(No Model.) 2 Sheets—Sheet 1.

I. FONTAINE.

LET-OFF MECHANISM FOR LOOMS.

No. 484,002. Patented Oct. 11, 1892.

Fig. 1.

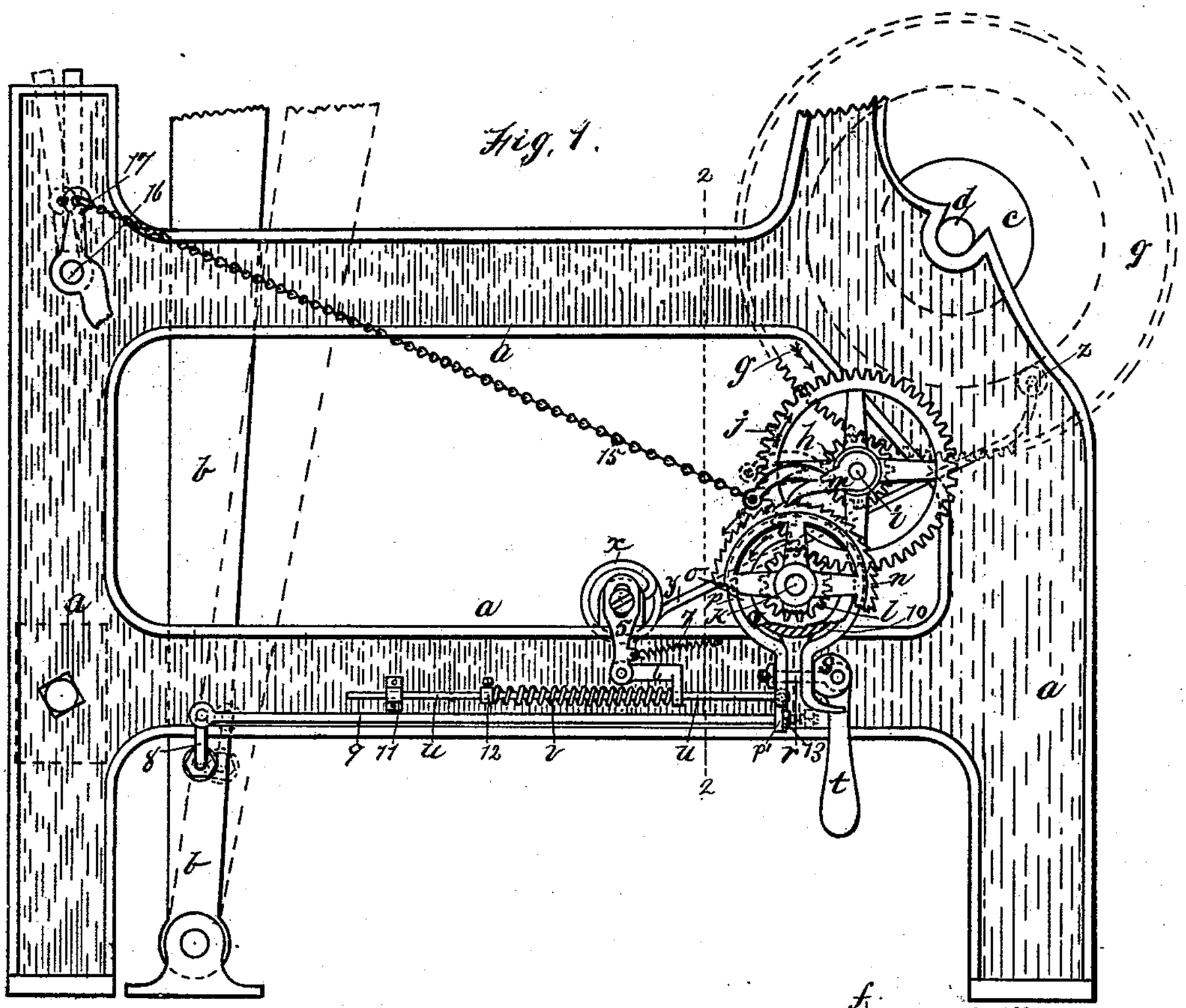
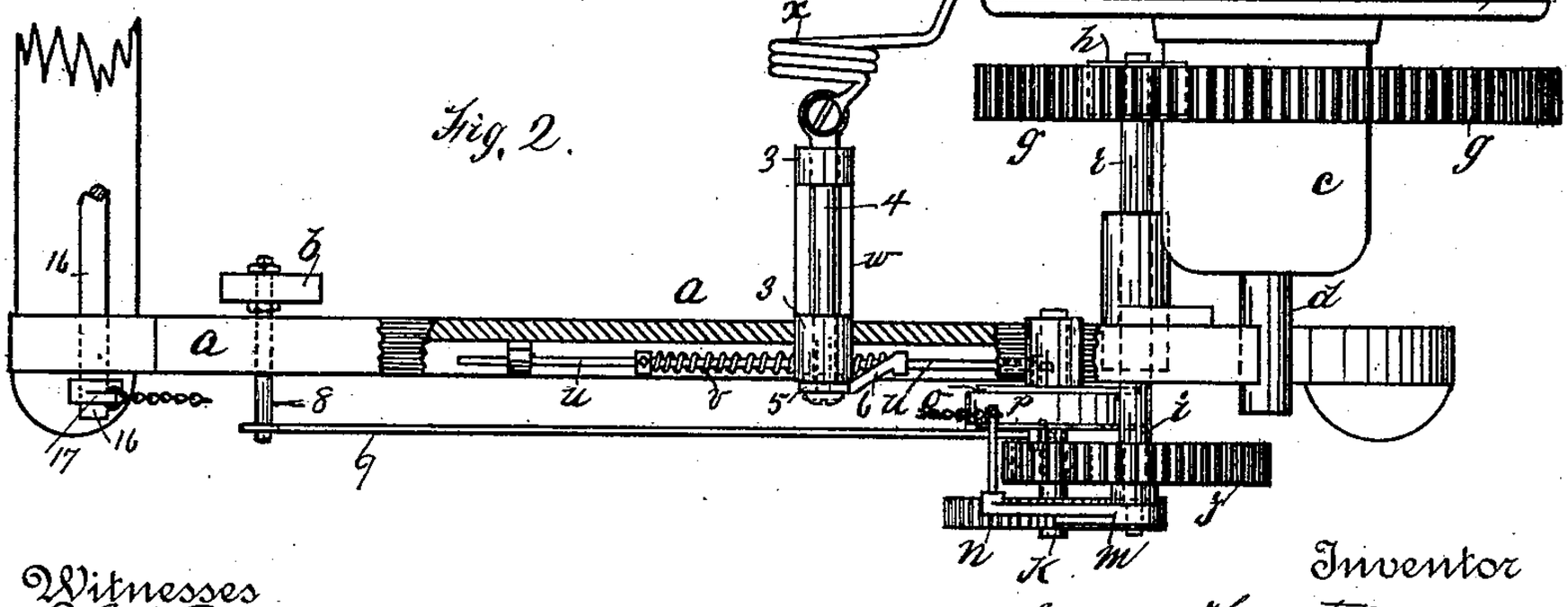


