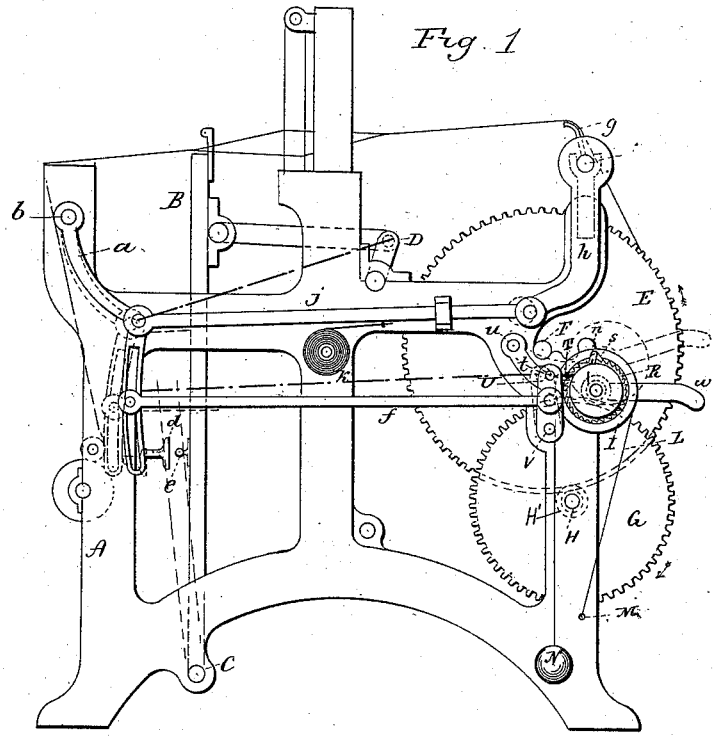
(No Model.) 3 Sheets—Sheet 1.

J. MORTON.

LET-OFF MECHANISM FOR LOOMS.

No. 385,279. Patented June 26, 1888.

Fig. 1



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(No Model.) 3 Sheets—Sheet 2.

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Fig. 2

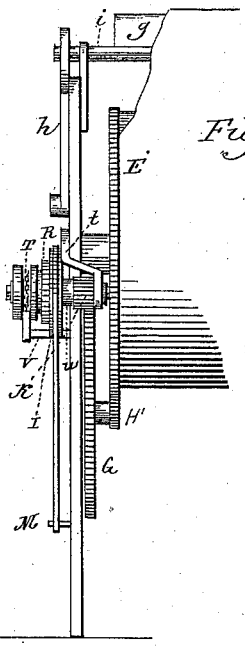


Fig. 3

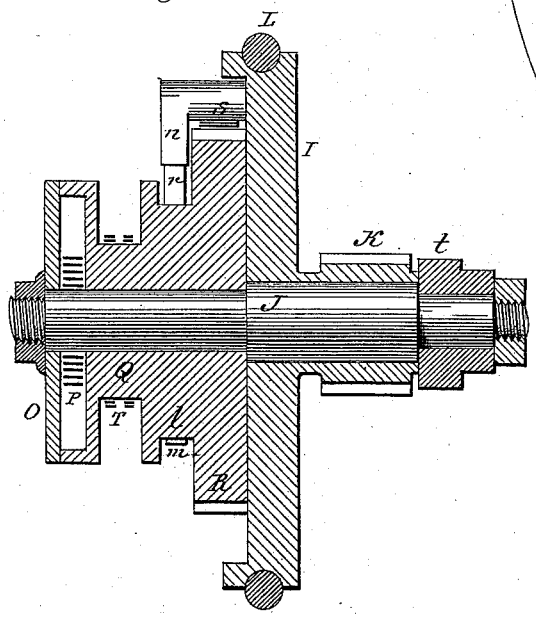
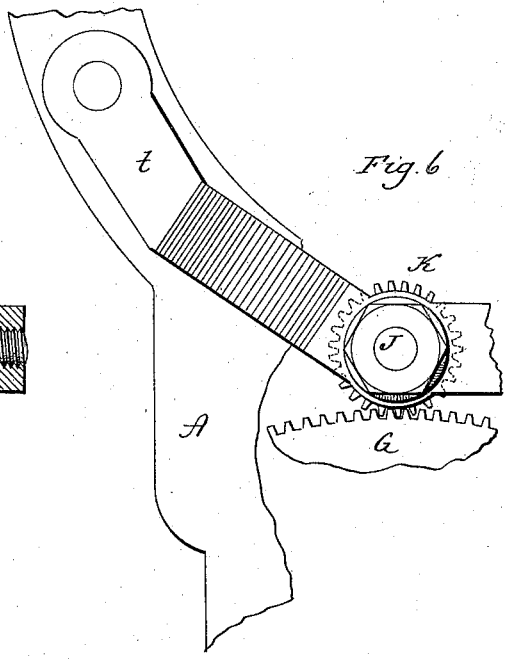


