(No Model.) 2 Sheets—Sheet 1.

J. MORTON.

LET-OFF MECHANISM FOR LOOMS.

No. 388,215. Patented Aug. 21, 1888.

Fig. 1

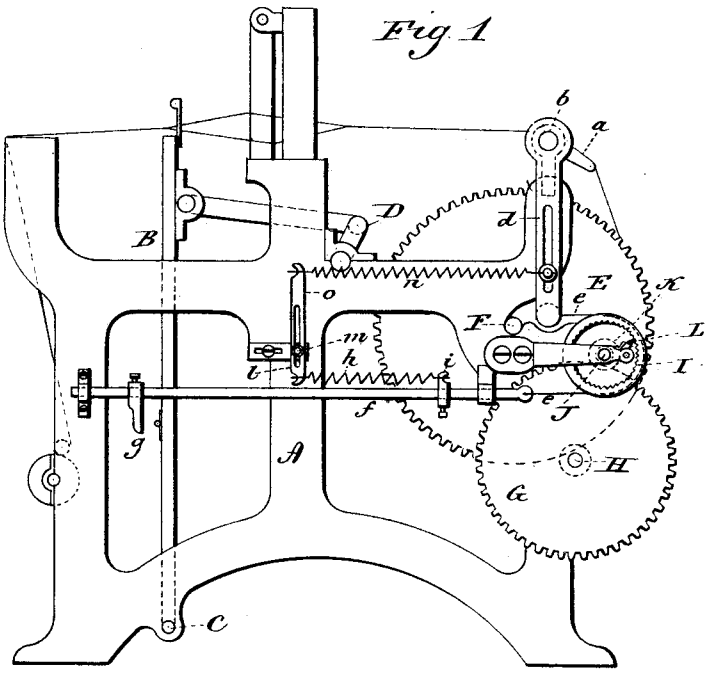


Fig. 2.

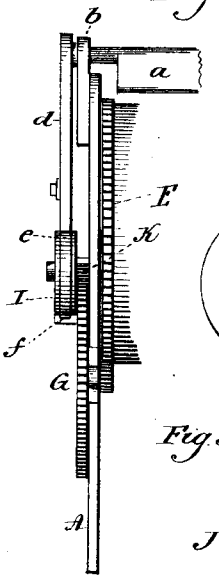


Fig. 3

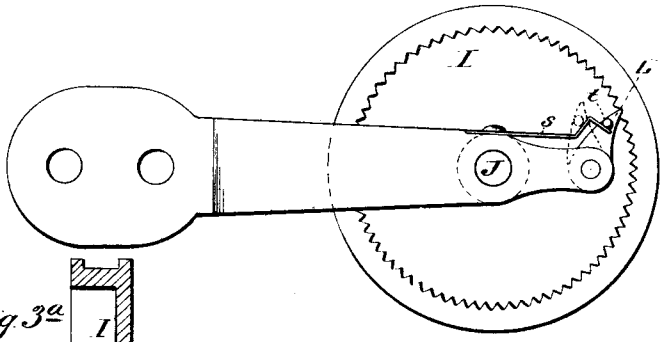
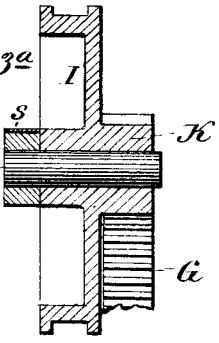


Fig. 3a



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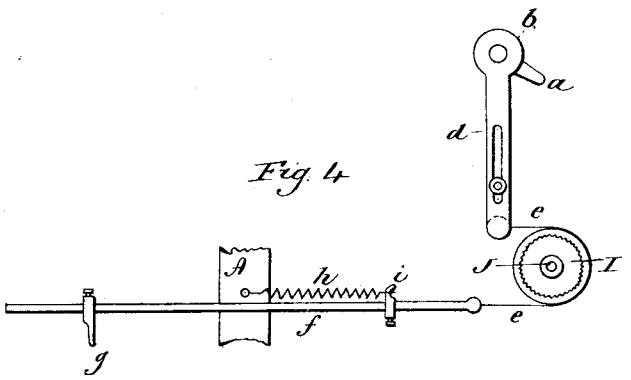
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Fig. 4



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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. 388,215, dated August 21, 1888.

Application filed March 8, 1888. Serial No. 266,575. (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, which drawings constitute part of this specification, and represent, in—

Figure 1, a side view of the frame and so much of the loom as is necessary to illustrate the invention; Fig. 2, a rear view of loom at one end, showing the invention as applied; Fig. 3, an outside side view of wheel I, showing the pawl and ratchet and connection enlarged; Fig. 3ª, a partial vertical section cutting through the axis of wheel I; Fig. 4, a modification.

