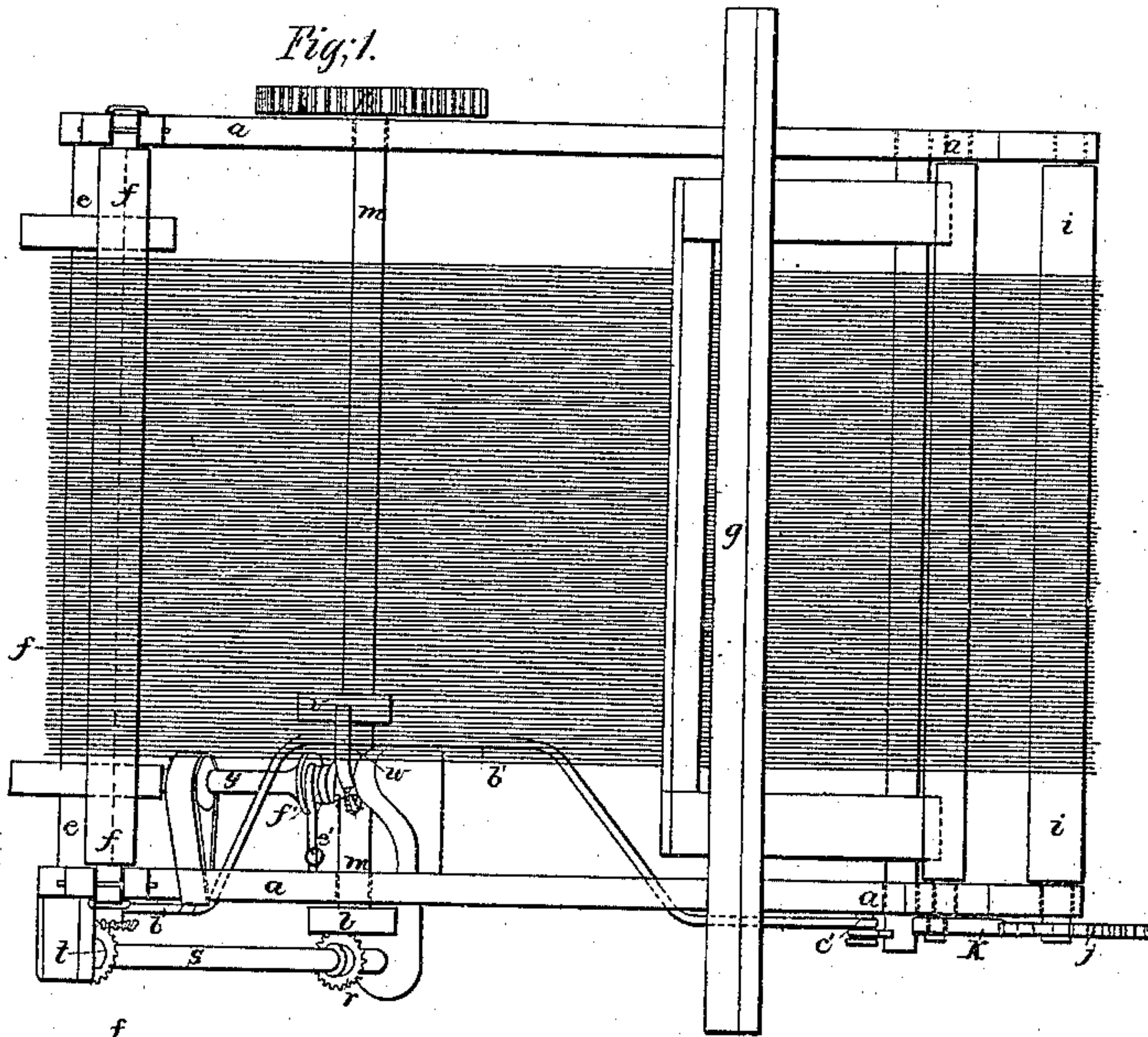


*J. A. Marden.*  
*Let-Off Motion.*

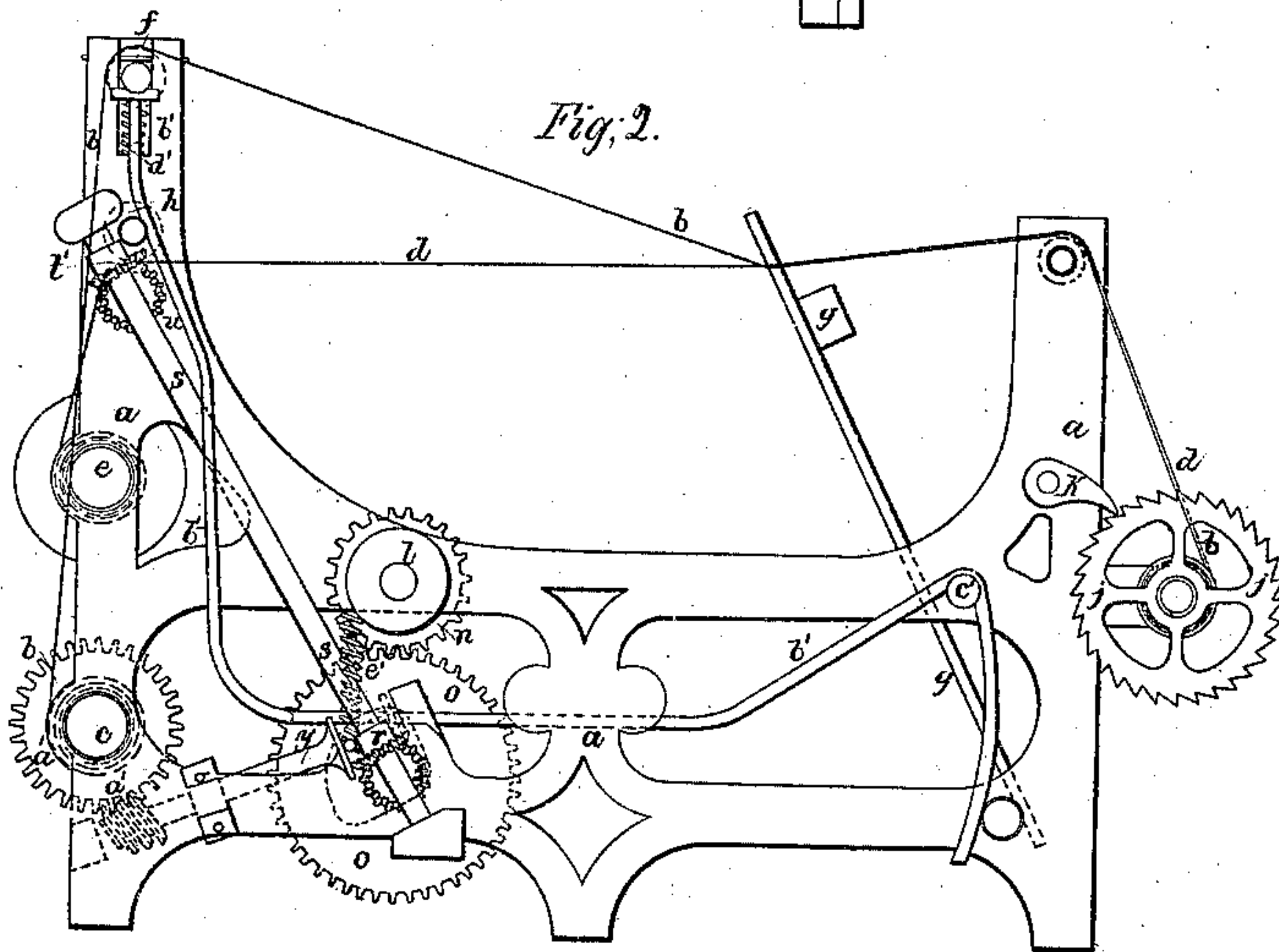