Fig. 6



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(No Model.) 3 Sheets—Sheet 3.

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Fig. 4

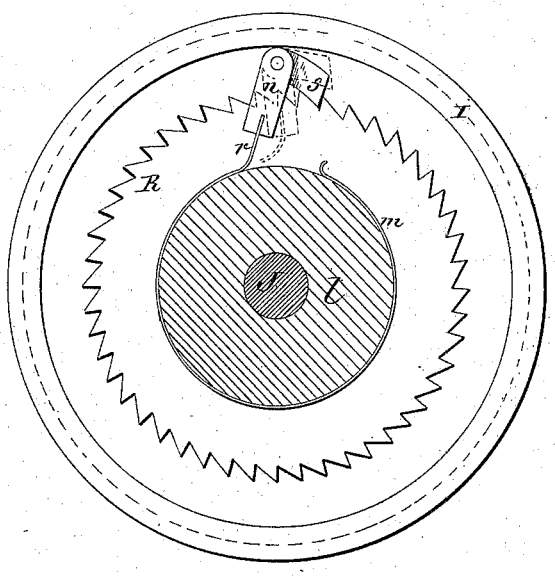


Fig. 5

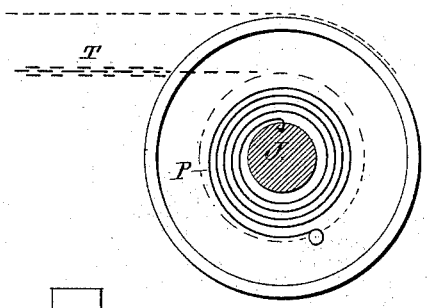
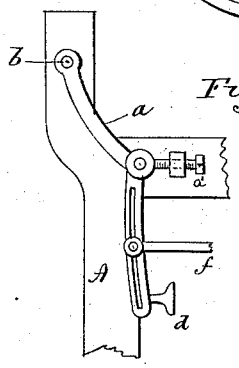


Fig. 7



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UNITED STATES PATENT OFFICE.

JAMES MORTON, OF QUIDNICK, RHODE ISLAND.

LET-OFF MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 385,279, dated June 26, 1888.

Application filed October 17, 1887. Serial No. 252,543. (No model.)

To all whom it may concern:

Be it known that I, JAMES MORTON, of Quidnick, in the county of Kent and State of Rhode Island, have invented a new Improvement in Let-Off Mechanism for Looms; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, an end view of so much of the loom as is necessary to show the invention applied thereto; Fig. 2, a rear view of the same end portion of the loom; Fig. 3, a section through the let-off mechanism, enlarged; Fig. 4, a face view, in section, of the ratchet and wheel I, illustrating the arrangement of the pawl-operating spring, enlarged; Fig. 5, a sectional view of the spring-drum, enlarged; Fig. 6, a detached view illustrating the means for disengaging the let-off mechanism from the warp-beam, enlarged; Fig. 7, a modification.

This invention relates to an improvement in the let-off mechanism of looms, the object of the invention being to automatically move the warp-beam, thereby avoiding draft-strain upon the warp, but at the same time to maintain a regular and constant tension upon the warp; and it consists in the combination of mechanism, as hereinafter particularly described and set forth.

A represents the frame of the loom, which is of common construction; B, the lay, hung below, as at C, and so as to vibrate in the usual manner. The lay is operated from the crank D, also in the usual manner, this mechanism being too well known to require full illustration or description.

