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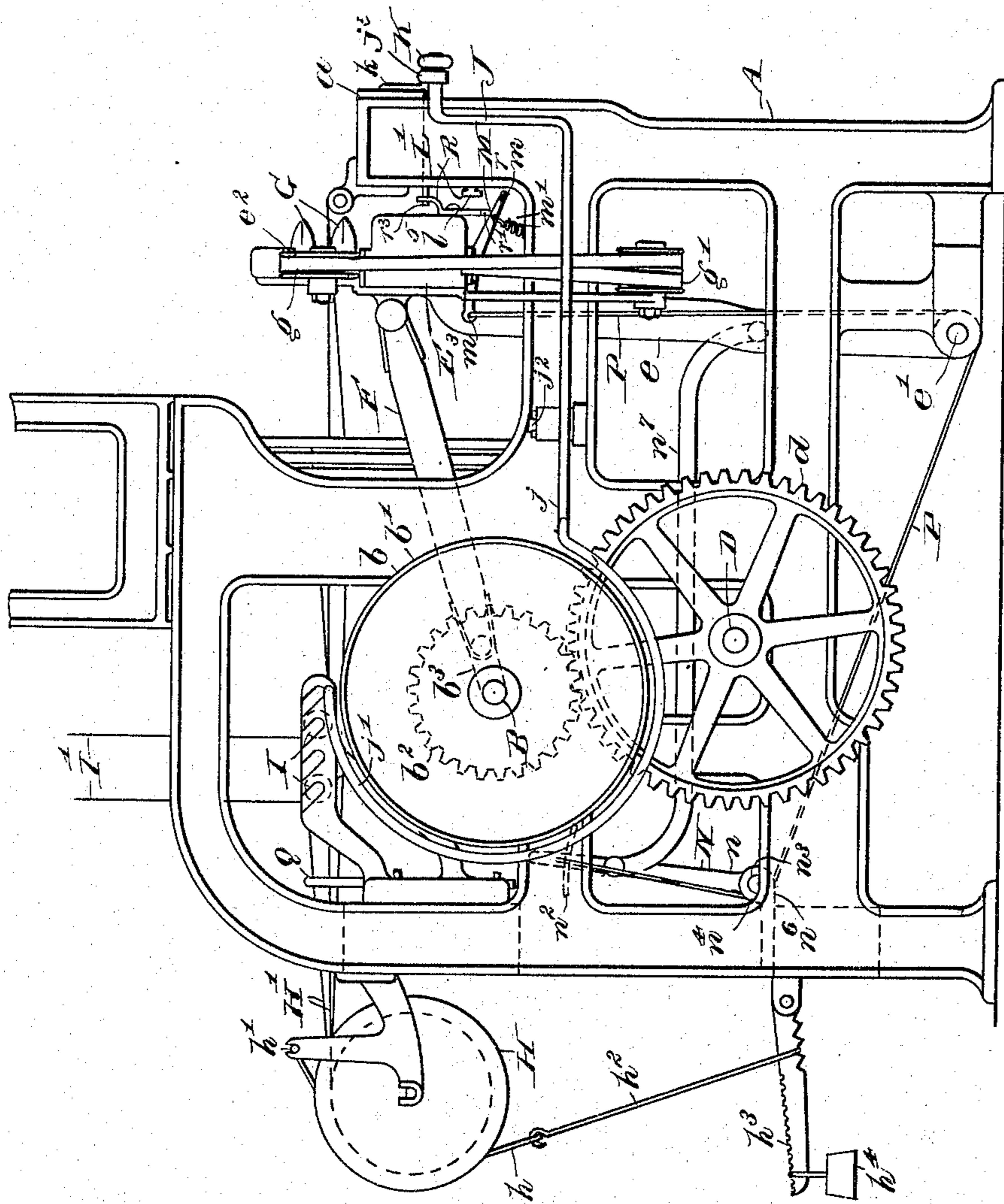
2 Sheets—Sheet 1.

JOSIAH HARRIMAN & JOHN HARRIMAN.
SLACK ALARM AND STOP MOTION FOR LOOMS.

No. 605,199.

Patented June 7, 1898.

Fig. 1.



WITNESSES.

