D. E. KEATING.

LET-OFF MECHANISM FOR LOOMS.

No. 192,514. Patented June 26, 1877.

Fig: 1.

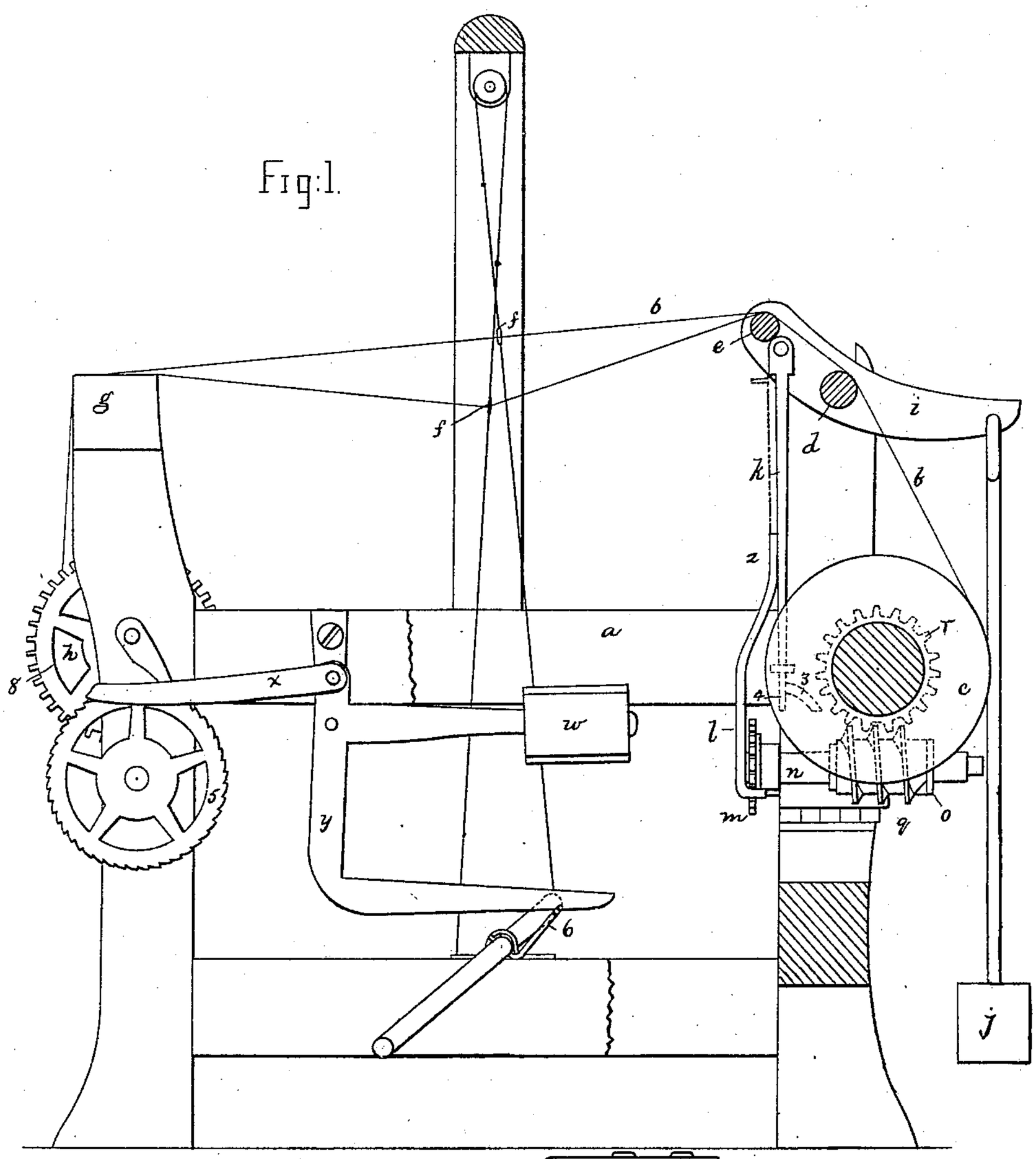
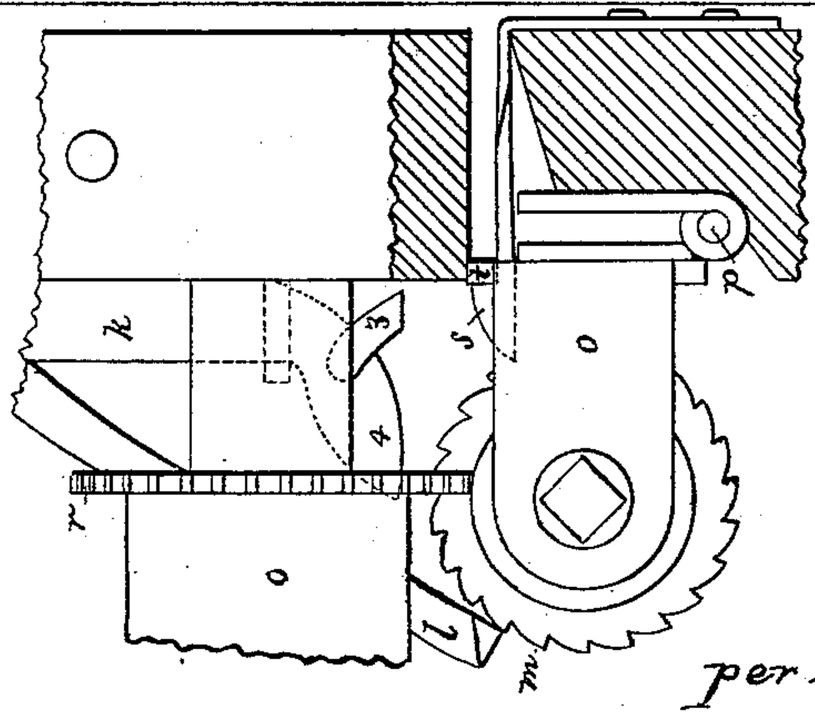


