcated, rearwardly extended bracket 30 the parallel cheeks of which are notched at their upper edges at 31 to receive a fulcrum pin 32 fixed in a carrier 33, located between the cheeks and projecting beyond them. Said carrier at its rear end has upturned ears 34 between which is pivoted at 35 a cam follower 36, extended above the carrier between the bracket cheeks 30 and under the controlling cam 22, as clearly shown in Fig. 3. The rear end of the follower terminates in an upright hub 37 in which is vertically movable an upright stem 38 fixedly secured at its lower end to a cross-bar 39 below the friction regulating members 15 and connected with the free ends thereof by hooked links 40 which embrace the said members 15. An adjustable collar 41 on the stem 39 below the hub 37 is held against the latter by the lifting tendency of the members 15, as will be apparent from Fig. 1.

Normally the cam follower 36 is held from movement toward its carrier 33 by a headed stud 42 rotatably mounted in the ears 34 and interposed between the carrier and follower, the part of the stud between said parts being semi-cylindrical, as at 43, Figs. 3 and 4, said stud being provided with a crank handle 44 by which it may be revolved. If said handle be swung to the left, Fig. 3, and given a quarter turn the part 43 of the stud will be turned to permit the follower 36 to drop downward, rocking on its pivot 35, such stud constituting a releasing device to relieve the warp beam temporarily from the control of the friction means, as will appear more fully hereinafter.

The details of construction of the let-off mechanism having been explained the mode of operation thereof will be described. When a full beam has been mounted in the loom the periphery of the yarn mass will engage the follower roll 25 and through the latter and the intervening connections the controlling cam 22 will be set or positioned angularly substantially as shown in Fig. 3, after which the friction members 5 and 6 are brought into coöperation and the inner ends of the members 6 are anchored at 7. The free ends of said members 6 are then connected with the drums 10 and by the hereinbefore described pawl and ratchet arrangement the members 6 are subjected to the requisite tension, the free ends of the arms 15 being then connected by the links 40 with the cross-head 39. The lifting tendency of the said arms 15, due to the tension on the chains and also to the pull on the chains as the sheaves 5 revolve, causes the collar 41 to press upward on the hub 37, and thereby the cam follower 36 and carrier 33 will be swung upward as a unit on the pin 32 as a fulcrum, the follower being pressed against the edge of the cam 22. The let-off mechanism is now in its operative condition, the cam being set to resist the lifting of the friction regulating members 15 and thereby to cause the maximum frictional retardation to be exerted upon the beam as the warp is drawn off. As the weaving progresses the diameter of the yarn mass 17 decreases, and as the pressure on the cam 22 is always tending to turn it it will be turned slowly as the roll 25 follows the periphery of the diminishing yarn mass and moves toward the axis of the beam. This slow and gradual rotation of the cam, however, will permit the follower 36 and the carrier 33 to swing upward slowly as the surface of the cam toward its low point is gradually brought into action, and as the hub 37 and cross-bar 39 rise the free ends of the members 15 will rise, so that little by little the tension or strain on the chains 6 is decreased. That is, as the yarn mass decreases in diameter the frictional retardation exerted upon the beam is diminished correspondingly, owing to the contour of the cam 22, and as the pull of the warps to rotate the beam acts with a diminishing leverage the resistance to such pull is diminished. Consequently the let-off tension on the warp is maintained substantially uniform from full to empty beam. If during the operation of the loom it becomes necessary for the weaver to turn the beam by hand he turns the releasing stud 42 as described, and thereby relieves the tension

upon the friction members or chains 6 sufficiently to permit ready rotative movement of the warp beam. Returning the releasing stud to normal position instantly restores the tension of the chains.

The arm 24 of the follower roll 25 is sufficiently rigid to maintain the proper cooperation between said roll and the controlling cam 22, but when in action preferably it is slightly flexed in order that the follower roll will follow up promptly the periphery of the yarn mass as it diminishes.

By the construction shown the tension of the warp is controlled automatically by the let-off mechanism throughout the operation, and the controlling cam can be adjusted or set angularly according to the diameter of the yarn mass when the beam is full. Additional adjustment is also provided by the setting of the collar 41 up or down on the stud 38.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In let-off mechanism for looms, a warp beam adapted to be rotated by the pull of the warp, frictional means to retard the rotation of the beam, said means including a rocking friction regulating member, a controlling cam having a gradually decreasing radius from its high point, a pivotally mounted cam follower, connections between it and said regulating member to maintain the follower in engagement with the cam, and means governed by the diameter of the yarn mass on the beam to rotate said cam slowly as the yarn mass diminishes, the frictional action on the beam being decreased gradually as the point of engagement between the cam and its follower moves from the high to the low point of the former.

