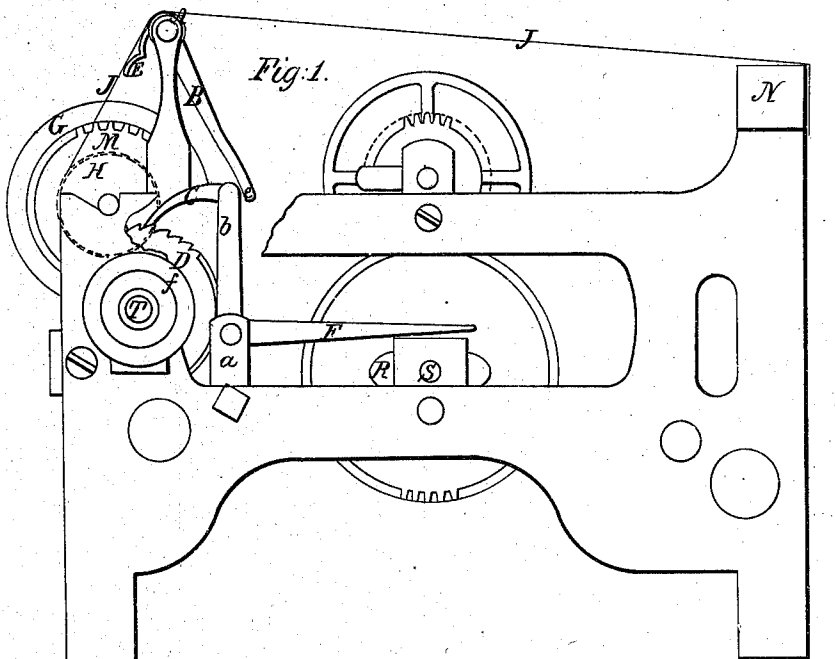
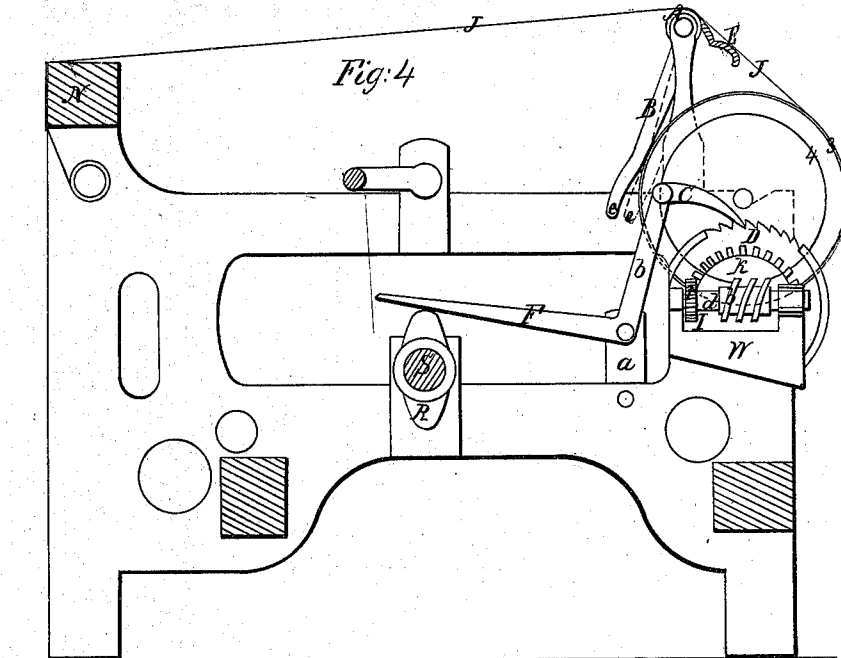


D. M. Collins.

Take-Up and Let-Off.

N^o 95,197.

Patented Sep. 28, 1869.



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Sheet 2-2 Sheets.

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United States Patent Office.

DAVID M. COLLINS, OF LOWELL, MASSACHUSETTS.

Letters Patent No. 95,197, dated September 28, 1869.

