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M. O. STEERE.

FRICTION LET-OFF FOR LOOMS.

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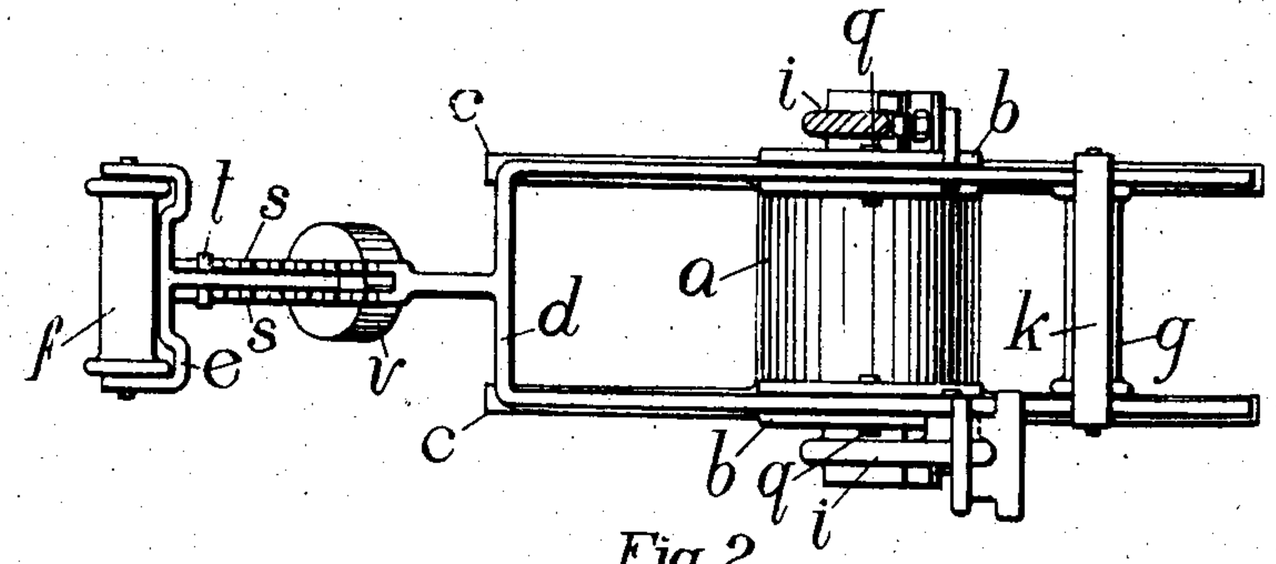

Fig. 2.

Fig. 3.