Fig. 2.



Witnesses
E. M. Power
Robt. Ruddell.

Inventor
Isaac Fontaine
By Allen Webster
Attorney

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3

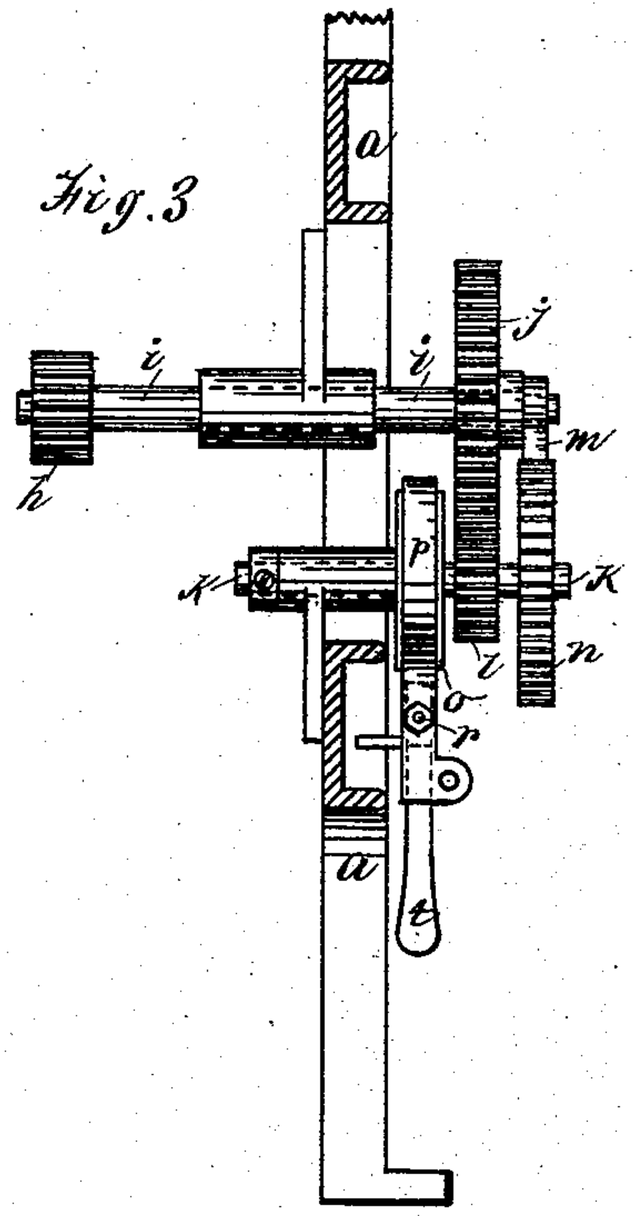
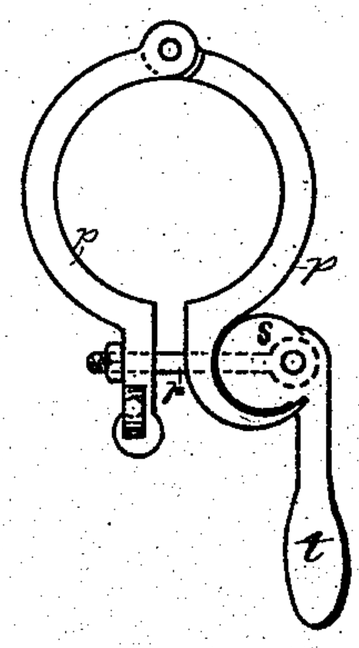


Fig. 4



Witnesses
C. M. Tower
Robt. Ruddell.

Inventor
Isaac Fontaine
By Allen Webster
Attorney

UNITED STATES PATENT OFFICE.

ISAAC FONTAINE, OF CHICOPEE, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO FRANK X. DEROIN, OF SAME PLACE.

LET-OFF MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 484,002, dated October 11, 1892.

Application filed December 30, 1891. Serial No. 416,538. (No model.)

To all whom it may concern:

Be it known that I, ISAAC FONTAINE, a citizen of the Dominion of Canada, residing in Chicopee, in the county of Hampden and State of Massachusetts, have made new and useful Improvements in Let-Off Mechanism for Looms, of which the following is a specification, reference being had to the accompanying drawings and letters and figures of reference marked thereon.

In the said drawings, in which like letters and figures of reference indicate like parts, Figure 1 is a side elevation of a loom-frame having my device arranged in operative position thereon. Fig. 2 is a plan view of a portion of the loom-frame having my device applied thereto. Fig. 3 is an elevation of the portion of the device at the right of line 2 of Fig. 1, the loom-frame being shown in section and the warp-beam being omitted; and Fig. 4 is a side view of a modified form of friction-strap.