E represents a gear on the end of the warp-beam, which is hung upon the shaft F, supported in bearings in the frame, and in the usual manner for supporting the warp-beam. G represents a gear hung upon an axis, H, in the frame, and carrying a pinion, H′, which works into the gear E on the warp-beam.

I represents a wheel loose on a shaft, J, which is supported in a bracket, *t*, on the frame, and to the said wheel I a pinion, K, is fixed, so as to revolve with the said wheel I, as seen in Fig. 3, and which pinion is arranged to work into the gear G, and so that rotation imparted to the wheel I will be communicated through the pinion K to the gear G, thence through the pinion H′ of the gear G to the warp-beam, through the gear E.

Around the wheel I is a frictional band, L, hung by one end below, as at M, the band passing around the wheel I and carrying a weight, N, at its other end, so that the wheel I revolves within the stationary band, the said band producing a frictional resistance upon the periphery of the said wheel I.

O represents a spring-actuated drum hung loose upon the shaft J and carrying within it a coiled spring, P, one end of the spring being made fast to the shaft and the other end of the spring being made fast to the drum, in the usual manner for this class of spring-actuated drums. This drum carries a pulley, Q, made fast to or formed as a part of the drum, and also loose upon the shaft, and so that the pulley and drum revolve freely. Made fast to the spring-actuated drum and pulley is a ratchet, R, which stands close to one side of the wheel I. On the wheel I a pawl, S, is hung, which is adapted to engage the teeth of the ratchet R in one direction, but leave the ratchet free to revolve in the opposite direction.

To the pulley Q a chain or band, T, is made fast by one end, the other end of the band being made fast to one end of a lever, U, said lever being hung upon a fulcrum, V, and so that as the lever U swings in one direction it will draw the band or chain T from the pulley Q and impart rotation to the said pulley, and consequently a corresponding rotation to the spring-actuated drum, which will wind the spring to the extent of such swinging movement. Then when the lever U is left free the reaction of the spring will cause the return of the lever, and because the ratchet R is also made fast to the pulley Q the rotation imparted by the swinging of the lever U will be communicated to the ratchet.

The swinging movement is imparted to the lever U from the lay through a lever, *a*, hung upon a fulcrum, *b*, extending downward to a convenient point, so that the lay as it swings forward in beating up will strike the lever. As here represented, a projection, *d*, is formed on the lever, extending toward the lay, and the lay is provided with a corresponding striking-surface, *e*, so that as the lay moves

forward it will strike the projection *d* and impart a corresponding forward movement to the lever *a*, and this forward movement of the lever *a* is communicated to the lever U through a connecting-rod, *f*. Under this arrangement, as the lay moves forward to beat, it will strike the lever *a* and cause the lever to swing forward, as indicated in broken lines, Fig. 1, and this forward movement of the lever will draw the band or chain from the pulley Q and impart corresponding rotation to the drum and ratchet. Then the reaction of the spring rewinding the band or chain will cause the return of the lever *a* into the path of the lay on the next beat.

The direction of revolution of the ratchet R under the forward movement of the lay is toward the pawl, and so that, the pawl being engaged with the ratchet, the rotation of the pulley Q will be communicated through the ratchet and pawl to the wheel I, and thence, through the pinion K on the wheel I and intermediate gearing, to the warp-beam. Under this arrangement, so far as described, the let-off would correspond to the extent of movement which is imparted to the ratchet-wheel through the action of the lay.

Above the warp-beam a tension-bar, *g*, is arranged, over which the warps pass, as represented in Fig. 1. This tension-bar is made fast to a lever, *h*, hung upon an axis, *i*, the tension-bar forming practically one arm of the lever, the pivot or fulcrum *i* being below the working-surface of the tension-bar. A rod, *j*, connects the lever *h* with the lever *a*, so that the swinging movement imparted to the lever *a*, as before described, will be communicated to the lever *h*, and this movement of the lever *h*, being forward, will cause the tension-bar above to move rearward against the warp coming from the beam.

A suitable spring, *k*, is arranged in connection with the lever *h*, here represented as a coiled spring hung to the frame, one end made fast to the rod *j*, so that the tendency of the spring is to bear the tension-bar against the warp, but with a yielding pressure. Under this arrangement it will be observed that as the lay moves forward and is brought into contact with the lever *a* at each beat it will impart a corresponding rear movement to the tension-bar *g*, and will thus apply a strain upon the warps at each beat of the lay, and so long as the tension of the warps over the tension-bar *g* remains the same the movement of the lever *a* in returning toward the lay will always be to the same point, and consequently the movement of the tension-bar will be constant, and also the rotation imparted to the ratchet from the lever *a* will be constant; but should the tension over the tension-bar *g* be greater, then the strain of the warps upon the tension-bar *g* will, through the lever *h*, cause the lever *a* to return to a position nearer the lay, and consequently the spring-actuated drum will wind the band or chain T to a greater extent, and so that on the next beat the lay will strike the lever *a* sooner and impart to it a correspondingly-greater extent of movement, which will cause the ratchet to rotate to a greater extent, and the tension-bar *g* also to be thrown rearward to a greater extent, and the ratchet engaging the pawl accordingly will impart a corresponding greater extent of rotation to the warp beam and let off a correspondingly-greater length of warp. If, however, the strain over the tension-bar *g* be reduced, the return of the lever *a* toward the lay will be correspondingly reduced, and the extent of rotation of the ratchet in like manner reduced, so that under this condition a less extent of feed will be produced; but in any case the tension of the warps over the tension-bar *g* will always remain the same, and that tension, acting through the lever *a* upon the spring-actuated drum, causes a greater or less extent of rotation of that drum, as the tension of the warps over the bar *g* is greater or less, and from this results a greater or less extent of feed. The greater the tension above the standard point the greater will be the extent of feed to bring the tension down to the required point, and vice versa. If the pawl S, through which the rotation is imparted to the pinion K, should remain at all times upon the ratchet R, a let-off would follow during the full rotation of the ratchet; but it is desirable that the tension upon the warp shall be increased somewhat at each beat before the let-off occurs. To produce this result, a concentric collar, *l*, is arranged upon the side of the ratchet and made fast to it, and so as to revolve with it and the pulley Q and drum O. Surrounding this collar is a spring, *m*, which is a flat metal spring resting in frictional contact upon the surface of the collar *l*, as seen in Fig. 4, so that the collar *l* may revolve within the spring, but with frictional contact, so that if free the spring would revolve with it, but so that if the spring be held the collar will revolve independently of the spring.

The pawl S is constructed with an arm, *n*, with which one end, *r*, of the spring *m* is engaged, preferably by making the arm *n* bifurcated, so as to form two fingers, and then extending the end *r* of the spring between the fingers. As the ratchet returns after having been advanced, the frictional contact between the collar *l* and the spring *m* causes the pawl to be turned away from the ratchet, as indicated in broken lines, Fig. 4, so that normally the pawl stands out of engagement with the ratchet; but when the ratchet is advanced, as before described, the action of the ratchet upon the spring *m* is to turn it in the opposite direction, so as to bring the pawl into engagement with the ratchet soon after the ratchet starts. On the return of the ratchet, after having thrown the pawl out of engagement therewith, the collar *l* rotates within the spring and without effect thereon, so that whereas the pawl will rotate with the wheel I, to which it is fixed, the spring *m* will also rotate therewith and apply the pawl to the ratchet in the same

manner, at whatever point it may stand in the circumference of the ratchet R. It is often desirable to leave the warp-beam free for rotation, or so that the warp may be readily pulled therefrom by the operator. To permit such movement of the warp-beam, the shaft J is supported in a bracket, *t*, which is hung to the frame, as at *u*, so as to swing in a vertical plane. This bracket extends rearward and terminates in a suitable handle, *w*, so that at any time when it is desired the bracket may be raised, as indicated in broken lines, Fig. 1, and thus lift the shaft J and all it carries, so as to take the pinion K out of engagement with the gear G, thus leaving the warp-beam free to be revolved independent of the let-off mechanism.

