J. D. COTTRELL.

Let-Off Mechanism for Looms.

No. 219,389. Patented Sept. 9, 1879.

Fig. 1.

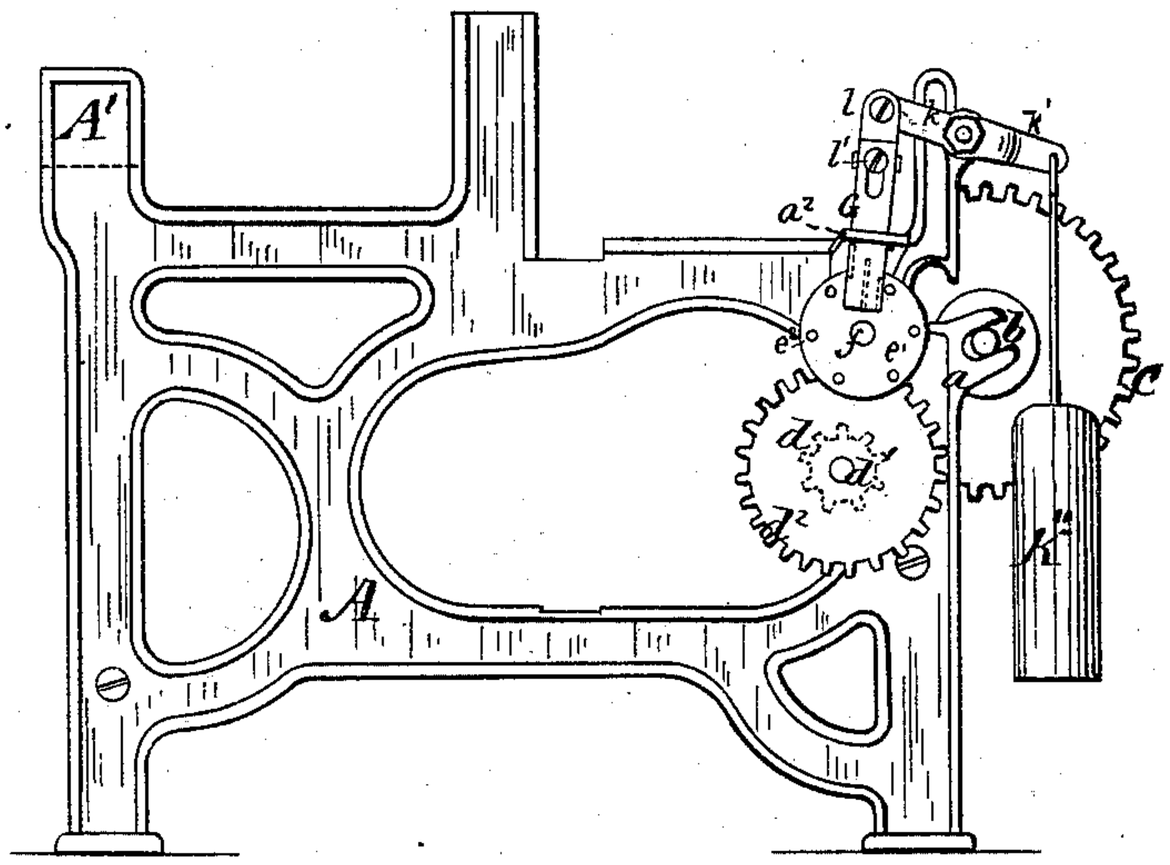


Fig. 2.