IMPROVEMENT IN LET-OFF MECHANISM FOR LOOMS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, DAVID M. COLLINS, of Lowell, in the county of Middlesex, and State of Massachusetts, have invented certain new and useful Improvements in Looms for Weaving, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 represents an end elevation of a portion of an ordinary loom having my improvements applied thereto.

Figure 2 is a rear-side, and

Figure 3, a top view of one end of the loom.

Figure 4 is a transverse section on the line *a b* of figs. 2 and 3. The circles 3 and 4 only indicate diameters of the full beam, and of the gear M.

Figures 5 and 6 are opposite transverse sections of smaller portions of the loom, the former on the line *e f*, and the latter on the line *c d*.

Figure 7 is a cross-section of the tension-bar, in size and form substantially my improvement.

This invention relates to that part of a loom which is known as the "let-off" motion or regulator, or feed, and has for its object, the regular and uniform delivery of warp from the yarn-beam during the entire process of weaving all the warp contained on such beam, and of preserving the same even tension on the warp, whether the beam is full, or partly full, or nearly empty.

This invention consists—

First, in the tension-bar A, of peculiar form or construction, as shown, and having combined therewith an adjustable arm, B, which controls the action of the pawl C on the ratchet-wheel D, by means of the action, draught, or tension of the yarn on the outer and overhanging cam-shaped edge, E, which forms one kind of progressive lever.

Second, my invention consists in the combination, with the tension-bar and arm, as shown and described, and with the beam-gear M, of the cam-lever F, pawl C, ratchet-wheel D, gears I and K, worm L, and a friction-device, all arranged as hereinafter described, and operating in connection with the parts first named.

In the construction, application, and use of my said improvements, the peculiar form of the tension-bar, and of the curved edge E, should be substantially preserved, maintained, or imitated, in order to produce the best and most desirable effect or result from its use, when applied to the loom in connection with the elements or devices which make it operative, or with other devices or elements substantially the same.

In the drawings I have shown the yarn-beam G and H, the former letter representing a full beam, and the latter an empty one.

Red lines J show the direction of the warp from the

yard-beam to and over the tension-bar and forward to the breast-beam N, except in fig. 7, where diverging lines J show the different direction of the warp from a beam having different quantities of yarn thereon, and the bearing, action, or effect of such warp upon the portion E of the tension-bar to draw it gradually downward as the yarn is woven off from the beam.

This gradual downward movement of the edge E of the tension-bar carries the lower end, *e*, of the arm B away from the pivoted head of the pawl, or gradually increases the distance between the two last-named parts as the beam of yarn grows smaller, and allows the pawl to recede a greater distance, and thereby to pass more frequently over and off from one or more teeth in the ratchet-wheel, so that when the pawl is carried back it turns the ratchet and the yarn-beam a greater part of a revolution, and more rapidly as the yarn unwinds from the beam.

When the yarn-beam is full, as when first put into the loom, the unwinding action of said beam is necessarily very slow, as one entire revolution of a full beam will let off nearly or quite double the length of warp or yarn of two revolutions of a beam which is nearly empty, and this gradual let-off, or unwinding action, or feed, is regulated by the adjustable arm B, and the tension-bar, and by the tension of the warp or yarn, or its action on the portion E of the bar, as, when the warp is drawn tightly by the continued weaving in of the filling, and the taking up of the cloth by the cloth-beam, actuated by the take-up motion, then the tightly-drawn warp draws the edge E of the tension-bar downward, and this carries the lower end, *e*, of the arm a sufficient distance from the pivoted head of the pawl to allow it to pass one or more teeth on the ratchet to turn the same and the yarn-beam, and allow the yarn to slacken and unwind.

Alternate actions or operations, substantially the same, and gradually increasing in number and extent, are kept up during the entire process of weaving off a beam of yarn, and the same even and uniform tension of the warp is preserved, whether the yarn-beam is full, partly full, or nearly empty, the curved portion E of the tension-bar acting as a progressive lever, increasing its leverage as the yarn unwinds from the beam, and as the beam of yarn grows smaller, said yarn leading or lapping downward on its outer surface, and gradually, further from the centre of the bar, which, by the peculiar form of the lever-portion E and by the adjustable arm, produces the desired effect, as hereinbefore described.