The lever *a* is constructed with a slot, in which the connecting-rod *f* is hung, so that it may be adjusted nearer to or farther from the fulcrum, accordingly as a less or greater movement is desired to be imparted from the lever *a* to the lever U.

The weight N, with its frictional band, is applied to the wheel I to hold the beam stationary, except when it is moved under the positive rotation of the wheel I.

The application of tension by the bar *g* to the warps at the time of the forward or beating movement of the lay may be applied to advantage with other let-off mechanism, or where the warp is drawn from the beam without such let-off mechanism. In such case the tension-bar *g* will ease up upon the warps immediately as the lay commences its rearward movement, and will apply the tension increasingly as the lay approaches its extreme forward movement, and such applied tension will serve to draw the warp from the beam.

The let-off mechanism may be employed without the tension device—that is to say, the tension device may be entirely omitted and the feed made positive. In such case a stop to arrest the rear movement of the lever *a* should be applied, and such stop should be adjusted and may be made in the form of an adjusting-screw applied to the frame, as represented at *a'* in Fig. 7. I therefore do not wish to be understood as limiting the invention to the necessary combination of the tension mechanism and the let-off mechanism.

While I prefer to make the connection between the lever *a* and the pulley Q through the intermediate lever, U, that lever may be omitted and the connection made direct, as indicated in broken lines, Fig. 1.

While I prefer to apply the band to a pulley fixed to or formed as a part of the spring-actuated drum, the band may be applied directly to the periphery of the spring-actuated drum, as represented in broken lines, Fig. 5, so that the drum will serve as the pulley.

I claim—

1. The combination of the warp-beam and lay of a loom, the wheel I, the pinion K, concentric with the wheel I, and connected to said wheel I so as to revolve therewith, the said pinion being in gear-connection with said warp-beam, a spring-actuated drum hung concentric with said wheel I, a ratchet, R, concentric with and adapted to rotate with said spring-actuated drum, a pawl on said wheel I, arranged to engage the teeth of the said ratchet, a pulley concentric with and arranged to rotate with said spring-actuated drum and ratchet, a band fixed by one end to said pulley, a lever hung forward of the lay, the free end of said lever adapted to engage with the lay as the lay advances, and a connection between said lever and said band, substantially as and for the purpose described.

2. The combination of the warp-beam and lay of a loom, the bracket *t*, hung to the frame of the loom and so as to swing in a vertical plane, and carrying a shaft, J, the wheel I, and a pinion, K, both on said shaft and connected so as to revolve together, the said pinion K in gear-connection with the warp-beam, the spring-actuated drum O, pulley and ratchet R, arranged loose upon the shaft concentric with said wheel I and adapted to rotate together, a pawl on said wheel I, arranged to engage said ratchet, a lever, *a*, hung forward of the lay, its free end arranged to engage the lay as the lay advances, and a band secured by one end to said pulley and its other end in connection with the said lever *a*, substantially as and for the purpose described.

3. The combination of the warp-beam and lay of a loom, the lever *a*, hung forward of the lay, its free end arranged to engage with the lay as the lay advances, the tension-bar *g*, lever *h*, carrying said tension-bar, a connection between said lever *h* and said lever *a*, the wheel I, a pinion concentric with said wheel I and so as to revolve therewith, the said pinion in gear-connection with the warp-beam, the spring-actuated drum O, pulley and ratchet R, arranged to rotate together and concentric with said wheel I, a pawl on said wheel I, adapted to engage the said ratchet R, and a band, one end secured to said pulley and the other in connection with said lever *a*, substantially as and for the purpose described.

4. The combination of the warp-beam and lay of a loom, with the wheel I, a pinion concentric with said wheel I and so as to revolve therewith, the said pinion in gear-connection with the warp-beam, the spring-actuated drum O, pulley, collar *l*, and ratchet R, arranged to rotate together and concentric with said wheel I, a pawl on said wheel arranged to engage the teeth of said ratchet, a friction-spring, *m*, around said collar, one end of said spring in connection with said pawl, a lever, *a*, forward of the lay and with which the lay is adapted to engage in its advance movement, and a band, one end secured to said pulley and the other end in connection with said lever *a*, substantially as described.

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