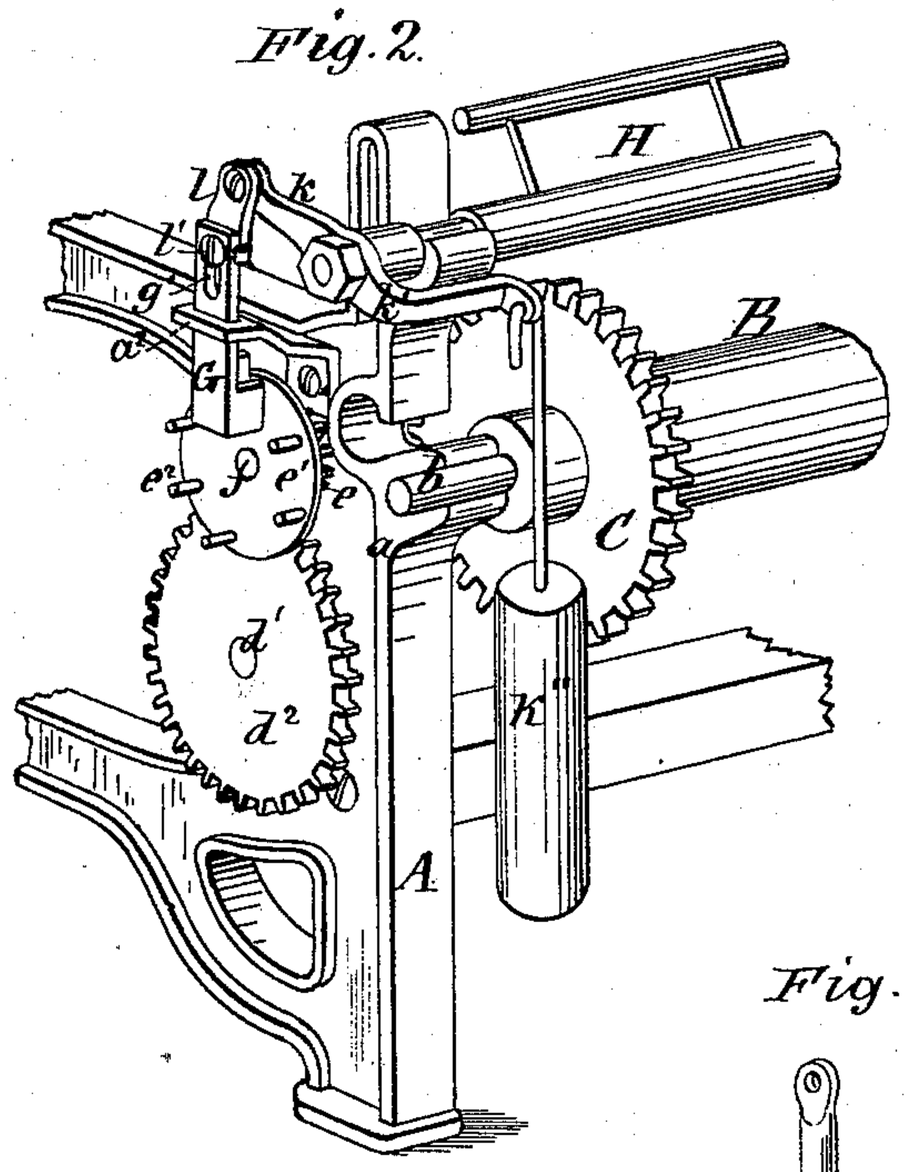


Fig. 3.

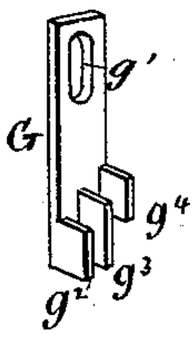
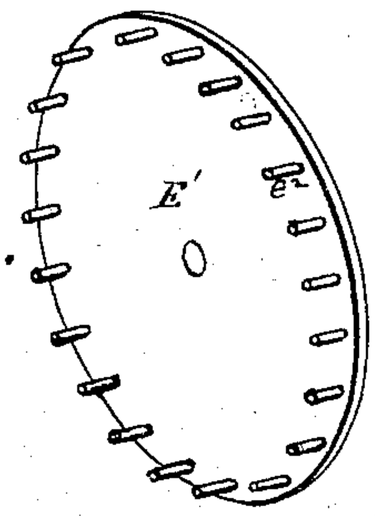
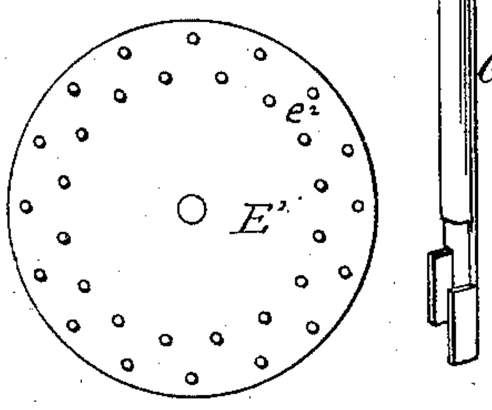


Fig. 4.





