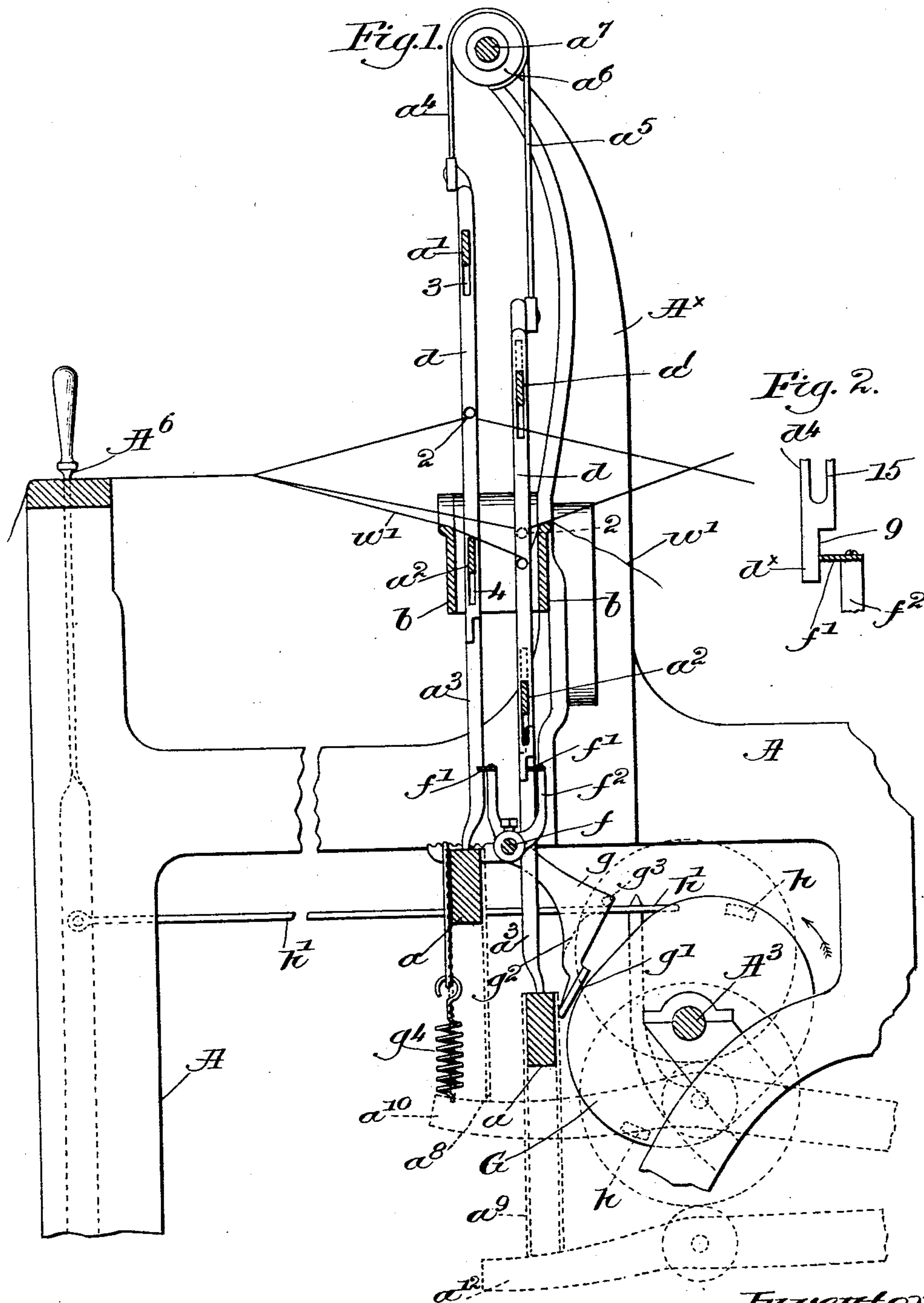


(No Model.)

G. O. DRAPER.  
WARP STOP MOTION FOR LOOMS.

No. 587,651.

Patented Aug. 3, 1897.



Witnesses:

A.C. Hammond,  
Thomas J. Drummond

Inventor:

George O. Draper,  
by Lewis Gregory, attys.



# UNITED STATES PATENT OFFICE.

GEORGE O. DRAPER, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO THE  
DRAPER COMPANY, OF SAME PLACE AND PORTLAND, MAINE.

## WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 587,651, dated August 3, 1897.

Application filed January 6, 1897. Serial No. 618,134. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE O. DRAPER, 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.

10 In warp stop-motion mechanism for looms employing a series of stop-motion-actuating detectors with which a vibrating feeler coöperates to detect a broken or unduly slack warp-thread there is a tendency to twist or  
15 bend a detector out of its proper position when engaged by the feeler, the detectors being usually made as flat metal strips having each an eye for the warp-thread. Such a construction is shown in United States Patent  
20 No. 536,969, dated April 2, 1895, the detectors therein shown acting also as heddles. To overcome this twisting or bending, it has been proposed to slot the detectors and extend a vibrating feeler through the slots, the feeler  
25 acting on a vertical edge of the slot located in the vertical central line of the detector. This construction, however, requires, among other features, a detector of great width, and while my present invention relates to warp  
30 stop-motion mechanism of similar character I have overcome the objection of very wide detectors while retaining the non-twisting feature of the former construction referred to. In order to avoid the disadvantages of such  
35 a construction—such as great width of detector, &c.—and still retain the feature of not twisting the detector, the detectors in my invention are supported in such manner that edgewise movement—i. e., movement in the  
40 direction of the warp-threads—is prevented, and each detector has a projecting portion or foot at its lower end, with its edge against which the feeler engages located in the longitudinal central line of the detector. With  
45 the construction shown herein no back plate or support is necessary for the detectors, for the supports of the frame in which the detectors are mounted prevent movement of the

frame in the direction of the warp-threads, and the feeler has a smooth or continuous  
engaging edge. 50

Figure 1 is a longitudinal sectional view of a sufficient portion of a loom to be understood with my invention applied thereto, and Fig. 2 is an enlarged detail of the lower end  
or foot of a detector and the coöperating vibrator. 55

The loom-frame A, the cam-shaft A<sup>3</sup>, and the shipper-lever A<sup>6</sup>, held in place while the loom is running properly, are and may be all  
as common in looms. 60

The uprights A<sup>x</sup>, one at each side the loom-frame, have secured thereto two warp-supporting bars *b b*, sufficiently separated to permit the detectors herein serving as heddles  
and the heddle-frames to pass between them, as in said Patent No. 536,969 referred to. 65

I have herein shown two heddle-frames, each composed of a bottom bar *a* and upper and lower cross-bars *a'* *a*<sup>2</sup>, rigidly connected  
by side bars *a*<sup>3</sup>. 70

The heddle-frames are connected by suitable straps *a*<sup>4</sup> *a*<sup>5</sup> with pulleys *a*<sup>6</sup> on a rock-shaft *a*<sup>7</sup>, mounted in the uprights A<sup>x</sup>, the bottom bars *a* of the frames being connected by  
suitable straps *a*<sup>8</sup> *a*<sup>9</sup> with the treadles *a*<sup>10</sup> *a*<sup>12</sup>, operated by cams on the cam-shaft A<sup>3</sup>, as in said patent, and the cams, levers, straps, and pulleys are and may be all as usual in looms  
for weaving cotton cloth. 80

Each detector or heddle *d* is preferably a flat strip of thin sheet metal having a warp-eye 2 and elongated slots 3 and 4 at or near its upper and lower ends, respectively, to receive through them the cross-bars *a'* *a*<sup>2</sup>, the  
slots being longer than the bars are wide to permit vertical movement of the heddles independently of said bars. 85

At its lower end each heddle is shown as cut away to leave a depending projection or  
foot *d*<sup>x</sup>, with its edge 9 substantially in the longitudinal central line of the heddle, leaving the width of the foot equal to or less than one-half of the width of the heddle. 90

The edge 9 of the foot is engaged by a vibrator or feeler should the heddle drop, due 95



to failure or undue slackness of its warp-thread, and in Fig. 1 the warp-thread  $w'$  is shown as broken, permitting its detector-heddle to drop into abnormal operative position.

The cooperating vibrator or feeler may be of any suitable construction and operating in connection with stopping mechanism for the loom in such manner that engagement and stoppage of normal movement of the vibrator by a dropped detector will effect stoppage of the loom.