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Josiah Harriman &
John Harriman,
By *Albert M. Moore,*
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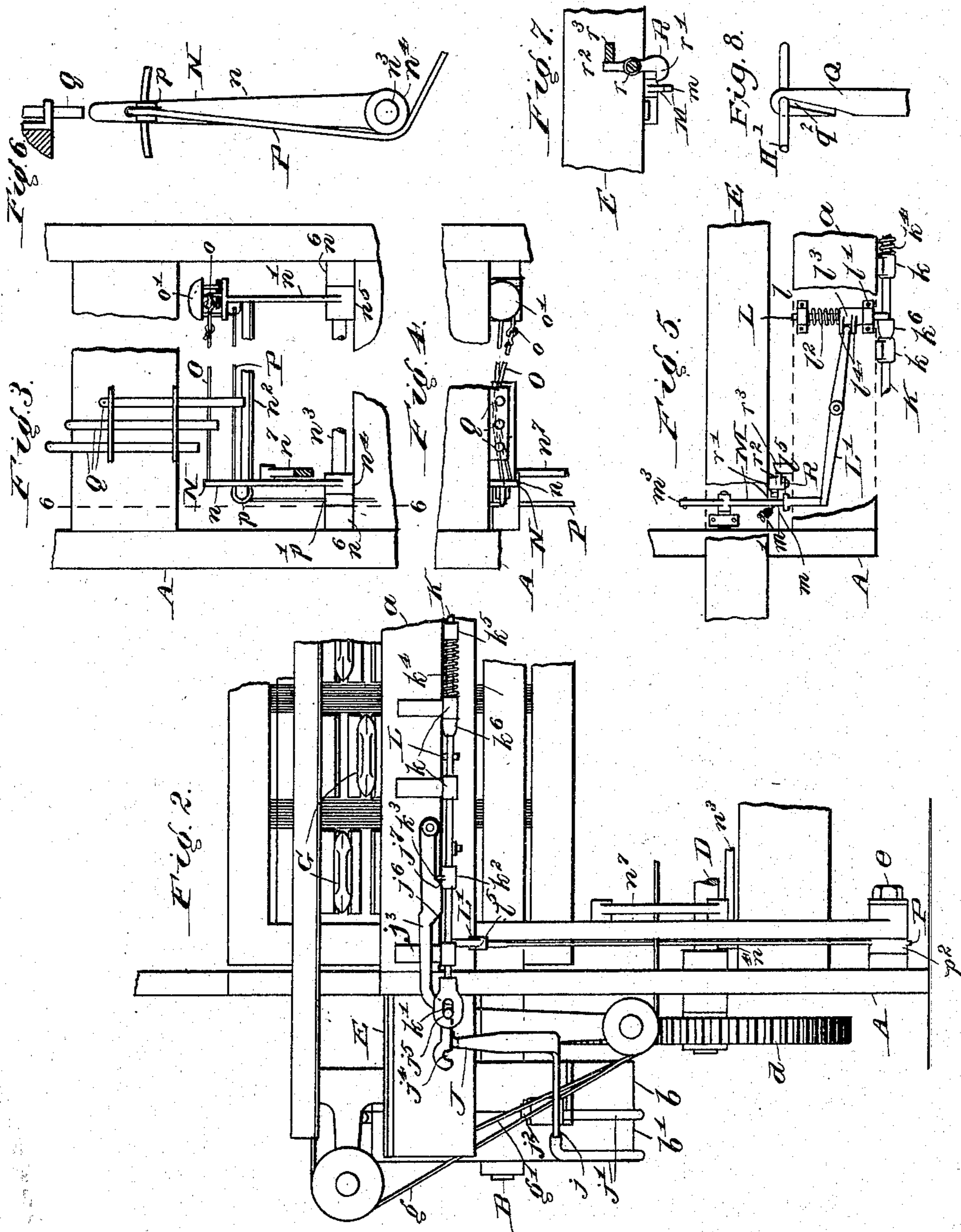
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UNITED STATES PATENT OFFICE.

JOSIAH HARRIMAN AND JOHN HARRIMAN, OF LOWELL, MASSACHUSETTS;
SAID JOHN HARRIMAN ASSIGNOR TO SAID JOSIAH HARRIMAN.