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UNITED STATES PATENT OFFICE.

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IMPROVEMENT IN LET-OFF MECHANISMS FOR LOOMS.

Specification forming part of Letters Patent No. **219,389,** dated September 9, 1879; application filed May 5, 1879.

To all whom it may concern:

Be it known that I, JESSE D. COTTRELL, of Central Falls, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Let-Off Mechanisms for Looms; and I hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents a side view of the frame of a loom carrying my invention. Fig. 2 represents a perspective view of a rear corner of the loom-frame carrying the let-off mechanism. Fig. 3 represents, in perspective, an inner view of the sliding bar or pawl detached, to be used in connection with a stud-wheel of the mechanism. Fig. 4 represents, in perspective, detached stud-wheels and a sliding bar or pawl, that will be hereinafter described.

The invention relates to mechanisms used to gradually let off the warp of looms and relieve the increasing strain upon said warp in weaving.

Heretofore the warp of looms has been retained under tension by various means. It has been done either by applying friction to the warp-beam or to its connections, or by combinations of gears and weights or springs, or by means of escapements with ratchet and stud-wheels. The first mode (by friction) is quite effective while the parts are in their normal condition, but becoming polished or sticky, they are thus rendered unreliable. The difficulty with the last-mentioned means is, that the diameter of the warp-beam is constantly changing while in use, and the escapement or let-off of one tooth of the ratchet-wheel produces a different result in the weaving when the warp-beam is full from what it does when the beam is partly unrolled, or when it is nearly uncovered, the escapement always letting off the same segment, and consequently unequal quantities, producing unevenness in the cloth.

The object of my invention is to provide a let-off mechanism which shall allow the warp-beam to rotate a segment of its circumference corresponding to the distance between two studs, or one-half or one-third of that distance, according to the tension on said warp, and independently of the size of the warp-beam.

My invention consists in combining with a wheel provided with pins projecting from its side a mechanism adapted to rotate the same from the warp-beam, a whip-roll, and a weight or its equivalent, a sliding bar or pawl provided with two or more parallel pallets of different lengths or heights, arranged thereon to arrest and let off said pins in succession, said sliding bar or pawl being connected to an arm projecting from the whip-roll, as will be hereinafter described, and pointed out in the claims.

In the drawings, A represents the side frame of a loom, the breast-beam being at A′, and the warp or yarn beam at B. The latter is provided with journals *b*, mounted in the frame at *a*, in which it can revolve. A gear-wheel, C, is secured to the warp-beam. This wheel meshes with a pinion, *d*, (shown in dotted lines in Fig. 1,) placed upon the inner end of the shaft d^1, passing through bearings secured to the frame. The outer end of the shaft d^1 carries the gear-wheel d^2, that transmits motion to the pinion *e*, mounted upon the stud *f*, projecting from the side of the frame. The pinion *e* is formed or provided with a circular plate, e^1, having a series of studs or pins, e^2, near its outer edge, to arrest its motion when coming in contact with the pallets of the pawl or sliding bar G. This pawl or sliding bar is suspended, guided, and operated in the following manner: To one end of the warp-guide or whip-roll H is secured an arm having the branches *k* and *k′*. The branch *k′* carries the weight K″ to balance and keep the whip-roll up. The arm *k* has pivoted to its extremity another arm, *l*, to which the pawl or sliding bar G is secured by a screw, *l′*, passing through a slot, g^1, in the upper part of said pawl or sliding bar, the slot being for the purpose of adjusting the length of the pawl-stem to suit the height of the whip-roll.

The sliding bar or pawl G is provided upon its inner face with a series of parallel pallets, g^2 g^3 g^4, for engagement with the studs e^2. These pallets are of different lengths. The pallet g^2 extends only a short distance above

the lower end of the pawl, and arrests, first, one of the studs. The pallet g^3 extends from the bottom of the pawl or sliding bar to a point higher than g^2, to receive the stud after it passes over the top of g^2. The top of g^4 is still higher than g^3, for a similar reason, but does not extend as low down, so that although it arrests the stud it soon allows it to escape under it, as the tension on the warp has been temporarily released by the advance of the stud and the pawl or sliding bar again elevated.