This invention relates to an improvement in let-off mechanism for 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 maintain a regular and constant tension upon the warp; and it consists in the combination of devices hereinafter particularly described, and set forth in the claims.

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 particular illustration or description.

E represents a gear on the end of the warp-beam, which is hung upon the shaft F, supported upon 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, carrying a pinion which works into the gear E on the warp-beam.

I represents a wheel loose on a shaft, J, supported in a bracket upon the frame.

K is a pinion made fast to or a part of the wheel I, and so as to revolve therewith. The pinion K works into the gear G, so that rotation imparted to the wheel I in one direction will be communicated through the pinion K to the gear G, thence from the pinion H of the gear G to the warp-beam through the gear E. The wheel I is prevented from rotation in the opposite direction by means of a pawl, L, hung upon a stationary pivot, and, as represented in Fig. 3, the wheel I is constructed with an internal series of teeth with which the said pawl is adapted to engage.

The tension-bar *a* is hung in bearings *b* above the warp-beam, and so that the tension-bar extends downward and rearward from its bearings and below the warps, so that the warps passing from the warp-beam run over the said tension-bar, and this tension-bar is adapted to receive a swinging movement, which will cause it to bear with greater or less force against the warps. From the tension-bar a lever, *d*, extends downward toward the wheel I to a point forward of the said wheel I. This lever is for the purpose of imparting a certain amount of vibratory movement to said tension-bar to increase or reduce its force upon the warps.

To the lever *d* a band, *e*, is attached, which passes around the wheel I in frictional contact with its periphery, the other end of said band *e* being attached to the horizontal rod *f*, supported in guides upon the frame of the loom. This rod *f* extends beyond or forward of the lay, and on the rod is an adjustable finger, *g*, which stands in the path of the lay as it advances to beat up.

A spring, *h*, is hung by one end to the rod *f*, as at *i*. The spring, extending forward, is hung by its other end to one arm, *l*, of a lever hung upon a fulcrum, *m*. A second spring, *n*, is attached to the lever *d* between the axis of the said lever *d* and the extreme end, to which the band *e* is attached. This spring *n* extends forward and is attached to a second arm, *o*, of the lever, hung upon the fulcrum *m*. The arm *o* is longer than the arm *l* of the said lever—say as two to one—and the springs *h* and *n* are in like proportion to each other, so as to draw equally upon the respective arms of the lever *o l*. The band is therefore held upon the periphery of the wheel I under the combined force or influence of the two springs *h n*, thus producing a very considerable friction upon the periphery of the wheel I.

The operation of the pawl on the wheel I is to hold it stationary under a forward or advance movement of the rod *f*—that is to say,

the pawl being in engagement with the wheel I, when the rod *f* advances under the action of the lay the band will simply slip around the wheel without imparting rotation thereto; but such advance movement of the rod *f* under the action of the lay will draw the tension-bar with increased force against the warps, and thereby tighten the warps while the beam is held to prevent let-off under the increased tension. As the lay retreats, it releases the rod *f*, so that it is free to return, and the force which has been applied to the warps through the tension-bar will react through the tension-bar, turning the tension-bar downward, consequently forcing the lever *d* forward, which, through the band *e* around the wheel I, will now impart a rotation to that wheel to the extent to which the lever *d* is so moved, and this rotation of the wheel I will impart corresponding rotation to the warp-beam, and will let off the warp accordingly.

The two springs *h* and *n*, as before stated, counterbalance each other on the lever *o l;* but because the power of the spring *h* is exerted in one direction upon the lever *d* at a point more distant from the fulcrum of that lever *d* than the force of the spring *n* is exerted in the opposite direction it follows that the action of the spring *h* is to force the lever *d* rearward, and consequently the tension-bar against the warps, with a force equal to the difference between the power of the two springs on said lever *d*. At the same time the combined power of both springs is exerted upon the band around the wheel I to produce a great amount of friction upon that wheel, so that, while the wheel is held as the rod *f* is advanced and the tension applied under the action of the lay, the reaction of the warps upon the lever *d* will draw the band in the opposite direction and impart rotation to the wheel I, as before described. This rotation is insured, because of the great amount of friction between the band and the wheel. The normal tension of the warps upon the tension-bar is such that the rod *f* will between each beat be drawn rearward to such an extent that on the next beat of the lay the rod will be advanced to a certain extent, and then as the lay returns, the reaction of the warps through the tension-bar will return the rod *f* and impart a certain amount of rotation to the wheel I, and consequently a corresponding let-off of the warps. If the tension of the warps should be greater than the normal tension required, then the depression of the tension-bar and consequent forward movement of the lever *d* would be greater than that occasioned by the normal tension, the result of which would be to draw the rod *f* rearward to a greater extent, so that the lay will sooner come into engagement with the finger *g*, and then in completing that beat the lay will give an increased length of movement to the rod *f* and to the lever *d*, drawing the band to a greater distance around the wheel I. Then as the lay retreats, the reaction of the warps through the lever *d* will be greater than before, consequently will impart an increased rotation to the wheel I and corresponding increased let-off until the normal tension is restored. If, on the contrary, the tension of the warps should be too light, then the return of the rod *f*, with its finger *g*, will be less, so that the action of the lay upon the rod *f* will be later, or not at all if the tension be so light; hence the rotation of the wheel I will be less or nothing, according as the tension may be and until the normal tension is restored.