In detail, *a* indicates the loom-frame; *b*, lay-sword; *c*, the warp-beam; *d*, the shaft upon which the warp-beam is mounted; *e*, flanges mounted thereon; *f*, the warp; *g*, a gear mounted upon the warp-beam; *h*, a pinion meshing therewith; *i*, a shaft upon which pinion *h* is mounted; *j*, a gear mounted upon shaft *i*; *k*, a shaft mounted adjacent to the shaft *i*; *l*, a pinion mounted on shaft *k* and meshing with gear *j*; *m*, a dog or pawl; *n*, a ratchet-wheel mounted on shaft *k* and having teeth with which the nose of the dog *m* engages; *o*, a flanged friction-pulley; *p*, a friction-strap mounted thereon; *r*, a bolt passing through the depending ends of the friction-strap; *s*, a cam pivotally mounted in the end of the bolt *r*; *t*, a hand-lever connected with the cam *s*; *u*, a horizontally-arranged rod connected at one end with one of the depending arms of the friction-strap and mounted in a suitable support at its opposite end; *v*, a spiral spring mounted upon the rod *u*; *w*, support for bearings; *x*, a coiled spring; *y*, an arm connected therewith, and *z* a roller mounted upon one end of said arm.

3 indicates bearings mounted on support *w*.

4 indicates a rotatable shaft mounted in the bearings 3.

5 indicates an arm adjustably mounted on the end of shaft 4; 6, a right-angled lever pivotally mounted at one end on the arm 5 and at the opposite end arranged to bear against the spring *v*.

7 indicates a spring arranged to draw the arm 5 in one direction.

8 indicates an arm mounted upon the lay-sword *b*, and 9 indicates a connecting-rod extending from one end of the depending arms of the friction-strap to arm 8.

The object of my invention is to provide a device by the employment of which the tension of the warp may be nicely and easily adjusted, and by which the let-off may be controlled with accuracy, and whereby the tension upon the warp-beam may be entirely and conveniently released.

My object is, further, to overcome the objections heretofore existing and to provide an accurately-operating device whereby a uniform tension may be maintained and a superior product thereby procured from the loom, and I accomplish these objects by the construction herein shown.

The construction and operation are as follows: *a* indicates an ordinary loom-frame provided with a warp-beam, shuttle-race, and lay arm or sword of the usual construction. Upon the warp-beam *c* is mounted a gear *g*, and mounted in a suitable support is a rotatable shaft *i*, having mounted thereon at one end a pinion *h*, the teeth of which mesh with the teeth upon the gear *g* and cause the shaft *i* to rotate. Near the opposite end of the shaft *i* and mounted thereon is a gear *j*, the teeth of which mesh with the teeth of a pinion *l*, the latter being mounted upon a shaft *k*, having suitable bearings in the frame. On the shaft *k* is also mounted a ratchet-wheel *n*, having ratchet-teeth upon its periphery, and upon the end of shaft *i* is pivotally mounted a dog *m*, the nose of which engages the teeth of the ratchet-wheel *n* and prevents return movement thereof. Upon the same shaft *k* is mounted a flanged or grooved pulley *o*, on which is arranged a friction-collar *p*, which passes around the greater part of the pulley and the ends of which collar project downwardly, as shown in Fig. 1.

Between the inner surface of the friction-strap *p* and the base of the groove in the pe-

riphery of the pulley *o* is a leather strap 10, which, being removable, may be replaced when worn and which will give a better friction-surface than the faces of the metal, if in contact. A bolt *r* is arranged to pass through the two depending arms of the friction-strap *p*, one end of which bolt is provided with a nut for the purpose of adjustment and on the opposite end of which is pivotally mounted a cam *s*, provided with an arm *t*, preferably made integral with the cam. As the tendency of the friction-collar *p* is to spring open when released, a movement of the cam-lever *t* upwardly upon its pivot will release the pressure upon the depending arms and allow them to separate, thus instantly releasing the tension.

Suitably secured to the frame is a support *w*, provided with bearing 3, within which is arranged a shaft 4, to one end of which is secured a spiral spring, and the opposite end is provided with an arm 5, the function of which is hereinafter pointed out.

Secured to the spring *x* is an arm *y*, which projects upwardly at an angle, and the free end of the same is provided with an antifriction-roll *z*, which at all times bears against the warp wound upon the warp-beam.