SLACK-ALARM AND STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 605,199, dated June 7, 1898.

Application filed February 7, 1896. Serial No. 578,354. (No model.)

To all whom it may concern:

Be it known that we, JOSIAH HARRIMAN and JOHN HARRIMAN, citizens of the United States, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Slack-Alarms and Stop-Motions for Looms, of which the following is a specification.

Our invention relates to slack-alarms and stop-motions for looms, and is especially adapted to give an audible alarm when any of the rubber warp-threads of narrow ware or elastic goods become slack and to stop the loom when such a rubber warp-thread is broken.

In elastic goods the rubber threads in requisite numbers must be introduced under tension in order that the finished fabric may not be sleazy and inelastic. Each narrow-ware loom as usually constructed may be considered as a number (about twenty) of looms, each weaving a separate web and all having a main shaft, cam-shaft, and lay in common, and the number of elastic threads in such a loom is so great that it is almost impossible for the operative to watch them all. The slackening of a part of the rubber threads renders the fabric uneven in appearance, and the slackening of all said rubber threads renders said fabric almost worthless. When any rubber thread is broken, the loom as hitherto generally used continues to run, weaving the fabric without the elastic thread, the absence of the rubber not being indicated by any alarm and not being apparent to the eye of the operator, unless the rubber thread happens to be one which should be woven into the fabric near the edge or selvage, until, in the subsequent operation of steaming, the contraction of the rubber thread properly woven into the fabric causes the part of the fabric from which said rubber thread is improperly omitted to shrivel and present a crinkly appearance. The web thus lacking a single rubber thread can be sold only for waste, and the loss thus occasioned is very great. Such losses are avoided by the use of our device and also the loss occasioned by the stopping of the loom during "pick-outs."

In the accompanying drawings, on two sheets, Figure 1 is a left side elevation of so much of a loom embodying our improvement as is necessary to the explanation of said improvement; Fig. 2, a front elevation of a part of the same near the left side thereof; Fig. 3, a front elevation of parts of the rear cross-girths and vibrator and showing three drop-wires, one in its normal raised position, another in position to operate the slack-alarm, and a third in position to operate the stop-motion; Fig. 4, a plan of the parts shown in Fig. 3; Fig. 5, a plan of a part of the loom-frame, breast-beam, and lay, said breast-beam and lay being broken away to show parts of the stop-motion; Fig. 6, a vertical section on the line 6 6 in Fig. 3 of the vibrator and stop-cord; Fig. 7, a front elevation of a part of the lay, showing the retaining-lever, the lever engaged thereby, and the stud which disengages said levers; Fig. 8, an isometric perspective view of an elastic warp-thread and the upper part of a drop-wire.

In Figs. 1 and 2 the frame A, main shaft or crank-shaft B, fast pulley b and loose pulley b' on said shaft B, the cam-shaft D, having a gear d , engaged by a pinion b^2 on the crank-shaft B, the lay E, pivoted at e' on the frame A and connected by the pitman F to a crank b^3 , the shuttles G, running on the lay-beam e^2 of said lay and driven by the usual rack-and-pinion device operated by reciprocating belts g g' , the warp-beam H, on which the rubber threads H' are wound, the tension-apron h , secured to the tension-apron roll h' , the tension-link h^2 , the notched tension-lever h^3 , the tension-weight h^4 , adjustable on said lever h^3 , and the idle-rolls I, which change the direction of the warps I', of cotton or other fibrous material, are all of the usual construction and operation. The loom is also provided with a belt-shipping fork j , between the tines j' of which the main driving-belt (not shown) runs, said fork being a part of or rigidly secured to the rear end of the belt-shipping lever J, which lever J is pivoted on a stud j^2 , rigidly supported on the loom-frame A, and extends to the front of the loom, where it may be operated by hand to throw said driving-belt from one to the other of the pulleys b b'

to start or stop the loom in the usual manner, these belt-shipping devices being also of the usual construction.

