

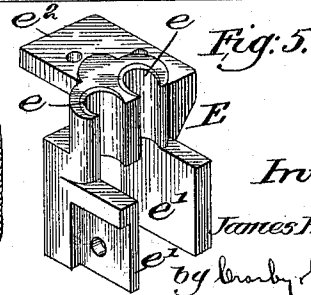
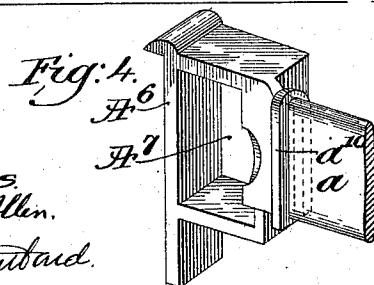
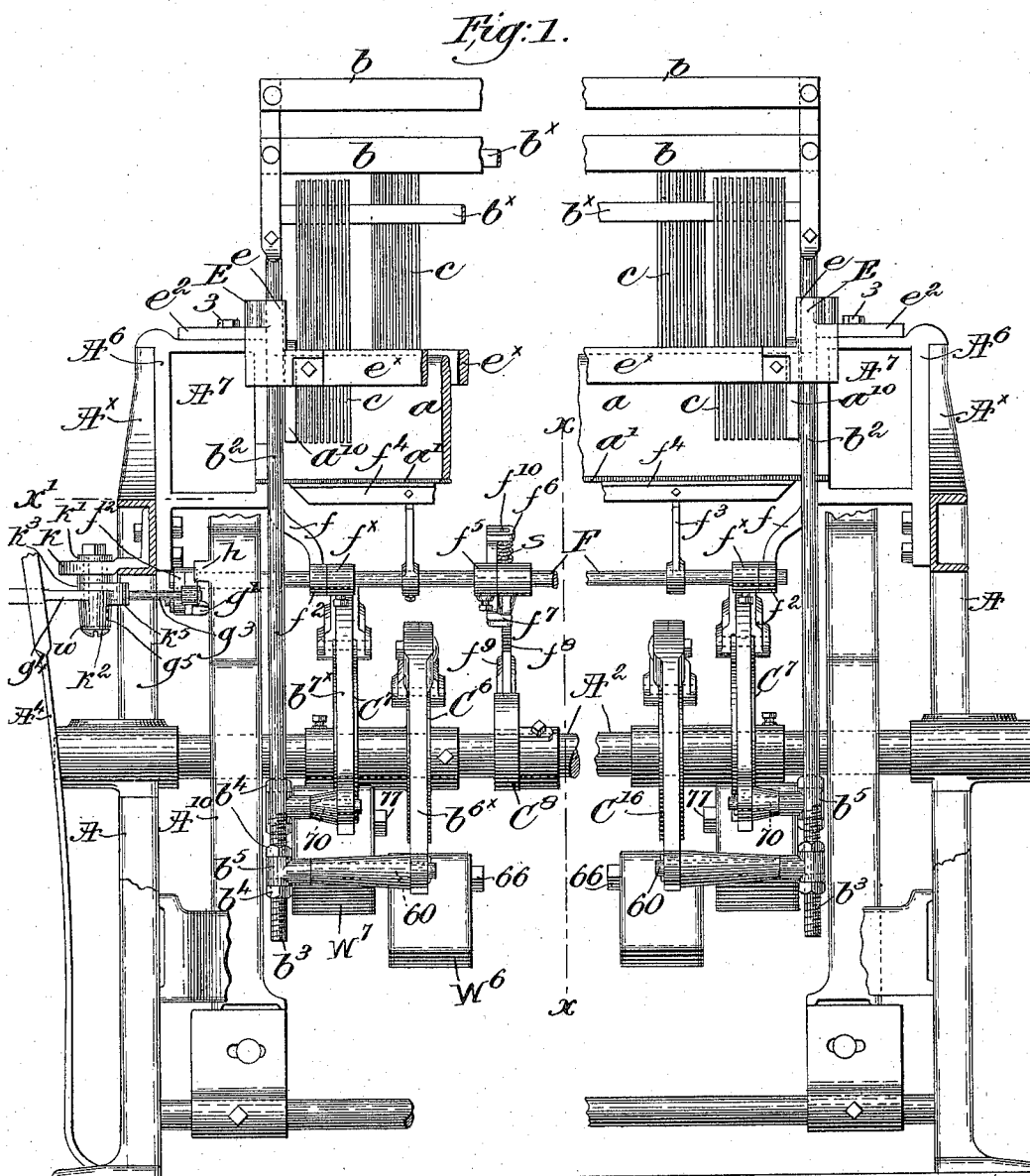
(No Model.)

2 Sheets—Sheet 1.

J. H. NORTHROP.
LOOM.

No. 576,508.

Patented Feb. 2, 1897.



Witnesses
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Walter E. Lombard.