To cause the pallets to more readily slip off the studs, the ends of said pallets may be made wedge-shaped or elliptical. The studs may also have that form.

The sliding bar or pawl G is retained in contact with one side of the face of the disk e^1, and directed by the guide a^2, attached to the frame of the loom; and this guide may be provided with a friction-roll, to sustain the forward side of the pawl in its motion up and down.

If desired, the pinion e and disk e^1, and also the gear-wheel d^2, may be dispensed with, and a large studded disk, E^1, as shown in Fig. 4, be secured to the shaft d^1; but as its motion will be the inverse of the disk e^1, the arrangement of the pallets of the pawl or sliding bar as regards their length will have also to be reversed, or be as shown in Fig. 4, in which only two parallel pallets are shown on the pawl G^1, Fig. 4. To augment the number of stops made by said pawl G^1 between two consecutive studs in the row, the studded disk E^2 may be provided with two or more concentric rows of pins or studs, the position of each internal pin corresponding radially with the space between two pins of the outer row, and be used with the pawl G^1; but this arrangement of parts I have tried in practice, and do not consider it as good as the construction first mentioned in connection with the pawl or sliding bar G. This sliding pawl or bar G is shown as operated vertically, or nearly so; but it may be made to play horizontally by connecting it to a swinging arm. This let-off mechanism is self-regulating, and operates as follows: Supposing the yarn-beam to be nearly full, it should unroll very slowly, and supposing one of the studs e^2 to rest against the surface of the pallet g^2, the pawl or sliding bar G, under the oscillating impulse of the whip-roll H, caused by the tension and spring of the warp, will bob or oscillate vertically once or twice before the stud e^2 passes over the top of pallet g^2 and is arrested by the pallet g^3. It then plays up and down between g^2 and g^3, and escapes over g^3, to be arrested by g^4, from the under side of which it finally escapes. In the meantime the yarn-beam had two let-offs for that single stud.

If the yarn-beam has become nearly empty, the motion of the whip-roll will be more decided, and with it the motion of the pawl or sliding bar G, and it will pass clear over pallets g^2 and g^3 at one jump, and escape under g^4, (this may be alternated by a half-jump,) thus releasing the required length of warp, and forming cloth even throughout.

The pawl or sliding bar G, as constructed with the three parallel pallets, is intended for a yarn-beam having, when uncovered, a diameter equal to one-half of said yarn-beam when full of yarn. If the diameter of the yarn-beam when full is three times the size of the empty one, the sliding bar or pawl G should have another pallet to accomplish a similar result.

In all let-off escapements with which I am acquainted the operation has been confined to letting off one tooth at a time on one side of the center of the wheel. They operate as upon the pallets of the verge of a clock—first upon a pin or pallet placed on one radius and then upon another pallet located on another radius of the pallet-wheel—and the escapement had to be so geared that this letting off of one tooth would be sufficient on the last part or end of the warp. The effect was this: on the full beam one tooth was too much, (when the beam is full it is generally sixteen inches in diameter, while it is only about six inches when nearly empty,) and one tooth passed at the beginning let off three times more yarn than necessary, and the result was uneven number of picks and uneven goods caused by the change of tension.

In my escapement the pawl or sliding bar is so arranged that on a full beam it will accommodate itself to the length of the warp needed, or to the tension of the yarn, by letting off a fraction of a tooth only at a time, if that amount only is required by the loom.

In the drawings the pawl or sliding bar G is represented as elevated by the weight K″ suspended from the end of the arm k', and is used, as shown, for light goods; but for heavy goods a spring is preferably used in connection with nearly all let-off mechanisms, to regulate the tension on the warp, and such a spring can be used in this case.

Having now fully described my invention, I claim—

In a let-off mechanism for looms, the combination, with a wheel provided with a series of pins projecting from its side, a mechanism adapted to rotate the same from the warp-beam, a whip-roll, and a weight or its equivalent, of a sliding bar provided with two or more parallel pallets of different lengths arranged thereon, the frame of the loom, a box or bearing for the sliding bar, and an arm projecting from the whip-roll and connected at one end to the said sliding bar, as and for the purpose set forth.

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