(No Model.) 2 Sheets—Sheet 1.

A. A. FORBES.

LET-OFF MECHANISM FOR LOOMS.

No. 569,865. Patented Oct. 20, 1896.

Fig. 1

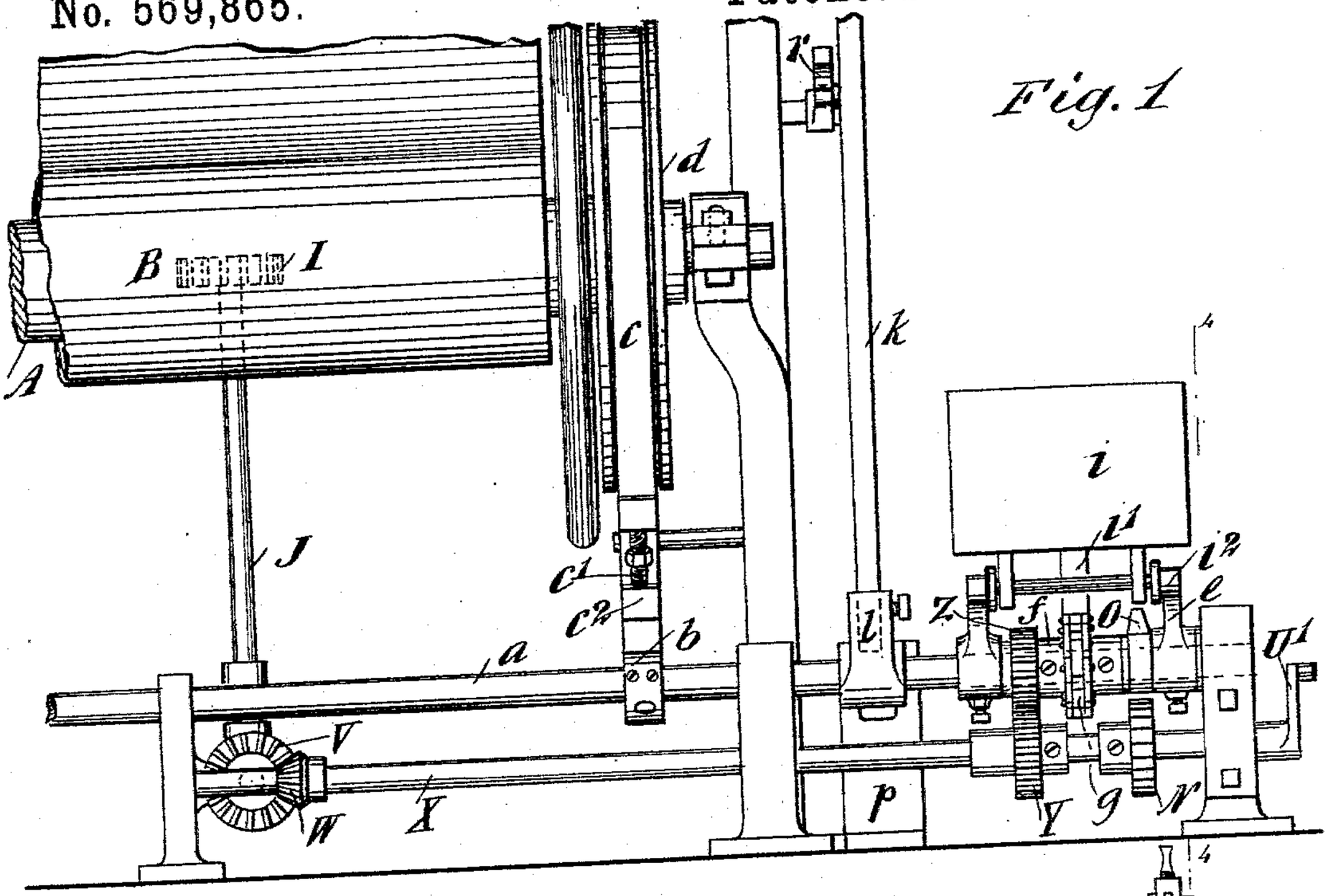
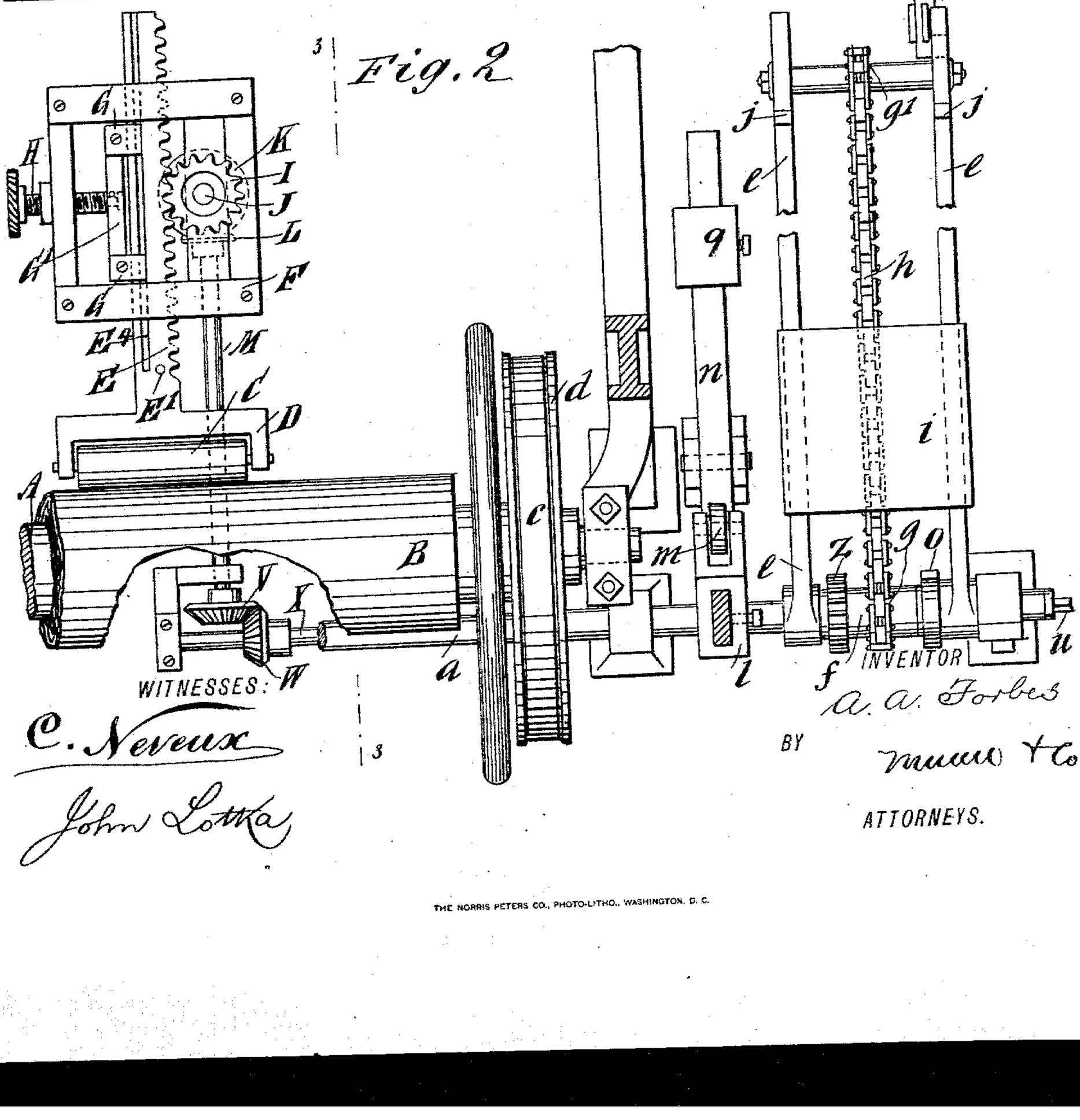


Fig. 2



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(No Model.) 2 Sheets—Sheet 2.

A. A. FORBES.

LET-OFF MECHANISM FOR LOOMS.

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Fig. 6

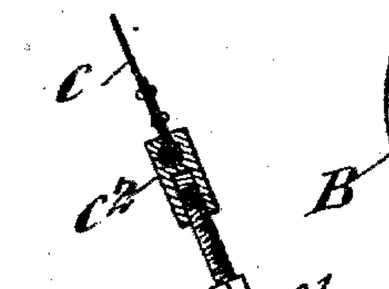


Fig. 3

Fig. 5

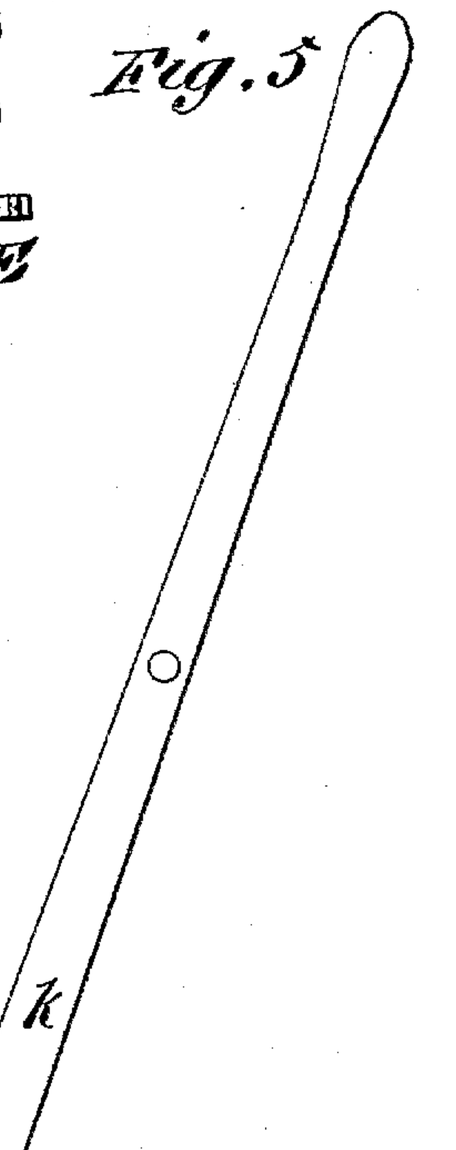
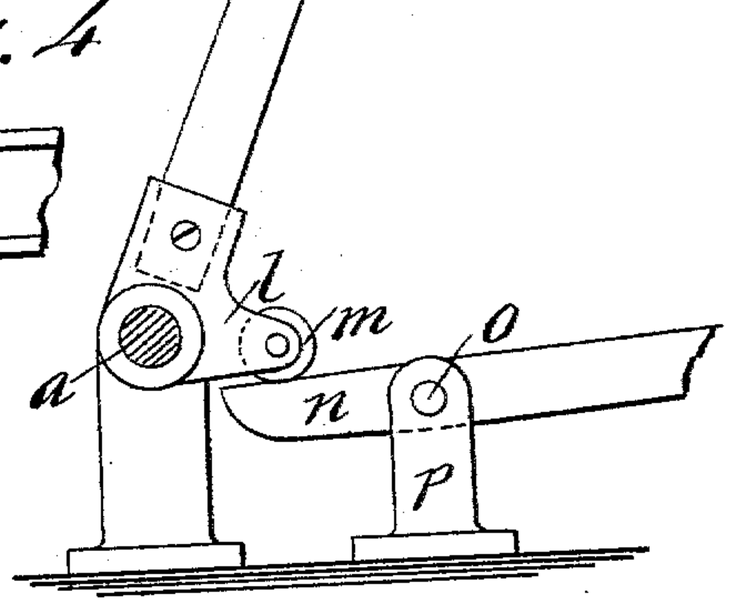


Fig. 4



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UNITED STATES PATENT OFFICE.