2. In let-off mechanism for looms, a warp beam adapted to be rotated by the pull of the warp, means, including sheaves fixed on the beam and flexible friction members cooperating therewith, to retard such rotation, a rotatable controlling cam having a gradually decreasing radius from its high to its low point, a rocking follower coöperating with the cam and operatively connected with said flexible friction members, the tension on the latter maintaining the follower in engagement with the cam and tending to rotate the latter to present a gradually decreasing radius to the follower, and means governed by the diameter of the yarn mass on the beam to permit such rotative movement of said controlling cam as the diameter of the yarn mass diminishes, whereby through the follower the frictional retarding action upon the beam is decreased gradually.

3. In let-off mechanism for looms, a warp beam adapted to be rotated by the pull of the warp, means, including sheaves fixed on the beam and flexible friction members cooperating therewith, to retard such rotation, each of said members having one end fixed, a tension regulating arm connected with the other end thereof, to regulate the initial frictional retardation of the beam, a rotatable controlling cam having a gradually decreasing radius from its high to its low point, a rocking follower coöperating with the cam, and operative connections between said arms and the follower, the tension exerted by the flexible friction members acting through said arms and connections upon the follower to maintain it in engagement with the cam and tending to rotate the latter to present a smaller radius to the follower, and means governed by the yarn mass on the beam to permit such rotative movement of the cam as the diameter of the yarn mass diminishes, whereby the initial frictional action exerted upon the beam is decreased gradually as the warp is unwound therefrom.

4. In let-off mechanism for looms, a warp beam adapted to be rotated by the pull of the warp, means, including sheaves fixed on the beam and flexible friction members coöperating therewith, to retard such rotation, a rotatable controlling cam having a gradually decreasing radius from its high to its low point, a rocking follower cooperating with the cam and operatively connected with said flexible friction members, the tension on the latter maintaining the follower in engagement with the cam and tending to rotate the latter to present a gradually decreasing radius to the follower, and means governed by the diameter of the yarn mass on the beam to permit such rotative movement of said controlling cam as the diameter of the yarn mass diminishes, whereby through the follower the frictional retarding action upon the beam is decreased gradually, combined with a device coöperating with the follower to effect temporarily an abnormal positioning thereof to release the beam from the control of the retarding means, whereby the beam may be turned manually.

5. In let-off mechanism for looms, a warp beam adapted to be rotated by the pull of the warp, means, including sheaves fixed on the beam and flexible friction members cooperating therewith, to retard such rotation, a rotatable controlling cam having a gradually decreasing radius from its high to its low point, a rocking follower coöperating with the cam and operatively connected with said flexible friction members, the tension on the latter maintaining the follower in engagement with the cam and tending to rotate the latter to present a gradually decreasing radius to the follower, an arm fixedly connected with the cam, and a follower roll on the free end of the arm held against the periphery of the yarn mass on

the beam, movement of said roll toward the axis of the beam as the diameter of the yarn mass decreases acting through the arm to permit rotative movement of the controlling cam for the presentation of a gradually decreasing radius thereof to its follower, whereby the frictional retarding action upon the beam is decreased gradually.

6. In let-off mechanism for looms, a warp beam adapted to be rotated by the pull of the warp, means, including sheaves fixed on the beam and flexible friction members coöperating therewith, to retard such rotation, a rotatable shaft mounted in fixed bearings, a controlling cam angularly adjustable on and rotating with the shaft and having a gradually decreasing radius from its high to its low point, a rocking carrier having a fixed fulcrum, a follower pivoted on the outer end of the carrier and having its free end coöperating with the cam, a releasing device interposed between said carrier and the follower and normally causing them to move in unison, connections between the follower and said flexible friction members, the tension on the latter maintaining the follower in engagement with the cam and tending to rotate the latter from its high toward its low point, and means connected with the cam shaft and governed by the diameter of the yarn mass on the beam, to permit the described rotative movement of the shaft and cam as the diameter of the yarn mass diminishes.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witneses.

ANDREW J. RILEY.

Witnesses:
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C. S. WILKINSON.

Copies of this patent may be obtained for five cents each, by addressing the ' Commissioner of Patents. Washington, D. C."