The front end of the shipping-lever J is horizontal and at right angles to the breast-beam *a* and is usually held in either of its positions by a latch-lever *j*³, pivoted on the front of said breast-beam *a* and having two notches *j*⁴ *j*⁵, Fig. 2, each adapted to drop over the front end portion of said shipping-lever and to prevent an accidental movement of said lever. This latch does not interfere with the operation of our improved device, but is by said device rendered unnecessary. There is usually a long rod K, which slides in brackets or loops *k*, secured to the front of the breast-beam, which rod has a loop or slot *k*¹ surrounding the front end portion of the shipping-lever and has also a collar *k*² fixed on said rod K and provided with a finger *k*³, adapted when the rod is pushed endwise to strike at the beginning of its movement on the under side of one of the inclines *j*⁶ *j*⁷ with which the latch *j*³ is provided and to raise the corresponding notch *j*⁴ *j*⁵ out of engagement with said shipping-lever, said slot *k*¹ being long enough to allow of said latch being thus raised before the corresponding end of said slot *k*¹ strikes said shipping-lever. Of course if the latch *j*³ is omitted the collar *k*² and its finger *k*³ may also be omitted.

In this invention we use a spring *k*⁴, which surrounds the rod K and is compressed between a collar *k*⁵, fast on said rod, and one of the brackets *k*, in which said rod slides, the expansion of said spring shifting the main driving-belt onto the loose pulley *b*¹ from said fast pulley. We also secure on said rod K a tapering collar *k*⁶, which, when said rod is moved to shift said belt onto the fast pulley to start the loom, crowds back and passes a catch or bolt L, Figs. 2 and 5, which slides in bearings *l*¹, bolted to the under side of the breast-beam, said bolt being then thrown forward by the expansion of a spring *l*², surrounding said bolt L and compressed between the bearing *l* and a collar *l*³, fixed on said bolt in such a manner as to prevent a return movement of said collar *k*⁶ and rod K. A lever L¹ is pivoted on the under side of the breast-beam, one end of said lever L¹ entering between ears *l*⁴, with which the collar *l*³ is provided, and the other end *l*⁵ of said lever L¹ being bent downward into a position to be struck by the front end *m* of another lever M, pivoted on the lay, when said front end *m* is raised sufficiently for that purpose, as hereinafter described, said front end *m* being normally held down by a spring *m*¹, (shown in Fig. 1 as a spiral spring,) connecting the front arm *m*² of said lever M and the sword *e* of the lay E.

A vibrator N, consisting of two parallel arms *n* *n*¹, connected by a cross-bar *n*², is provided at the lower ends of said arms with hubs *n*⁴ *n*⁵, which loosely surround a horizontal shaft *n*³, supported in brackets *n*⁶ on the

frame A, said vibrator being connected to the lay by the rod *n*⁷ and therefore oscillated by the movement of said lay. Above the vibrator N are as many drop-wires or drops Q as there are rubber warp-threads H¹, each drop being supported on one of said threads H¹ and held in position indicated by the drop at the left in Fig. 3. Each drop-wire Q is represented as a straight wire sliding in horizontal guides *q* *q*¹, (see Fig. 3,) secured to the frame of the machine, and each drop-wire having at its upper end a hook *q*² to reach over a rubber warp-thread H¹ in a well-known manner. (See Fig. 8.) An inextensible cord O is attached at one end to one arm *n* of the vibrator and at the other end to the operating-lever *o* of any audible signal, as preferably a mechanical buzz-bell of any usual construction, such that the pulling of said cord will ring the bell *o*¹. The drawings indicate such a bell as is shown in United States Patent No. 361,048, granted April 12, 1887, to Busby, mounted on the arm *n*¹ of said vibrator.

When any rubber warp slackens, the corresponding drop Q falls low enough to be struck by the cord O, causing said cord to be bent or pushed aside sufficiently to operate the bell and call the attention of the operative, and the bell will be rung at every pick of the loom until the tension of the slackened rubber warp is sufficiently increased to raise the corresponding drop above the path of the cord O. The middle drop M in Fig. 3 is represented as in a position to cause the ringing of the bell.

Upon the breaking of a rubber warp the corresponding drop falls still lower into the path of the cord P, which is arranged below the cord O and is fastened at one end to the arm *n*¹ of the vibrator N, from which arm *n*¹ said cord P passes over an idle-pulley *p*, journaled on the opposite side of said vibrator, then under another idle-pulley *p*¹, journaled on the shaft *n*³ of said vibrator, then under another idle-pulley *p*², journaled on the lay-stud or center *e*, the other end of said cord P being attached to the rear end *m*³ of the lever M.