Fig. 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

DANIEL E. KEATING, OF LOWELL, MASS., ASSIGNOR TO HIMSELF, DAVID PICKMAN, AND GEORGE W. CROSS, OF SAME PLACE.

IMPROVEMENT IN LET-OFF MECHANISMS FOR LOOMS.

Specification forming part of Letters Patent No. **192,514**, dated June 26, 1877; application filed May 19, 1877.

To all whom it may concern:

Be it known that I, DANIEL E. KEATING, of Lowell, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Let-Off Mechanism for Looms, of which the following is a specification:

This invention relates to mechanism for letting off the warp as it is required in weaving.

The invention consists in the combination, with a whip-roll, operated by a weight, of a pawl connected with and operated directly by the whip-roll, to engage a ratchet-wheel on a worm-shaft, engaged directly with a pinion on the warp-beam.

By devices connected in such manner, and operated positively according to the tension on the warps, the latter may be retained uniformly under a certain amount of tension at all positions of the whip-roll, and for every pick from the commencement of a full warp until it is woven off or unwound to its end. The tension of the warp is not increased by the blow of the lay when beating in the filling, and is not varied by the reduction of the size of the yarn-beam. Also, in so pivoting the worm to drive the warp-beam that it may be thrown out of operative engagement with the worm-pinion on the warp-beam whenever the shuttle becomes caught in the shed.

This construction obviates breaking the warp and loom.

Figure 1 represents in side elevation sufficient portions of a loom to delineate my invention, and Fig. 2 a sectional detail thereof.

The frame *a* of the loom may be of any usual form, and may be supplied with crank-shaft, lay, and shedding mechanism of any usual construction.

The warp *b* on the warp-beam *c* is extended over the rod *d*, which is in this instance the center of motion of the whip-roller frame, thence over the whip-roller *e*, through eyes *f* of the harnesses, and woven into cloth. It then passes over the breast-beam *g*, and is wound upon the take-up beam *h*. The whip-roller *e* is supported between arms *i* attached to the shaft *d*, mounted on the usual whip-roll brackets at the rear of loom. These arms are provided at their outer ends with weights *j*.

The yarn bearing upon the whip-roll is by the weight or weights constantly kept pressed upward with a certain fixed amount of tension under all conditions of the warp and positions of the whip-roller, whether the lay is just beating up the filling, or whether the warp-beam contains more or less warp.

This, it is obvious, would not be the case if a spring was used instead of the weight, for the power of the spring is changed at each variation of position of the whip-roller, and also by variations in temperature and temper.