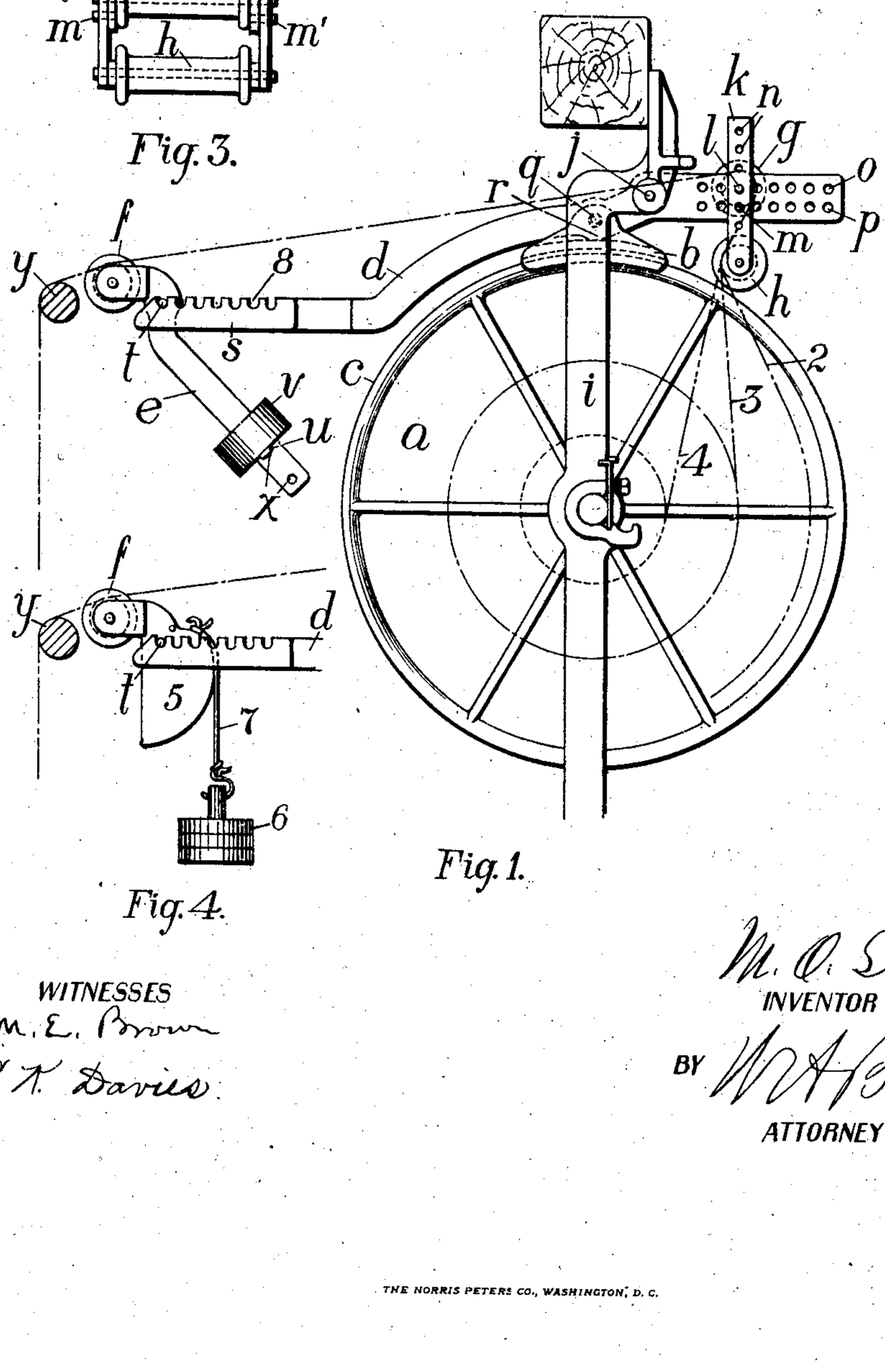

Fig. 1.

Fig. 4.

WITNESSES

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FRICTION LET-OFF FOR LOOMS.

No. 834,170. Specification of Letters Patent. Patented Oct. 23, 1906.

Application filed November 12, 1902. Serial No. 131,058.

To all whom it may concern:

Be it known that I, MERRILL O. STEERE, a citizen of the United States, residing at Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Friction Let-Offs for Looms, of which the following is a specification.

This invention relates to friction let-offs for looms, and has for its object to provide for controlling the delivery of a warp from its beam to maintain its tension uniform.

The following is a complete description of the invention, illustrated by the accompanying drawings, in which—

Figure 1 represents a side view of the device; Fig. 2, a plan view; Fig. 3, an end view of the yoke *k*, showing the method of fastening it to the lever *d;* and Fig. 4, a modification.

The essential feature of my invention is a mechanism for tensioning the warp-threads of a loom, for controlling the said tension, and maintaining it uniform without the use of the massive tension and take-up weights usually employed.

The invention embodied as illustrated comprises a warp-beam *a*, brake-shoes *b b*, bearing on the peripheral edges of the beam-heads *c c*, and a lever *d*, suitably fulcrumed and carrying the brake-shoes *b b*, a pendulum-lever *e* with guide-roll *f*, and appropriate guides or guide-rolls *g* and *h*.

The beam *a* is of usual structure, comprising a barrel on which the warp is wound and two heads *c c*. This beam is removably mounted in two uprights *i i*, which are formed with suitable bearings therefor and to which is also fulcrumed the lever *d* by means of the pins *j*.

The lever *d* is formed with two forks, one of which, relatively wide and long, forms the body of the lever, while the other, relatively short and narrow, serves as a bearing for the lever *e*. The body portion is of such width that it extends between the two uprights *i i*, to which it is fulcrumed.

At the extremity of the body-fork are the guide-rolls *g* and *h*, which are mounted in the adjustable yoke *k*. The latter is adjustable both vertically and horizontally, by which means the lower guide-roll *h* may be maintained adjacent the warp-beam. The yoke is secured in position by the long pin *l*, which also serves as a shaft or bearing for the upper guide-roll *g*, and by two pins *m m'*, which serve as dowels to prevent the yoke from turning under the stress of pull of the warp-threads. (See Fig. 3.)

For the purpose of such adjustment the sides of the yoke are each pierced with a vertical row of holes *n* and the sides of the lever *d* each with a double row of holes *o* and *p*.

The brake-shoes *b b* are attached to the lever *d* at a point adjacent its fulcrum and on the opposite side thereof from yoke *k*. The pins *q q*, whereby the brake-shoes are attached to their lever *d*, serve only to hold the latter in place, fitting them so freely that the lever *d* bears directly on the shoes when pressing them against the beam-heads, abutments *r* being formed on the lever *d* for this purpose.

At the opposite end of the lever *d* is mounted the weighted pendulum-lever *e* between the two sides or prongs *s* of its forked extremity. In the top edges of these prongs are formed alining notches 8, which take and serve as bearings for the pin *t*, on which the lever *e* is mounted. The upper end of the lever *e* is also forked, and in it is mounted the guide-roll *f*. On the lower pendent portion of the lever *e* is adjustably mounted the weight *v*, supported by the pin *u*, which can be located in either of the holes *x*. Adjacent the end of the lever *d* is supported a guide-rod *y*, bearing a fixed relation to the beam, and over this the warp is led to direct its course to the weaving.

The pendulum-lever *e* serves as a controller to regulate the pressure of the brake-shoes *b b* on the beam-heads *c*. As the warp draws across the roll *f* to the rod *y* it tends to depress the roll *f*, which tendency is resisted by the weight *v* and increasingly with the degree of depression of the said roll. The lever *e* therefore assumes a position dependent upon the tension under which the warp is drawn from its beam and upon the position of the weight *v* on said pendulum-lever. The extent of downward movement of the roll *f* due to action of the warp is, however, limited, for if the warp pass from the roll *g* to the rod *y* in a straight line it obviously can produce no further downward motion of the roll *f*, and

tension on the warp then acts to depress the opposite end of the lever *d* and to thus release the brakes from the beam.

The portion of the warp between the roll *g* and rod *y* never becomes absolutely straightened; but under a high degree of tension the extent of its deflection becomes sufficiently diminished so that the direct pull on the roll *g* and tendency to lift the brakes from the beam exceeds the braking effect of the warp upon the lever *d* through the roll *f*.

I have seen fit to differentiate in the claims between the action of the warp upon the roll *f* and its action on the roll *g* by stating that movement of the roll *f* is due to the tensioned warp bearing against it in contradistinction to its pulling on the roll *g*, for the movement of the roll *f* is due to the tendency of the warp to straighten under tension, while that of the roll *g* is due to the direct pull of the warp on the roll *g* in a direction substantially perpendicular to its lever-arm.

By varying the position of the weight *v* on the lever *e* and also by varying the position of the lever *e* on the lever *d* the degree of excess tension that must be brought upon the warp before the brakes are relieved can be adjusted. By varying the position of the weight *v* on the lever *e* its reaction against the downward pressure of the warp on the roll *f* can be adjusted, and by varying the position of the lever *e* on the lever *d* the effect of the warp-pressure on the brakes is diminished.

Where the warp is composed of light and relatively delicate threads, the pendulum-lever may be of the form indicated in Fig. 4, in which an arm 5, spirally curved from its fulcrum, is substituted for the pendent arm of Fig. 1. The weight 6 is hung from the arm by a strap or cord 7, which passes over the edge of the arm. By this means the variation in degree of resistance to movement of the roll *f* from its highest to its lowermost position may be made as great or as little as is desired.

The operation of my device is as follows: The full warp-beam having been mounted in its bearings, the warp is drawn therefrom over the rolls *g* and *h*, as indicated in Fig. 1, and over the roll *f* and the rod *y* to the weaving. The draft on the warp due to the take-up of the woven fabric brings pressure upon and depresses the roll *f* until the lever *e* assumes a position in which the pressure of the warp upon the roll *f* is balanced by the reactive effect of the weight *v*. In this position the weight *v* acts with a compound leverage on the lever *d* to press the brakes upon their beam-heads. The pull of the warp in passing the rolls *h* and *g* produces a reactive tendency at the opposite end of the lever *d* to lift the brake-shoes *b b*. Should any undue resistance occur to the rotation of the warp-beam, the roll *f* will be depressed, the tension on the warp increasing with its depression. If the resistance continues, the roll *f* will be depressed to its lowermost position, and then the only yielding point in the path of the warp is the opposite end of the lever *d*, where the rolls *g* and *h* are located. When the pull of the warp on the rolls *g* and *h* becomes so great that the downward tendency of that end of the lever *d* exceeds the downward tendency of the opposite end, due to the weight *v* and the bearing of the warp against the roll *f*, the brakes *b* are raised and the beam released. As the diameter of the warp decreases the line of pull on the rolls *g* and *h* changes with relation to the lever's fulcrum, so that the warp acts on the lever with increasing leverage to diminish the braking effect on the beam, thus adjusting the degree of brake-pressure to leverage with which the warp must rotate the beam. The broken line 2 indicates the direction of pull from a full beam, in which case the leverage with which the warp tends to relieve the brake-pressure is relatively slight. The broken line 3 indicates the direction of pull from a partially-emptied beam, and the broken line 4 indicates the direction of pull from a nearly-empty beam, in which case the warp pulls nearly directly on the roll *g*. By varying the position of the rolls *g* and *h* both mutually and with relation to the fulcrum *j* the degree of change of leverage of the pull of the warp to relieve the brakes can be varied as desired.

In some lines of work the lower roll *h* is omitted, a sufficient variation in leverage being attainable with only the one roll *g*.

My invention is particularly valuable because of the effective manner in which the tension on the warp is maintained uniform, accommodating itself to changes in diameter of the warp mass and to other varying resistances to delivery and without the employment of massive weights.

Without limiting myself to the precise form and arrangement of parts, I claim as my invention—

1. The combination in a friction let-off for looms with a beam and brakes engaging the beam, of a lever to which the said brakes are secured, a roll yieldingly secured to one end of the lever whereby the latter is pressed downward to operate the brakes, and a guide-roll at the opposite end of the lever on which the warp pulls to act against the operative tendency of the brakes.

2. The combination in a friction let-off for looms of brakes, a brake-lever, a roll yieldingly mounted on said lever on the same side of the fulcrum with the brakes and a roll unyieldingly mounted on said lever on the opposite side from said brakes.

3. The combination in a friction let-off for looms, with a warp-beam, of brakes acting to retard the rotation of the beam, a brake-lever carrying the brakes, on which the warp bears at one end with a tendency to relieve the

brake-pressure, and a second lever pivoted to the opposite end of said brake-lever and operated by the warp bearing thereon to apply pressure to the brakes, but adapted to yield to relieve said pressure.

4. The combination, in a friction let-off for looms, of a warp-beam brake, a lever connected to said brake and fulcrumed on the frame, a bearing-piece on said lever over which the warp passes at one side of the fulcrum, and a weighted second lever pivoted to the first at the opposite side of the fulcrum and having a bearing over which the warp passes.

5. The combination in a friction let-off for looms with a beam *a* and support *i i* therefor, of a lever *d* fulcrumed to the said supports, having a forked body portion and a forked extremity, brake-shoes *b b* mounted on the forked body portion between the lever's fulcrum and its forked extremity, a yoke *k* adjustably mounted on the said body portion on the opposite side of said fulcrum from the brake-shoes *b b*, rolls *g* and *h* mounted in said yoke, and a pendulum-lever *e* mounted on the forked extremity of the lever *d*, a roll *f* mounted in the pendulum-lever and a weight *v* adjustably secured to the said pendulum-lever, substantially as described.

6. The combination in a friction let-off for looms, with a beam, and brake-shoes to control said beam, of a lever *d* with a forked body having rows of holes *o* and *p* in its sides and a forked extremity with alining notches 8 in the top of its sides *s s*, a yoke *k* having holes *n* and secured to the lever *d* by the pin *l* and dowel-pins *m m'*, a roll *g* mounted on the pin *l*, a roll *h* mounted at the bottom of the yoke *k*, a pendulum-lever *e* mounted in the notches 8 of the forked extremity, a roll *f* on said pendulum-lever, and a weight *v* adjustably mounted thereon, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

MERRILL O. STEERE.

Witnesses:
EZRA D. GROVES,
EDWIN C. SMITH.