The part of the cord P between the arm *n*¹ and the pulley *p* is normally horizontal, straight, and of uniform tension, so that said cord P causes no movement of the lever M except when the proper movement of said cord P with the vibrator is interrupted by a fallen drop Q, (see drop at the right in Fig. 3,) when said cord is bent between the arm *n*¹ and the pulley *p*, causing the rear end of the lever M to be depressed and the front end *m* of said lever M to strike the end *l*⁵ of the lever L¹ in such a manner as to draw the bolt L backward out of engagement with the tapering collar *k*⁶ and to allow the rod K to be moved by the spring *k*⁴ to shift the belt onto the loose pulley, as above described. The stopping of the loom would then take place if the drop Q fell in front of the cord P; but obviously if

said drop should fall back of the cord P the backward movement of the vibrator would bend said cord and raise the front end of the lever M, and the following forward movement of said vibrator would allow said cord to straighten and the said front end of said lever to fall before striking the lever L. We therefore use a retaining lever or latch R, which is pivoted at r on the lay-beam E and is provided at its lower end with a hook r' , beveled on its under surface, which hook is pushed aside by and engages the front arm m^2 of said lever M (when said arm is raised) and holds said arm in a raised position until the upper arm r^2 of said lever R, just at the end of the forward movement of said lay, strikes the beveled rear end of a backwardly-projecting stud r^3 , secured to the lay-beam, and is thereby thrown out of engagement with said lever M.

We claim as our invention—

1. The combination in a loom, of a vibrator operated by a moving part of the loom, drops, each adapted to be supported by a warp of normal tension, and an audible signal supported on said vibrator, and a cord carried by said vibrator and connected to said signal and arranged to strike and to be pulled by a fallen drop, as and for the purpose specified.

2. The combination in a loom, of the lay, a vibrator, operated by the movement of said lay, drops, each adapted to be supported by a warp of normal tension, and an audible signal supported on said vibrator, and a cord carried by said vibrator and connected to said signal and arranged to strike and to be pulled by a fallen drop, as and for the purpose specified.

3. The combination in a loom, of a vibrator operated by a moving part of the loom, a cord, stretched across said vibrator, a mechanical buzz-bell, supported on said vibrator and adapted to be operated by the pulling of said cord, and drops, each normally supported by a warp-thread and adapted upon the slackening of said warp-thread, to fall in the path

of said cord and to pull the same, as and for the purpose specified.

4. The combination in a loom, of a vibrator, operated by a moving part of said loom, a cord carried thereby, an audible signal operated by the pulling of said cord, another cord carried by said vibrator, below said first-named cord, the shipping-lever, intermediate mechanism connected to said second-named cord and engaging said shipping-lever and operated by the pulling of said second-named cord, to disengage said shipping-lever, and drop-wires, each adapted to be supported by a warp of normal tension and to fall and engage said first-named cord upon the slackening of such warp and to engage said second-named cord upon the breaking of such warp, as and for the purpose specified.

5. The combination of a main shaft, a loose pulley, a fast pulley, a shipping-lever, a shipping-rod, to move said shipping-lever, a spring, to operate said rod in one direction, to move the belt from said fast pulley to said loose pulley, a collar fast on said shipping-rod, a bolt, normally engaging said collar, a lever, engaging said bolt to draw the same out of engagement with said collar, the lay, another lever, pivoted on said lay, a vibrator, operated by the movement of said lay, a cord connecting said vibrator and said last-named lever, and drops, each adapted to be supported by a warp-thread of normal tension and when unsupported to engage said cord and to raise said last-named lever into a position to strike said bolt-engaging lever and disengage said bolt from said collar, as and for the purpose specified.

In witness whereof we have signed this specification, in the presence of two attesting witnesses, this 28th day of January, A. D. 1896.

JOSIAH HARRIMAN.
JOHN HARRIMAN.

Witnesses:

ALBERT M. MOORE,
JOSEPH WILLIS.