Herein I have shown a rock-shaft  $f$ , provided with vibrators or feelers  $f'$ , having smooth-acting edges and carried by arms  $f^2$ , the rock-shaft being provided outside the loom-frame with a controller-lever  $g$ , having a toe  $g'$ , a heel  $g^2$ , (see dotted lines, Fig. 1,) a pin or projection  $g^3$ , and a spiral spring  $g^4$ , operatively connected to one arm of the controller-lever, acting to normally keep the toe  $g'$  thereof in contact with the cam  $G$ , fast on the shaft  $A^3$ , all as in said Patent No. 536,969 referred to. Said cam has pins or projections  $h$  on its rear side adapted in the rotation of the cam when the loom is working properly to pass under the elevated end of the rod  $h'$ , attached to the shipper-handle, the rod resting upon the heel  $g^2$ , between it and the pin  $g^3$ , and, as in said patent, when a dropped heddle engages and stops the movement of the vibrator the toe of the controller-lever will be prevented from going back to the cam and the end of the rod  $h'$  will be in the path of movement of one of the projections  $h$ , as in Fig. 1, so that the projection in the further movement of the cam will disengage the shipper-handle from the notch in the holding-plate and stop the loom.

By constructing the detector-heddles with the foot or reduced portion  $d^x$  the movement of the vibrator will be stopped without bringing upon the detector the severe twisting effect which might otherwise occur.

In the patent referred to the acting edge of the vibrator is notched, as is also the guide, to prevent twisting of the heddle; but I simplify the construction of the vibrator and do away altogether with the guide or back rest, as the lower cross-bar  $a^2$  of the harness or heddle-frame is sufficient to take up and resist the movement of the vibrator when engaged by a dropped detector.

By making the vibrator-engaging portion of the detector equal to or less than one-half of the main width of the detector the twisting tendency is practically eliminated, for the edge 15 of the slot 4 of the detector engages the supporting cross-bar  $a^2$ , and said edge is back of the vertical line passing through the edge 9 of the foot  $d^x$ .

The lateral thrust of the vibrator when engaging a detector is taken up by or through the top or bottom frame-supports, which prevent movement of the frame as a whole in

the direction of the warp-threads, the cross-bars in this instance maintaining the detectors from edgewise movement in the frame.

My invention is not restricted to the vibrator-actuating mechanism herein shown, nor to the connections between it and the stopping mechanism for the loom, as any convenient or desirable vibrator and shipper controlling mechanisms may be employed.

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 maintained in inoperative position by the warp-threads when intact, and means to prevent movement of the detectors in the direction of the warp-threads, each detector having one of its ends reduced in width and with its inner longitudinal edge in substantially the central line of the detector, combined with a vibrator to engage the inner edge of a detector in abnormal position, means to move said vibrator back and forth in the direction of the length of the warp, and stopping mechanism for the loom under control of the vibrator, substantially as described.

2. In a loom, a series of vertically-movable warp-stop-motion-actuating detectors maintained in inoperative position by the warp-threads when intact, said detectors having each a longitudinally-extended foot narrower than the width of the detector, a rocking vibrator to engage the inner longitudinal edge of a detector in abnormal position and be thereby held from movement, means to prevent edgewise movement of a detector engaged by the vibrator, and stopping mechanism for the loom, operative upon stoppage of the vibrator, substantially as described.

3. In a loom, a frame provided with a cross-bar and a series of vertically-movable warp-stop-motion-actuating detectors longitudinally slotted near their lower ends to receive said cross-bar, each detector having its end below the slot decreased in width, combined with a vibrator to engage the inner edge of the narrowed end of a detector in abnormal position, means to normally move the vibrator toward and from the detectors, and stopping mechanism for the loom under the control of the vibrator, the cross-bar and vibrator acting upon a detector and preventing it from twisting, substantially as described.

4. A warp-stop-motion-actuating detector for looms, composed of a flat strip of sheet metal having a warp-eye and a longitudinally-extended foot reduced in width, to serve as an operating-surface, substantially as described.

5. In a loom, a frame supported at top and bottom and provided with a series of vertically-movable warp-stop-motion-actuating detectors, and means to reciprocate the frame by or through its supports, combined with a



vibrator independent of said frame to engage the edge of a detector in abnormal position, means to normally move the vibrator toward and from the detectors, the frame-supports  
5 taking up the lateral thrust of the vibrator engaging a detector, stopping mechanism for the loom, and connections between it and the vibrator, substantially as described.

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

GEORGE O. DRAPER.

Witnesses:

E. D. BANCROFT,  
E. E. HOWARD: