(No Model.)

M. J. BIGELOW.

WARP STOP MOTION FOR LOOMS.

No. 594,341. Patented Nov. 23, 1897.

Fig. 2.

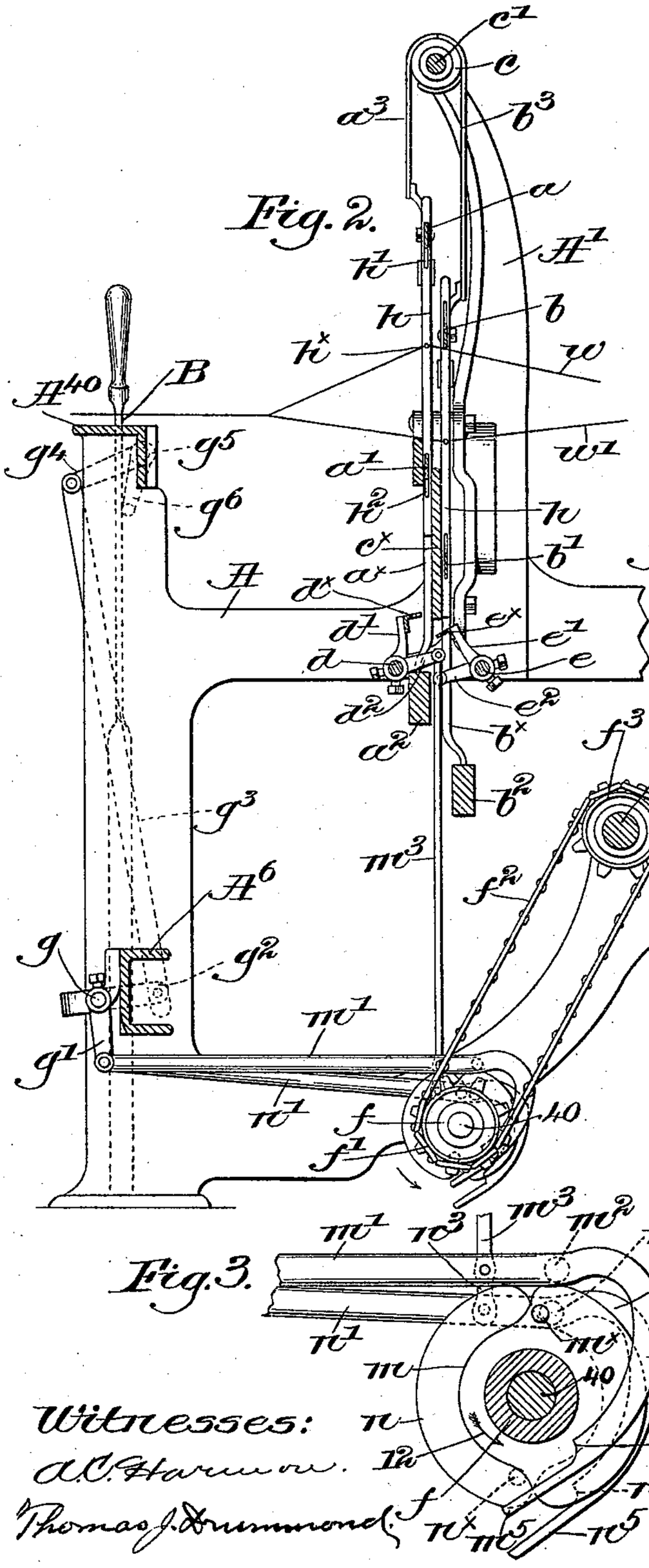

Fig. 1

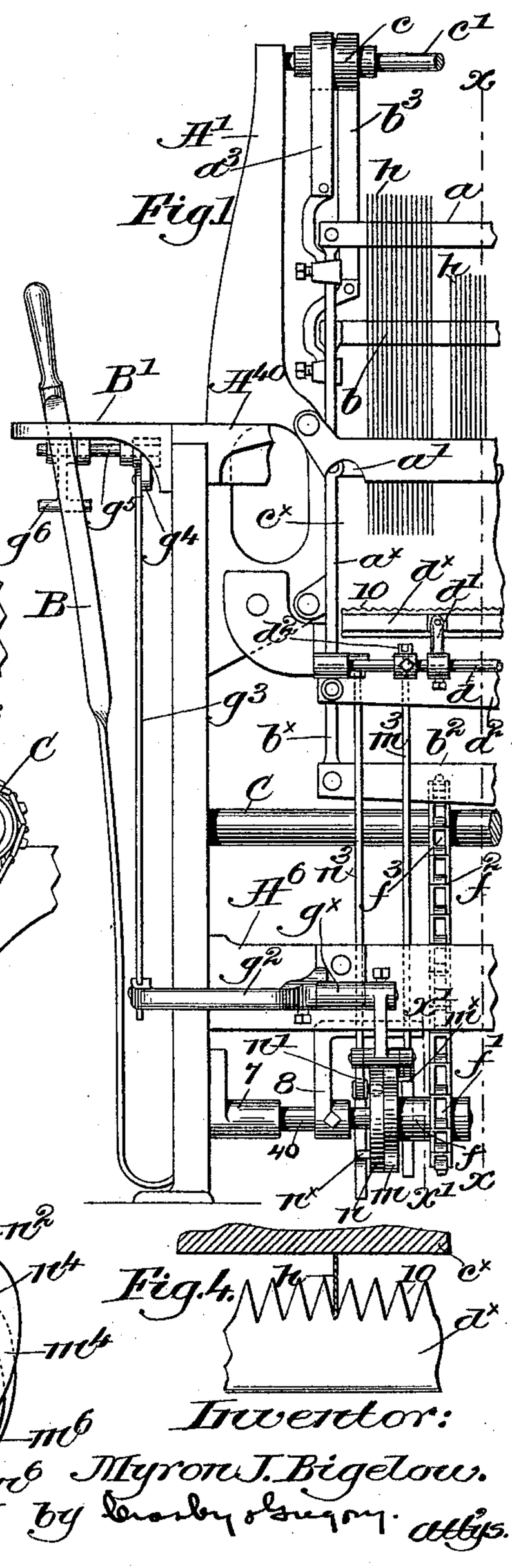

Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

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WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 594,341, dated November 23, 1897.

Application filed December 4, 1896. Serial No. 614,394. (No model.)

To all whom it may concern:

Be it known that I, MYRON J. BIGELOW, of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Warp Stop-Motions for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

This invention relates to warp stop-motions for looms, wherein one or more of a series of warp-stop-motion-actuating detectors coöperate with a normally-vibrating feeler upon breakage or undue slackness of the warp-threads to control the stopping mechanism for the loom. I have dispensed with a spring-actuator for the feeler and have provided means to positively actuate it in one direction, its movement in the other direction being effected by gravity.

While I have herein shown my invention as applied to a loom wherein the actuating-detectors also serve as heddles, it will be obvious hereinafter that the detectors would operate equally well and in the same manner were they mounted entirely independently of the shed-forming mechanism, and accordingly my invention is not restricted to either of said constructions.

Figure 1, in front elevation, represents a sufficient portion of the left-hand side of a loom to be understood, the lay being omitted, with one embodiment of my invention applied thereto. Fig. 2 is a vertical sectional view of the loom on the line $x\,x$, Fig. 1, looking toward the left. Fig. 3 is an enlarged detail, to be described, taken on the line $x'\,x'$, Fig. 1, looking toward the left; and Fig. 4 is an enlarged detail in plan of a portion of the feeler.

The loom-frame A, of suitable shape to provide bearings for the operating parts, the breast-beam A^{40}, the shipper-lever B, and its notched holding-plate B′ are and may be all of usual or well-known construction.