The connection of the spring *n* with the lever *d* is adjustable, so that the differential action of the two springs *n h* upon the said lever *d* may be varied as occasion may require, and preferably I make the fulcrum of the lever *o l* adjustable, in order to bring the arms to correspond to the difference in the power of the two springs, that the two springs on that lever may counterbalance each other.

It will be understood that as the lever *d* moves forward or backward the spring *n* is correspondingly relieved or strained, and thus a certain amount of oscillation of the lever *o l* will necessarily follow to maintain the equilibrium between the two springs—that is to say, as the power of the spring *n* is relieved the spring *h* will accordingly draw upon its arm *l* of the lever, the lever turning accordingly, and vice versa, so that the said lever *o l* always maintains an equilibrium between the two springs.

The action of the two springs *h n* upon the tension-bar is so nearly equal that the tension-bar and its lever become very sensitive under the action of the warps, so that a slight variation from the normal tension will produce a corresponding movement of the tension-bar and its lever and vary the point of engagement between the lay and the bar accordingly. In some cases, as in heavier fabrics, this nicety of adjustment is not necessary. In that case the spring *n* and the lever *o l* may be omitted, as represented in Fig. 4, the forward end of the spring *h* being attached directly to the frame. While therefore preferring the nicety of adjustment produced by the differential springs, I do not wish to be understood as limiting my invention to the employment of said differential springs.

It is often desirable to leave the warp-beam free for rotation and so that the warp may be readily pulled therefrom by the operator. To permit such movement of the warp-beam, a cam-like spring, *s*, is arranged beside the pawl, and from the pawl a pin, *t*, extends outward and rests upon one side of the cam of said spring, so that the said spring tends to yieldingly hold the pawl in engagement with the teeth of the ratchet; but if the pawl be thrown away from the teeth of the wheel the pin will pass over the cam-like portion of the spring, as represented in broken lines, and there be held out of engagement with the wheel I, so that the wheel I is then free to turn, and the warp-beam is correspondingly free; but when again the warp is in condition for work the

pawl is returned into engagement with the wheel, and so that the spring then operates as a pawl-spring.

I claim—

1. In a loom, the combination of the warp-beam and lay, the wheel I, in gear-connection with the warp-beam, a pawl and ratchet to prevent the rotation of the said wheel I in one direction, but leave it free to rotate in the opposite direction, the tension-bar *a*, its lever *d*, extending from said tension-bar, a frictional band, *e*, having one end in connection with said lever and extending around said wheel I in frictional contact therewith, the spring *h*, and an extension from said band to a point forward of the lay, the said extension constructed to engage the lay in the forward or beating movement of the lay, substantially as described.

2. In a loom, the combination of the warp-beam and lay, the wheel I, in gear-connection with the warp-beam, pawl and ratchet to prevent the rotation of the wheel I in one direction, but leave it free to rotate in the opposite direction, the tension-bar *a*, over which the warps pass, lever *d*, extending from the said tension-bar, a frictional band, *e*, having one end in connection with said lever and extending around said wheel I in frictional contact therewith, an extension from said band to a point forward of the lay, the said extension constructed to engage the lay in the forward or beating movement of the lay, the two-armed lever *o l*, having the arms thereof of different lengths, differential springs *h n*, each hung by one end to the respective arms *o l* of the said lever, the other end of the spring *h* engaged with the said band, the other end of the said spring *n* hung to the lever *d* between the tension-bar and the point where the said band is attached to said lever *o l*, substantially as described.

3. In a loom, the combination of warp-beam and lay, the wheel I, in gear-connection with the warp-beam, said wheel provided with a pawl and ratchet to prevent the rotation of the said wheel I in one direction, but leave it free to rotate in the opposite direction, the tension-bar *a*, its lever *d*, extending from said tension-bar, a frictional band, *e*, having one end in connection with said lever and extending around said wheel I in frictional contact therewith, and an extension from said band to a point forward of the lay, the said extension constructed to engage the lay in the forward or beating movement of the lay, the said pawl hung on a stationary pivot, with a cam-shaped spring, *i*, and a pin, *t*, projecting from said pawl and adapted to work over said cam-shaped spring, substantially as described.

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Witnesses:

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ALBERT KNIGHT.