Any slight modification in the form of the portion E of the tension-bar, or changing it to the curved form, shown in figs. 1 and 4, will not prevent the successful working of the let-off motion, and such modifications I consider mere colorable alterations which I

have contemplated. The form substantially shown in fig. 7, I consider the best, when the adjusting-arm B is combined, as shown and described.

In connection with the tension-bar and the arm B, as before described, I employ a cam-lever, F, which is pivoted to a stand, *a*, secured to the frame.

This lever F has an arm, *b*, to the top end of which I pivot the head of the pawl. A cam, R, on the shaft S, actuates the lever F, and the pawl, to turn the ratchet-wheel D, arranged on a short shaft, T, supported in a box or bearing, U, secured to the frame. On the face of the ratchet-wheel is a bevel or other suitable gear, K, which gears into a proper gear, I, on a cross-shaft, *d*, which also carries a worm, L, and this worm engages with the gear M on the end of the yarn-beam, the worm-shaft being supported by a stand or stands, W, projecting inward, and fastened to the end of the loom.

On the outer end of the shaft T is a disk, or a wheel, *f*, between which and the end of the bearing U, is a spiral spring, *g*. The former is for turning the shaft T backward or forward, by hand, to temporarily slacken or to tighten the warp, or to adjust the beam and bring the proper tension on the warp after it has been slackened, and the latter is to produce friction on the shaft, and prevent it being turned backward by the backward action of the pawl, or by accident otherwise.

An adjustable collar, *h*, connected by one or more set-screws, *i*, is arranged on the shaft T, to keep the gear K into acting contact with the gear I, and to insure the compression of the spring *f*, thus forming a friction-device. The spring is concealed in a cavity formed in the end of the bearing U.

The ratchet-wheel may be so constructed as to be turned more than one tooth at each forward and backward motion of the pawl, if preferred.

At the opposite end of the loom, and as shown in figs. 2 and 5, a flat spring, *k*, is applied to the shaft of the tension-bar. The lower end of this spring bears against an adjustable stop or bracket, *l*, which may be set to accommodate the stiffness of the spring. This spring holds the tension-bar in position against the weight of the projecting portion E, and the tension of the warp, and restores said bar to its proper set position after each beat of the lay, and thereby retains the arm B in its adjusted position, and prevents the frequent engagement of the pawl with the ratchet, and measurably controls the action and insures (in connection with the arm B and the tension-bar) the

successful operation of the other parts of the feed or let-off, and the regular and uniform delivery of warp from the yarn-beam.

When the loom is in motion, the rotating cam R keeps the lever F and the pawl in reciprocating motion on the toothed edge of the ratchet-wheel, occasionally or frequently moving backward (by the rising of the end *e* of the arm B, caused by the action of the tension of the warp on the progressive-lever edge E of the tension-bar) far enough to catch a tooth or teeth of the ratchet-wheel, and turning the latter and the yarn-beam to let off the necessary quantity or length of warp therefrom, proportionate to the fullness of the beam or the amount of warp thereon, and to the velocity or speed of the operating-loom.

To slacken the warp for any purpose, I turn the beam back, by turning the disk or wheel *f*, and to tighten the slackened warp, I lift the pawl and turn the wheel *f* in the opposite direction.

Having described my invention,

What I claim, and desire to secure by Letters Patent, is—

1. The tension-bar A, in combination with the adjustable arm B, and spring *k*, all constructed, arranged, and operating in the manner and for the purpose specified.

2. In combination, with the tension-bar A, arm B, spring *k*, and the beam-gear M, as described, the cam-lever F, pawl C, ratchet-wheel D, gears I and K, worm L, cam R, and the friction-device, all arranged and operating in the manner and for the purpose set forth.

3. The method, substantially as described, of controlling or regulating the action of the pawl C on the ratchet-wheel D, to operate the "let-off," for the uniform delivery of warp from the yarn-beam, by means of the adjustable arm B and the tension-bar A, constructed and arranged as shown and described, and acted on by the unwinding warp, which gradually draws the portion E downward, and as gradually carries the end *e* of the arm away from the pivoted head of the pawl, or widens the distance between the two last-named parts, and increases the action of the latter proportionate to the amount of warp on the beam.

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Witnesses:

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