I have herein shown the warp-stop-motion-actuating detectors as flat, preferably metallic, heddles h, provided each with a warp-eye $h^{\times}$ and slotted longitudinally at or near their upper and lower ends at $h'\,h^{2}$ to receive therethrough top and bottom cross-bars $a\,a'$ and $b\,b'$ of the two heddle-frames connected by side bars $a^{\times}\,b^{\times}$ and having the bottom bars $a^{2}\,b^{2}$, to which the usual actuating-treadles (not shown) are attached. Flexible bands or straps $a^{3}\,b^{3}$ are attached to the heddle-frames and to rolls c on a rotatable shaft c', mounted in the uprights $A^{\times}$, secured to the loom sides. A wide thin plate or bar $c^{\times}$ is extended across the loom between and to separate the lower ends of the two series of detectors h, which have a limited vertical movement relative to the cross-bars of the heddle-frames.

At front and rear of the separator $c^{\times}$ are mounted in suitable bearings 5 (see Fig. 1) like rock-shafts d and e, to which, by suitable rigid arms d' and e', are attached the vibrators $d^{\times}$ and $e^{\times}$, (shown as angle-bars,) vibratable toward and from the separator below the two series of detectors. When one of the said series is lowered, the warp-threads w' thereof, Fig. 2, being in the lower plane of the shed, the feeler for such series will vibrate below them under normal conditions; but should a detector drop into abnormal position, due to breakage or slackening of its warp-thread, such detector will be in the path of and engage the feeler. Such interposition of the detector between the separator $c^{\times}$ and the feeler will stop the vibration of the latter, and in order to prevent undue twisting of the detector I notch the guide $c^{\times}$ or the edge of the feeler, the latter, as herein shown at 10, Fig. 4, the depth of the notches being greater than one-half the width of the detector to firmly engage and hold the upright edge thereof.