ARTHUR A. FORBES, OF ST. HYACINTHE, CANADA.

LET-OFF MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 569,865, dated October 20, 1896.

Application filed December 27, 1895. Serial No. 573,440. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR A. FORBES, a subject of the Queen of Great Britain and Ireland, and a resident of St. Hyacinthe, Province of Quebec, and Dominion of Canada, have invented a new and Improved Let-Off Mechanism for Looms, of which the following is a full, clear, and exact description.

My invention relates to devices for governing the automatic reduction of the tension of the yarn upon the yarn or warp beam of a loom, and has particular reference to devices of the above-indicated class in which the reduction of the tension is obtained by means of a weight or car moving upon a lever which is connected to the friction-bands upon the heads of the beam.

The object of my invention is to provide a means whereby the reduction of tension called for in consequence of the unwinding of the yarn from a loom warp-beam, and consequent change in diameter and power of purchase, can be governed automatically and correctly from a full to an empty beam with one setting of a mechanism on the weight-and-lever principle, the mechanism having no connection whatever with any running or moving part of the loom, except the force-roller, which bears against the warp on beam for the purpose of controlling corresponding to the reduction of the diameter of the warp on the beam the time taken by a loaded car to travel a predetermined distance toward a lever's fulcrum, said distance being determined by the number of teeth in the gear which meshes with the toothed bar on the end of which the free roller operates against the yarn on the beam, all the parts being so arranged that the operator cannot without using a wrench put in fewer picks of filling per inch than the mechanism is set and loaded for.

Other features of the invention will appear from the description following hereinafter and from the appended claim.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a broken rear elevation showing one end of a loom provided with the improvement. Fig. 2 is a broken plan view of the same. Fig. 3 is a sectional elevation on the line 3 3 of Fig. 2. Fig. 4 is a side elevation, with parts in section, on the line 4 4 of Fig. 1. Fig. 5 is a broken detail view of a counterbalancing-lever, and Fig. 6 is a detail sectional elevation showing one end of the friction-band.

On the beam A is wound the yarn B, against which presses a force-roller C, whose axis extends parallel to that of the beam. The roller C is journaled in a support or fork D, which is made integral with a rack E, having sliding movement in a frame F toward and from the beam. The rack E is provided with an aperture E′, into which may be put a pin E^2, connected to the frame F by means of a chain E^3 or a like connection, for a purpose to be stated hereinafter. The rack is also provided with a groove or guideway E^4, which extends longitudinally and is engaged by lugs G, which have sliding movement in the frame F in a direction substantially parallel to the axis of the beam A. A screw H, which engages a screw-threaded socket in the frame F and has a head loosely rotating in the connecting-rod G′ of the lugs G, serves to move the said lugs and the rack E in a direction parallel to the shaft of the beam to bring the teeth of the rack into or out of engagement with those of a pinion I, mounted on a shaft J. The shaft J is vertical and is journaled in the frame F, the lower end of the said shaft carrying a bevel-wheel K, engaging a similar wheel L on a horizontal shaft M, which extends forwardly at the bottom of the loom. The pinion I is removable, and a set of change-pinions furnished with each let-off mechanism.

On the shaft M is rigidly secured a scroll P, that is, a pulley having produced therein a spiral groove Q, which receives the wire or rope R, passing over a pulley S, one end of the said wire being secured to the scroll P and the other end to a weight T. The opposite end of the shaft M to that carrying the bevel-wheel L is provided with a bevel-wheel V, meshing into a similar wheel W, located upon a horizontal shaft X, which extends longitudinally of the loom, that is, parallel to the beam A. On the said shaft X is rigidly secured a pinion Y, engaging another pinion Z, which is loose upon a shaft *a*, located above the shaft

X and parallel thereto. The shaft X is provided with a square end U, adapted to receive a wrench or crank U′ for the purpose of turning the shafts X and M and raising the weight T. A pawl O, made integral with or rigidly secured to the collar loosely mounted on the shaft *a*, is adapted to engage a ratchet-wheel N, rigid upon the shaft X, to prevent return movement of said shaft.