Mounted upon the side of the frame in a suitable support is a rod *u*, one end of which is pivotally attached to the depending arm *p'* of the friction-strap *p*, and arranged upon said rod is a spiral spring *v*. The depending arm or lever 5, secured to the shaft 4, is pivotally connected at its free end with a right-angle arm 6, through the depending arm of which the rod *u* passes, as shown in Fig. 1 of the drawings, and against which the spiral spring *v* bears at one end, the opposite end of the said spiral spring *v* abutting against the collar 12.

Secured to the lay-sword *b* is a projecting part 8, and pivotally connected therewith is the rod 9, whose opposite end passes through the depending arm *p'* of the friction-strap *p*, and a nut 13 is mounted on the end of the rod, so that the motion of the lay-sword will operate to move the friction-strap on the grooved pulley in one direction, while the dog *m* prevents return movement of the ratchet-wheel *n*, and as the rod 9 is free to move through the depending arm *p'* toward the cam-lever *t* it will not operate the mechanism in any manner by such return movement.

It will be perceived from the foregoing description, in connection with the drawings, that when the lay moves back the rod 9, connected therewith, is also moved back, and the nut on the right-hand end of said rod, as shown in Fig. 1, will be moved therewith from the depending arm *p'*. At this time the take-up mechanism will operate to wind up the cloth on the cloth-beam, and so doing will draw off the warp from the warp-beam, causing the latter to rotate and imparting rotation through the intermediate mechanism to the shaft *k* until such rotation is arrested by the rod *u*. Following this action the lay beats up, and in so doing the depending arm *p'* is engaged by the nut 13, and since the ratchet-wheel is engaged by the pawl to prevent the rotation of the shaft *k* the friction-wheel slips within the friction-strap as long as forward action of the lay continues. This series of actions is repeated as long as the loom keeps up its work. The extent of revolution is, however, limited by the movement of the rod *u*, the movement of which rod varies according to the resilient pressure of the spring *s*, determined by the location of the roller *z* with reference to the center of the warp-beam, and as less tension or strain upon the warp is required to unwind it from the warp-beam when a considerable quantity is wound thereon and a considerable strain or tension is required to unwind it when but a small quantity is wound upon the warp-beam, unless some means were provided for compensating for such variable strain the material being woven would be very uneven, a portion having the warp drawn taut and a portion having the warp but loosely interwoven. It will now be seen that if the arm *y*, carrying the roller *z*, which bears upon the warp which is wound upon the warp-beam, be near the center of the axis of revolution of the beam greater freedom of return movement of the shaft *k*, with parts attached, will be permitted, because of the fact that the arm or lever *y* will occupy a position more nearly perpendicular, and will thus bear with less force and allow greater freedom of revolution of the shaft 4, and therefore through the medium of the arm 5 and right-angle arm 6 will permit greater freedom of movement of the rod *u*, thus permitting the depending end of the friction-strap, to which it is attached, to move a greater distance, and with it the friction-pulley upon which the strap is mounted, and hence the pinions and gears in the chain, while if there be a large amount of warp wound upon the beam, thus causing the roller mounted upon the end of the arm *y* to be removed a greater distance from the axis of the warp-beam, then greater strain will be applied to the intermediate parts and less revolution of the shaft 4 be allowed, and consequently less movement of the mechanism through which connection is made. It will readily be seen that this restraining-pressure will be varied, depending upon the position, as before stated, of the arm *y*, carrying the roller *z*, with reference to the axis of revolution of the warp, and the material being woven will all be of like quality with reference to tension.

The arm 5 is mounted upon the end of the shaft 4 by the employment of a set-screw, as shown in the drawings, and the arm at the point of connection with the shaft is slotted for the purpose of enabling me to vary the throw of the arm by lengthening or shortening it with reference to the shaft 4. The

springs *x* and *v* serve to cushion the operation of the parts, and by varying the position of the collar 12 upon the rod *u* the degree of pressure exerted by the spring *v* may be varied.