The detectors being loosely supported are liable to lie in vertical planes more or less inclined to the length of the warp-threads, and heretofore when the edge of the feeler and the fixed stop at the other side of the detectors have been milled the two edges of a dropped detector in such inclined plane have been engaged and held as the feeler moved forward, thus acting to still further twist the detector out of its proper plane. The result has been a bend in the detector or splitting of its end, in either case failing to stop the loom.

It will be obvious that if substantially the full width of a detector is necessary to stop the feeler at the proper point to effect stop-

page of the loom the inclination of a detector will permit the feeler to move too far to stop the loom.

With the deep notches herein shown it is impossible to bend the detector beyond the slight amount between the points of the teeth. The inclined sides of the latter guide the edge of the detector into proper position, and then the greater portion of the width of the detector is supported by the side of a tooth should the engaged detector be inclined slightly to one or the other side. It is also unnecessary to serrate or mill the fixed bar or stop.

Inasmuch as the detector cannot be inclined more than a certain amount, as set forth, the stopping mechanism will not fail to operate, for the feeler will always be held by the dropped detector at the proper point.

Brackets 7 and 8, Fig. 1, rigidly secured to the main frame, support a short stud 40, which carries a rotatable sleeve f, having fast thereon a sprocket-wheel f', as herein shown, connected by a suitable belt or chain f^2 with an actuating sprocket-wheel f^3, fast on the cam-shaft C of the loom, to continuously rotate the sleeve f. Two like but diametrically oppositely set cams m n are secured side by side on the sleeve f, pins or projections $m^\times$ and $n^\times$ being located on the outer sides of said cams, respectively.

A bearing $g^\times$ on the cross-girth A^6 of the frame supports a rock-shaft g, having a depending arm g', to which are pivoted the outer ends of levers m' n', provided, respectively, with suitable rolls or studs m^2 n^2 (see dotted lines, Figs. 2 and 3) to rest on the peripheries of the cams m and n, while links m^3 n^3 connect the levers with arms d^2 e^2 of the feeler rock-shafts d and e. Rotation of the cams will operate to alternately raise and depress the levers m' n', the raising of a lever acting through its link to rock the shaft and move its attached vibrator away from the separator, while the weight of the lever and link will rock the shaft to move the vibrator toward the separator $c^\times$ when the low portion of the actuating-cam is engaged by the roll on the lever. The inner ends of the levers are bent or curved into substantially sickle shape, as at m^4 n^4, with reduced extremities m^5 n^5, leaving shoulders m^6 n^6, respectively. Now when a lever-roll is on the low part of its cam, as the lever n', Figs. 2 and 3, the shoulder n^6 will be below and out of the path of movement of the lug $n^\times$; but when a dropped detector engages a feeler the latter is held from vibrating and maintains its lever lifted, with its shoulder in the path of the projection on its cam.

If a dropped detector should, for instance, engage the feeler $d^\times$, Fig. 2, then the lever m' would be held in the position shown and rotation of the sleeve f in the direction of arrow 12, Fig. 3, bring the cam projection $m^\times$ into engagement with the shoulder m^6, moving the lever longitudinally inward and rocking the shaft g. This rock-shaft g has fast thereon a bent arm g^2, connected by a link g^3 with an arm g^4 of a short rock-shaft g^5, mounted, as herein shown, below the holding-plate B', the rock-shaft having a knock-off arm g^6 fast thereon to engage the shipper-lever B. When the rock-shaft g is rocked, as described, the knock-off arm g^6 is swung against the shipper-lever to release it from its holding-notch and thereby operate the usual belt-shifter to stop the loom.

The knock-off lever, the rock-shaft g, and intermediate connections constitute a releasing device for the shipper-lever, and the levers and cams constitute controlling means for the stopping mechanism of the loom, operative upon failure or undue slackening of a warp-thread.

As shown in Fig. 2, the arms d^2 e^2 of the feeler rock-shafts are extended toward each other in order to give the proper movements to the feelers.

When the actuating projection on the cam has completed the movement of the lever longitudinally, it will pass from the shoulder of said lever and release the latter.

In case the feeler rock-shaft should stick upon the return throw of the vibrator and thus hold up its lever to be moved longitudinally by its cam the loom would be stopped; but I have prevented such improper stoppage by providing the extensions m^5 n^5. The coöperating actuating-cam lug will engage such extension and depress the lever positively, giving it a start usually sufficient to carry the shoulder out of the path of the lug, but if not the loom will be stopped and the binding can be remedied.

I do not herein claim, broadly, the movement of the vibratable feeler in one direction by gravity and its movement in the other direction positively.