To the shaft *a* are rigidly secured pulleys *b*, to each of which is connected one end of the friction-band *c*, encircling the head *d* of the beam, it being understood that there is a friction-band for each head. The other end of each friction-band is secured to the frame of the loom. The friction-band may be adjusted by means of a rotatable double-threaded screw or fastener *c*′, screwing into female-threaded sockets c^2. On the shaft *a* are also rigidly secured two arms or levers *e*. Between the said arms or levers is arranged a sleeve *f*, which is made integral with the pinion Z, and also has rigidly secured to it a sprocket-wheel *g*. Another sprocket-wheel *g*′ is journaled in the opposite or free ends of the levers *e*, and a chain *h* passes over the said sprocket-wheels. The chain is adapted to be engaged by a projection *i*′ from a car *i*, which is provided with rollers i^2, adapted to run upon the levers *e*, the said levers forming a track for the car. The shaft of the sprocket-wheel *g*′ is mounted in slots *e*′, extending longitudinally in the levers *e*, so that the chain may readily be drawn tight. The car is locked, so that the operator cannot interfere with the weights.

The levers *e* are provided with abutments *j*, adapted to engage the car *i* upon its outward travel. On the shaft *a* is further rigidly secured an angular offset *l*, carrying the antifriction-roller *m*, the latter being adapted to engage one end of a lever *n*, fulcrumed at *o* upon a bracket *p*. The lever *n* is provided with a longitudinally-slidable weight *q*, which may be adjusted in any suitable manner and is for the purpose of balancing the levers *e*, on which the car *i* travels, before the car is put on the levers. A pivoted catch *r* serves to hold the lever *k* in position, said lever being attached to the offset *l*.

The operation is as follows: The attendant of the machine first sets the pawl O in engagement with the ratchet-wheel N and then rotates the screw H to remove the rack E from contact with the pinion I, and the rack E is then slipped back until the yoke D substantially abuts against the frame F, so as to be out of the way when putting in a full beam. The end of the shaft X projects through its bearing and is squared for the purpose of using a wrench or small crank U′ with which to turn the said shaft X, which motion will be communicated to the shaft M, on which is rigidly secured the scroll P, to which one end of the wire R is made fast and on which the wire R is wound, raising the weight T to its highest position and at the same time moving the car *i* outward from the track formed by the levers *e* until said car *i* engages the stops or abutments *j*, the pawl O acting on the ratchet-wheel N preventing a return movement of the weight T, the scroll P, the shafts M and X, and the car *i*. Thereupon the rack E is drawn forward and the pin E^2 is inserted in the aperture E′. The rack E is then pushed backward until the pin E^2 abuts against the frame F. When the weight T, the car *i*, and the rack E are in the aforesaid positions, the screw H is turned to bring the teeth of the rack E in engagement with the teeth of the pinion I, and thereupon the pawl O is thrown back, as illustrated. This will release the shaft X, and under the influence of the weight T the shaft M will be rotated, and the rotation will be communicated to the shafts J X and the sleeve *f*, so the roller C will be projected toward the beam A, while the car *i* will be caused to travel toward the fulcrum of the levers *e*, that is, the shaft *a*. This motion will continue until the roller C strikes the yarn B on the beam A.

It will be obvious that a predetermined position of the car *i* will always correspond to a certain position of the roller C relative to the center or axis of the beam; that is, the leverage exerted by the weighted car *i* will have a predetermined relation to the distance of the roller C from the center of the beam. When the roller C has come in contact with the yarn B, it will gradually follow the reduction in thickness which ensues as the yarn is reeled off the beam, and simultaneously the car *i* will travel toward the shaft *a*, it being obvious that as the car approaches the said shaft the leverage of the weight represented by the said car will be decreased, and the friction-bands *c* will be gradually drawn less tight against the circumference of the heads *d*, so that friction will be reduced to correspond to the reduction in diameter of the yarn on the beam.