If the loom be provided with the usual construction of stop-motion for the purpose of greater security and to prevent danger of feed in case the stop-motion should fail to operate successfully, I mount upon the usual rock-shaft 16, which is employed in stop-motions of the ordinary form, a lever 17, and the same being fixed upon said shaft in proper position will be moved when the shaft is rocked by the usual mechanism when there is no thread in the shuttle, and from the end of the lever 17 I extend a chain or cord 15 to the dog or pawl *m*, and when, therefore, the rock-shaft moves to the left in the usual manner when operating to stop the loom, and because of the want of thread in the shuttle, the dog *m* will be carried away from engagement with the ratchet-teeth, and thereby all further feed will be avoided, even though the loom should continue in motion.

In Fig. 4 of the drawings is illustrated a friction-strap composed of two parts hinged together, which may be substituted for a strap of a single piece.

Having therefore described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination, in a loom, of a warp-beam provided with a gear *g*, a shaft *i*, having a pinion *h* meshing with the gear *g*, a gear *j*, mounted on the shaft *i*, a shaft *k*, a pinion *l* on the shaft *k*, meshing with the gear *j*, a friction-pulley *o* on the shaft *k*, a friction-strap *p* on the friction-pulley, formed with depending arms, a shaft 4, connected through intermediate mechanism with one of the depending arms of the friction-strap, an arm *y*, arranged to bear with its free end against the warps on the beam and connected at its opposite end with the shaft 4, the lay-sword, and a connecting-rod between the lay-sword and the arm of the friction-strap, substantially as and for the purpose specified.

2. The combination, in a loom, of a warp-beam, a friction-pulley, a friction-strap mounted thereon, means to communicate motion from the warp-beam to the shaft upon which the friction-pulley is mounted, a ratchet-wheel mounted on the shaft with the friction-pulley, a dog arranged to prevent return movement of the ratchet-wheel and shaft upon which the same is mounted, means to communicate motion from the lay-sword to the friction-strap and move the same upon friction-pulley while the same is restrained from rotation by the dog, and an arm arranged with one end provided with a roll to bear against the warp and the opposite end operating through intermediate mechanism to limit the rotation of the shaft upon which the friction-pulley is mounted with reference to the relative position of the free end of said arm and the axis of the warp-beam, substantially as shown.

3. The combination of a loom-frame, a warp-beam mounted therein, a lay-sword, a gear mounted upon the warp-beam, a shaft *i*, provided with a pinion *h* and a gear *j*, a shaft *k*, provided with a pinion *l*, a friction-pulley and a ratchet-wheel, a dog *m*, pivotally mounted on the end of shaft *i* and arranged with its nose to engage the teeth on the ratchet-wheel, a shaft 4, provided with an arm 5, a rod *u*, a connecting-arm extending from arm 5 to the rod *u*, a friction-strap mounted upon the friction-pulley and provided with depending arms, one arm of which is pivotally connected with the rod *u*, a bolt *r*, passing through the arms of the friction-strap and pivotally connected at one end with a cam *s*, a rod 9, connected at one end with the lay-sword and at its opposite end with one of the depending arms of the friction-strap, and an arm *y*, provided at its free end with a friction-pulley *z* to bear against the warp and connected at its opposite end with the shaft 4, all arranged and operating substantially as and for the purposes stated.

4. The combination of a loom-frame provided with a lay-sword and a warp-beam, a shaft *i*, arranged to be rotated by the rotation of the warp-beam, a shaft *k*, arranged to be rotated by the rotation of the shaft *i*, a friction-pulley on the shaft *k*, provided with a friction-strap, a ratchet-wheel on the shaft *k*, arranged to prevent motion of the friction-pulley in one direction, an arm *y*, provided at its free end with a shaft 4, an arm 5, connected with shaft 4, a rod *u*, connected at one end with the friction-strap and provided with a suitable support at its opposite end, an arm 6, pivotally connected with arm 5 at one end and arranged to engage the rod *u* at its opposite end, and a rod 9, connected at one end with the lay-sword and at its opposite end with the friction-strap to move the same in one direction only, all in combination substantially as and for the purposes stated.

ISAAC FONTAINE.

Witnesses:
ALLEN WEBSTER,
FRANK X. DEROIN.