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

1. In a loom, a series of vertically-movable warp-stop-motion-actuating detectors, a vibrating feeler moved by gravity toward them and to be engaged and held by a dropped detector, a shipper-lever, and a releasing device therefor, combined with controlling means for said device, including a rotating cam having a projection thereon, and a shouldered lever fulcrumed on a part of said releasing device and connected with the feeler and coöperating with the cam, to positively raise said lever on its fulcrum and move the feeler away from the detectors, stoppage of the said feeler holding the lever raised with its shoulder in the path of and to be engaged by the cam projection, to thereby move the lever longitudinally and operate the releasing device, substantially as described.

2. In a loom, a series of vertically-movable warp-stop-motion-actuating detectors, a vibrating feeler moved by gravity toward them and to be engaged and held by a dropped de-

tector, a shipper-lever, and a releasing device therefor, combined with controlling means for said device, including a rotating cam having a projection thereon, and a lever connected with the feeler and normally rocked by the cam, said lever having a downturned extension thereon to be engaged by the cam projection upon accidental stoppage of the feeler, to thereby depress the lever and effect movement of the feeler, substantially as described.

3. In a loom, a series of vertically-movable warp-stop-motion-actuating detectors, a vibrating feeler moved by gravity toward them and to be engaged and held by a dropped detector, a shipper-lever, and a releasing device therefor, combined with controlling means for said device, including a rotating cam having a projection thereon, and a lever connected with the feeler and normally rocked by the cam, said lever having a shoulder, and a downturned extension to be engaged by the cam projection upon accidental stoppage of the feeler, to effect movement of the latter, stoppage of the feeler by a dropped detector bringing the shoulder into the path of the said projection, to thereby move the lever longitudinally and operate the releasing device, substantially as described.

4. In a loom, a series of stop-motion-actuating detectors movable vertically by the warp-threads, a coöperating feeler vibrated positively in one direction and in the other direction by gravity, and stopping mechanism for the loom, combined with controlling means for said mechanism, comprising a rocking and longitudinally-movable lever, a continuously-rotated cam to engage and rock said lever, an actuating projection on said cam to move the lever longitudinally, and a link pivotally connecting the free end of the lever and the feeler, whereby stoppage of the latter by a dropped detector will retain the lever out of engagement with the cam and in the path of movement of said actuating projection, whereby engagement of the latter with the lever will move it longitudinally and release the stopping mechanism, substantially as described.

5. In a loom, a series of stop-motion-actuating detectors vertically movable by the warp-threads, a feeler moved by gravity toward said detectors, to be engaged and held by one in abnormal position, a shipper-lever, and releasing mechanism therefor, combined with controlling means for said mechanism, comprising a rotating cam, a normally-vibrated lever pivotally mounted on said mechanism and directly connected by a link with and to move the feeler away from said detectors, by engagement with the cam, and a continuously-rotated actuator to engage the lever when held from vibration by the feeler, and move the lever longitudinally to operate the releasing mechanism, substantially as described.

6. In a loom, a series of flat warp-stop-motion-actuating detectors vertically movable by the warp-threads, a stationary bar to act against one longitudinal edge of a detector in abnormal position, a feeler having a deeply-notched edge to engage the adjacent longitudinal edge of a dropped detector, said notches being deeper than one-half the width of the detectors, to prevent the latter from twisting out of a notch when engaged and backed against the bar, the sides of the notches inwardly converging to guide the detector to the bottom of a notch, and means to vibrate the feeler, substantially as described.

7. In a loom, a series of stop-motion-actuating detectors vertically movable by the warp-threads, a feeler moved by gravity toward said detectors, to be engaged and held by one in abnormal position, a shipper-lever, a knock-off arm therefor, a rock-shaft having a rocker-arm, and a link connecting said knock-off and rock-shaft, combined with a lever pivoted on said rocker-arm and connected with the feeler, a continuously-rotating cam to rock said lever on its pivot and thereby effect vibration of the feeler, and means to engage said lever and move it longitudinally to rock the knock-off-controlling shaft, upon stoppage of the feeler by a dropped detector, substantially as described.

8. In a warp stop-motion for looms, a series of vertically-movable flat detector-heddles, a notched vibratable feeler to engage and be stopped by a dropped heddle, and a coöperating guide at the back of the heddles, the notches being deeper than one-half the width of the heddles to prevent the latter from twisting out of a notch when engaged and backed against said guide, said notches having sides converging to the bottoms thereof, to guide the edge of a heddle to the bottom of a notch, substantially as described.

9. In a loom, a series of flat stop-motion-actuating detectors vertically movable by the warp-threads, and a vibratable feeler having a notched acting edge, to engage the adjacent longitudinal edge of a dropped detector, said notches having inwardly-converging sides to guide the detector to the bottom of a notch, the depth of the notches being greater than one-half the width of the detector, whereby the latter is prevented from twisting out of a notch when engaged by the feeler, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MYRON J. BIGELOW.

Witnesses:

HERBERT S. MANLEY,

GEO. OTIS DRAPER.