It will be understood that the weighted levers *e* constitute a tension device for the friction-bands *c*.

It will also be understood that, as the wire R is in the spiral groove Q of the scroll P, the leverage of the weight will be reduced as the said weight rotates the shaft M. This is for the purpose of counterbalancing the gradual greater ease with which the car *i* is drawn on account of the levers *e* gradually rising from the level as said car comes toward said levers' fulcrum and at the same time keeping the pressure of roller C against the yarn on the beam A as near the same as possible from full to empty beam.

It will be understood that the ratio of the speed of the roller C to that of the car *i* may be varied according to the requirements of each individual case by employing pinions I of different numbers of teeth, and the mobility of the rack E toward and from the said pinion facilitates the removal and exchange of the latter.

It will be obvious that it matters not whether

there be a thick or a thin layer of yarn upon the beam A, as by means of the pin E^2 or equivalent stop of the rack E always deciding the distance of the roller C from the center of the beam A and the abutment *j* on the levers *e* or equivalent stop of the car *i* always deciding the distance of the said car *i* from the center of the shaft *a* said roller C and car *i* on lifting the pawl O and freeing the ratchet-wheel N will, through the influence of the weight T, find their correct relative positions, which are governed by the number of teeth on the pinion I which meshes with the rack E, and travel their corresponding and predetermined distances until all the yarn is delivered from the beam.

The lever *k*, the down end of which fits into the angular offset *l*, is for the purpose of easing the friction sufficiently at any time there should be pick-backs, and the catch *r* is for the purpose of holding the lever *k* in position and so set that the friction-bands will be relaxed only sufficiently to turn back the beam with ease after picking out, and no more, so as to give as little opportunity as possible for change of grip and tension when the friction is again applied.

I also provide a gage *s* adjacent to one of the levers *e*, for the purpose of ascertaining if the lever is horizontal or how far it is from being so at any time.

In order to hold up the levers *e* while attaching the friction-bands *c*, a vertically-adjustable slide *t* is provided, which may be held in position by means of a set-screw *u*. This slide is set on the inner side of the inside track of the levers *e*, that is, on the side adjacent to the loom-frame.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A let-off mechanism for looms, comprising a shaft arranged lengthwise of the warp-beam and carrying pulleys *b*, friction-bands engaging the heads of the beam, band-holders connecting said bands to said pulleys, levers *e* rigidly secured to the aforesaid shaft and provided with abutments *j*, a gage *s* for ascertaining the position of the said levers *e*, the holders *t* for supporting the said levers, the car or weight held to travel on said levers *e* and to engage said abutments *j*, a rack E movable toward and from the warp-beam and carrying a follower, such as a roller to engage the warp, said rack being provided with an aperture E′, a pin E^2 adapted to be inserted in said aperture to collide with the frame and thereby limit the movement of the rack and determine the position thereof, a change-pinion I engaging the said rack and operatively connected to the aforesaid car, so that the rack and car may move in unison, means for imparting motion to the rack and car, a ratchet-wheel N operatively connected to the car so as to turn when the car travels on the levers *e* and a pawl O adapted to engage said ratchet to prevent rotation thereof in one direction and thereby temporarily prevent the return movement of the car, substantially as shown and described.

2. In a let-off mechanism for looms, a shaft arranged lengthwise of the warp-beam and carrying pulleys *b*, friction-bands engaging the heads of the beams, band-holders connecting said bands to said pulleys, levers *e* rigidly secured to said shaft, a car or weight *i* held to travel on said levers an angular offset *l* rigidly secured to said shaft, a lever *k* secured to said annular offset, a catch *r* for holding the lever stationary, an antifriction-roller *m* carried by said annular offset, a stationary bracket a balance-lever *n* fulcrumed in said bracket and engaging said antifriction-roller, and a slidable weight *q* on said balance-lever, substantially as shown and described.

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Witnesses:
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OSCAR FREUND.