One of the arms *i* has pivoted upon it a disengaging rod or finger, *k*, and in this instance of my invention I have pivoted upon the rod *k*, at 2, the let-off operating-pawl *l*, but it is obvious that it might be just as well pivoted directly upon the arm *i*. (See dotted lines.) The construction shown in the drawing is the cheaper. The pawl *l* engages the teeth of a ratchet, *m*, on a shaft, *n*, supported in bearings *o* projecting from a plate pivoted at *p* to a stationary part of the loom-frame. The shaft *n* is provided with a worm, *q*, adapted to engage a pinion, *r*, attached to the yarn-beam. The worm-gear is held up in engagement with the teeth of the pinion by means of a catch, *s*, which engages a projection, *t*, on the bearing-frame. (See Fig. 2.) The weight *j* is adapted to the yarn employed and the cloth being woven, so as to hold it under a certain definite tension. The whip-roller is depressed from its upward to a lower position each time that the reed beats up the filling. As the cloth is formed and moved forward the warp depresses the whip-roller, so that as it rises and falls under the action of the beat of the lay at the cloth-making point, and the formation of the sheds, it rises not quite so high and descends a little lower, until it descends far enough for the pawl to pass over and engage a tooth of the ratchet, and then as the whip-roll rises under the action of the weight it rotates the ratchet and its shaft one tooth, causing the worm-gear to rotate the warp-beam, and thus let off the warp, so that the whip-roll again ascends substantially to its highest point, ready to be again gradually depressed, as just before described.

In this way it is obvious that the proper amount of yarn will be let off at the proper

time, and it will be let off evenly, one tooth after another of the ratchet being successively engaged by the pawl.

In this my improved let-off the tension on the warp is kept constant by the direct action of a weight, as contradistinguished from a spring, which is liable to variations in power under varying temperature and degrees of compression.

On a loom provided with this let-off, and in practical operation, thirty-six successive "cuts" of cloth—three full warps—have been woven from like warp and filling with a variation of less than one per cent. in weight. The power applied to cause the pawl to move the ratchet and let off the warp comes directly from the weight or weights *j*, and the power to lower the pawl is exerted by the warp on the whip-roll, with which the pawl is connected, and in unison with which it rises and falls.

In case the shuttle becomes caught in the shed, then the warp must be suddenly let off, or the warp or the loom will be broken. To prevent injury of warp or loom at such an accident, I have provided a leg, *k*, it having a foot consisting of a heel, 3, and a toe, 4, so arranged that when the whip-roller is suddenly depressed by unnatural strain on the warp the heel 3 will strike the catch *s* and release it from the part *t* of the bearing-frame of the shaft *n*, and the toe 4 will simultaneously strike the top of and push down the shaft *n*, its pivoted bearing portions turning on the pivot *p*, permitting the worm to free itself from the pinion *r*, and the warp-beam to turn freely.

When the loom is again ready to be started the bearing portions sustaining the shaft *n* are again brought into operative position and caught by the catch.

The connection between the whip-roll and the ratchet for moving the worm-shaft and warp-beam is direct and positive without the intervention of a spring, and the movement of the pawl is derived solely from the movement of the whip-roll.

Instead of the whip-roll and catch shown, I might employ any other well-known and equivalent devices.

The take-up is in this instance shown as controlled by a lever, *y*, a weight, *w*, a tappet, 6, a pawl, *x*, and a ratchet, 5, it being on a shaft provided, as usual, with a pinion in gear with the pinion 8 in the take-up roller.

I claim—

1. The warp-beam and its gear, the shaft *n* and its worm-wheel, placed at right angles to the axis of the warp-beam and the ratchet on the shaft *n*, in combination with the whip-roll and the suspended weight and pawl, adapted to operate as described, to move the warp-beam positively to let off the warp as the whip-roll rises.

2. The warp-beam and its operating-gear, the latter supported in a pivoted frame, in combination with devices adapted to disengage the operative-gear from the warp-beam, to release it when the shuttle becomes caught in the shed.

3. The whip-roll, controlled as to its downward position by the strain on the warp, and the leg *k* connected therewith, in combination with a shaft supported in pivoted bearings, and adapted to operate the warp-beam, whereby, when the strain on the warp is excessive, the warp-beam is left free to rotate, substantially as described.

4. The combination, with the lay to beat up the filling and strain the warp according to the diameter of the filling, a whip-roller, and a suspended weight to elevate it in opposition to the strain of the warp after the blow of the lay, of a positively-operating catch-pawl gear and worm, whereby the said mechanism is adapted to move the screw-shaft to operate the warp-beam positively to let off the warp, substantially as described.

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

DANIEL E. KEATING.

Witnesses:

G. W. GREGORY,

S. B. KIDDER.