*N<sup>o</sup> 2,393.*  
*33,397.*

*Patented Oct. 1, 1861.*

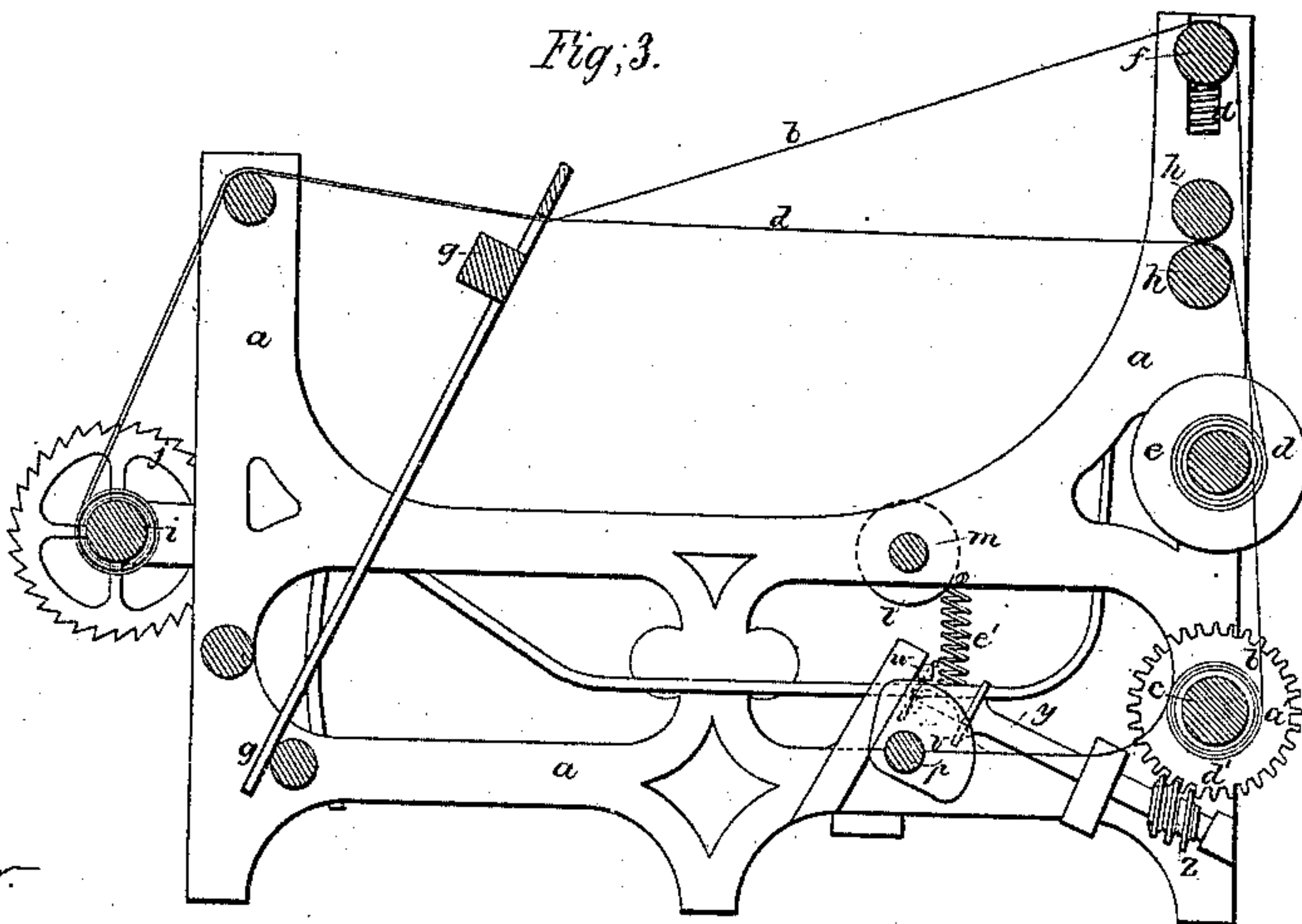
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN LOOMS.

Specification forming part of Letters Patent No. 33,397, dated October 1, 1861.

*To all whom it may concern:*

Be it known that I, JEREMIAH A. MARDEN, of Newburyport, in the county of Essex and State of Massachusetts, have invented certain new and useful Improvements in Let-Off Motions for Looms; and I do hereby declare that the following description, taken in connection with the accompanying drawings hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvements, by which my invention may be distinguished from all others of a similar class, together with such parts as I claim and desire to have secured to me by Letters Patent.

The figures of the accompanying plate of drawings represent my improvements.

Figure 1 is a plan or top view of a loom with my improvements applied thereto. Fig. 2 is a side elevation of the same. Fig. 3 is a central longitudinal vertical section of the same.

It is well known by those versed in the art of weaving cloth that as the circumference or periphery of the warp-beam decreases from the unwinding of the warp the tension on the warp increases in the same ratio. To provide for and to remedy this increase of the tension it is necessary that some arrangement of mechanical devices should be contrived that will balance this increase of tension by the letting out of more of the warp-yarn, thereby rendering the tension uniform.

Many devices have been invented for accomplishing the desired result in weaving—viz., the uniform tension of the warp or yarn; but the great objection to them all is the complication of their parts, the great expense of their manufacture, and the difficulty of applying them to the ordinary loom machinery, so that they have proved practically unsuccessful.

The present invention consists in a new and improved let-off motion for looms, comprising in itself the combined qualities of simplicity, inexpensiveness, efficiency of action, and easy application to the ordinary looms.

*a a* in the drawings represent the support-frame-work of a loom.

*b b* is the warp, (shown by red lines,) wound upon a warp beam or roller *c*.

*d d* is the filling, (shown by blue lines,) wound upon the roller *e*. The warp *b b* passes upward over a guide-roller *f*, thence through

an ordinary reed or raddle placed in the lathe *g*, after which the weft or woof is entwined with the same by the ordinary mechanism in looms. The filling *d d* at the same time with the warp passes upward and between two guiding and nipping rollers *h h*, and thence through the reed, the same operation then taking place in conjunction with the warp, as has been above referred to. The whole—warp, weft, and filling—being then in the form of cloth, is then wound upon the cloth beam or roller *i*, having a ratchet-wheel *j* upon one end, with which engages the pawl *k*, preventing the unwinding of the cloth.

The two rollers *h h*, between which the filling passes, are so arranged with regard to each other that the filling will receive a little binding or nipping, which, together with the tension acting upon the filling passing through the reed, will serve to stretch or lengthen out the fibers or filaments of the same. In this description the filling is supposed to be composed of elastic or rubber filaments or threads, from which it will be readily inferred that the goods wove will belong to that class of goods called "shirred." The filling, however, can consist of any desired material other than rubber.

*l* is a pulley upon the horizontal shaft *m*, on the other end of which is a gear-wheel *n*, interlocking with another gear-wheel *o*, placed on the horizontal shaft *p*, on the other end of which shaft is a bevel-gear *q*, engaging with a similar gear *r*, placed on the lower end of the inclined vertical shaft *s*. On the upper end of the shaft *s* is another bevel-gear *t*, engaging with a similar gear *u*, placed on the shaft of the lower roller *h*. By communicating motion to the pulley *l* by means of a belt or band it will, by means of the arrangement of gears described, communicate a rotary motion to the lower roller *h h*, thereby feeding the filling between the same.

On the lower shaft *p* is a cam *v*, upon which bears a pawl *w*, engaging with a ratchet-wheel *x*, placed on a shaft *y*, having suitable bearings in the frame-work *a a*, upon the other end of which is an endless screw *z*, engaging with a gear-wheel *a'*, placed on the shaft of the warp-roller *c*, which will consequently receive an intermittent rotary motion.

The guide-roller *f* has suitable bearings in sliding boxes *g' g'*, both of which boxes rest



upon springs  $d'$   $d'$ , and one of which also rests upon the top end of the bent rod  $b'$ , turning upon a fulcrum at  $c'$ . This bent rod  $b'$  passes down from the box  $g'$  under the pawl  $w$  between the cam  $v$  and ratchet-wheel  $x$ , the pawl  $w$  when in repose resting upon the same, so that any change of position of the rod  $b'$  will affect it, (the pawl.) The pawl  $w$ , being actuated by the revolution of the cam  $v$ , upon which it travels, revolves the ratchet-wheel  $x$ , and by means of the connecting arrangement of devices above described the warp-beam, thereby letting off the yarn always at a uniform rate so long as the tension of the same is uniform, as desired; but when the tension of the warp or yarn is increased, as it will be in consequence of the diminution of the periphery of the yarn or warp beam, it is necessary that some arrangement of devices should be provided to let off more yarn from the beam in order to balance this increase of tension.

The above-described arrangement of devices, consisting of the guide-roller  $f$ , bent rod  $b'$ , pawl  $w$ , cam  $v$ , and ratchet wheel  $x$  will by their united operation effect this desired result, for, as the tension upon the warp is increased, however slight may be the increase above the desired tension, it will draw down the guide-roller  $f$ , and as one of its journals or sliding boxes  $g'$  rests upon the top end of the bent rod  $b'$  it will also force down the rod  $b'$ . Upon this rod  $b'$  rests, as has been stated, the pawl  $w$  when in repose, and as the rod  $b'$  is lowered the pawl  $w$  will also, by its own weight, follow the same, the rod  $b'$  at all times when the pawl is not actuated by the cam serving the purpose of a rest for the same and as a limit to the fall of the pawl. By thus arranging the pawl  $w$  with respect to the bent rod  $b'$  it is evident that any increase of tension upon the yarn will so operate upon the rod  $b'$  as to lower its position, and as the rod  $b'$  is the limit of the fall of the pawl over the teeth of the ratchet-wheel it will regulate the number over which the pawl is to fall, and according as the number is greater or less the ratchet-wheel  $x$  will be revolved by the pawl a greater or less distance, and consequently more or less yarn will be delivered from the warp-beam to correspond to and overcome the variation of the tension. The springs  $d'$   $d'$ , placed under the boxes  $g'$   $g'$ , serve to replace the roller  $f$  upon the desired tension being imparted to the yarn. The rod

$b'$  is retracted by the spring  $h'$ , coiled upon the fulcrum  $c'$ . The spring  $f'$ , coiled upon the shaft  $y$ , is connected or attached to the under side of the pawl  $w$  and, acting in conjunction with the vertical spiral spring  $e'$ , to which one end of it (the spring  $f$ ) is attached, serves to keep the pawl bearing upon the cam and ratchet-wheel.

It will be evident that there are a variety of modes of imparting motion to the pawl or to the ratchet-wheel otherwise than by the cam  $v$ , such as the following, for instance: The pawl could be connected with the lathe of the reed in such a manner that the lathe by its forward and backward movement would communicate the necessary motion to the pawl and by that transmitted to the ratchet-wheel.

The above-described arrangement, it will be seen, renders the loom entirely self-regulating and very sensitive in regard to the essential matter of keeping up a perfectly-uniform tension on the yarns, as the slightest variation in the movement of the guide-roller  $f$  will be instantly conveyed to the warp-beam. This arrangement, moreover, renders it impossible for the operative to tamper with the loom with a view to altering the tension so as to increase the rapidity of weaving, thereby injuring the goods by loosening the texture of the weaving, as is frequently done where the work is paid for by the number of yards made.

Having thus described my improvements, I shall state my claims as follows:

1. The use of a roller having yielding or elastic supports for carrying the warp over it to the reeds, in combination with guiding or nipping rollers, operating substantially as described, for the conveyance to the reeds of the filling, whether the same be of an elastic nature or not, the whole being arranged in relation to the driving mechanism essentially as shown and set forth.

2. The peculiar construction and arrangement of the mechanism for automatically regulating the tension to the threads and yarns in a loom, the same consisting of the several devices specified, so arranged and combined as to operate in unison in the manner and for the purposes set forth.

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