Inventor:
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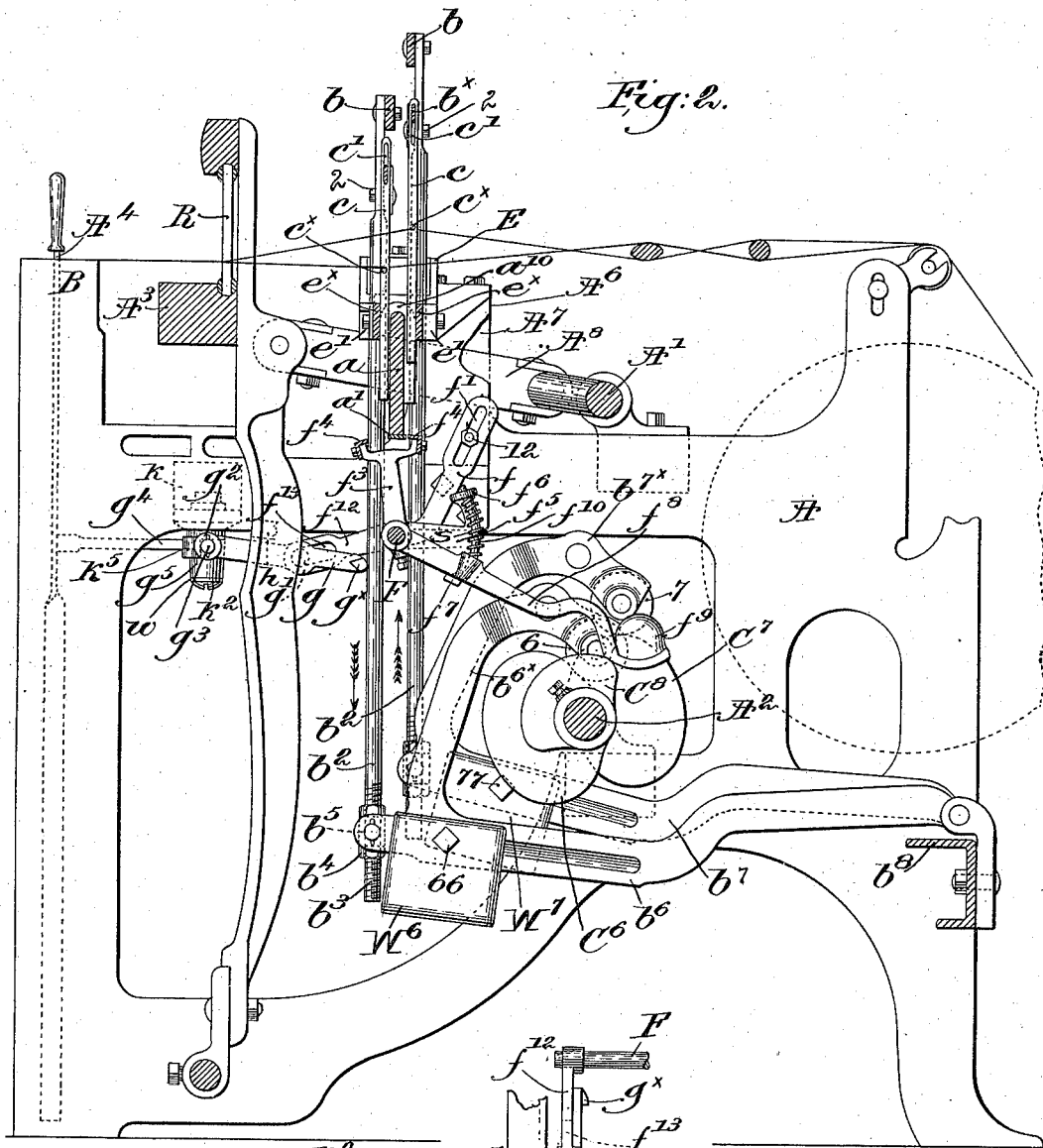


Fig. 6.

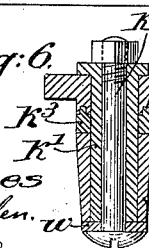
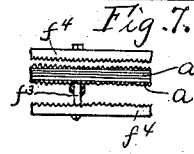
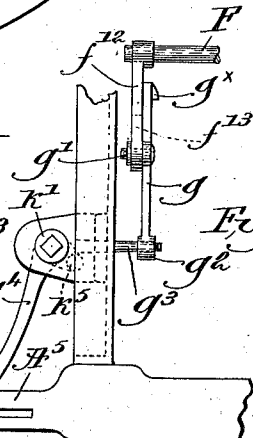


Fig. 3.



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UNITED STATES PATENT OFFICE.

JAMES H. NORTHROP, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO THE
NORTHROP LOOM COMPANY, OF SAME PLACE AND SACO, MAINE.

LOOM.

SPECIFICATION forming part of Letters Patent No. 576,508, dated February 2, 1897.

Application filed May 22, 1896. Serial No. 592,571. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. NORTHROP, of Hopedale, county of Worcester, and State of Massachusetts, have invented an Improvement in 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 This invention relates to that class of looms wherein the harness-frames are provided with heddles composed of thin metallic strips having holes for the reception of the warp-threads, said devices being made effective in stopping
15 the loom when a warp-thread breaks or abnormally slackens.

In the loom to be hereinafter described the harness-frames are independently operated by a combination of cams and treadles or
20 levers, the rolls of the harness-treadles running on the tops of the cams, of which latter there are two sets, one at each side of the loom.

In carrying out my invention I provide
25 each harness-frame with a series of detector-heddles, which are strung at one end on a transverse support or actuator-bar, so that the heddles may be raised and lowered with the harness-frames, while having a limited
30 vertical movement relative thereto.

The free ends of the heddles of each series lie side by side, the heddles of one harness-frame being located in front of the series of the other frame, the two series being controlled as to their position in the direction of
35 the warp by a guide within which they slide up and down, the guide having an open bottom.

A fixed separator is interposed between
40 the lower ends of the two series of heddles to prevent the heddles of one series from interfering with those of the other series, the separator also forming a side support for a dropped heddle when coöperating with the
45 detector to set the stop-motion into operation.

A dropped heddle is engaged by a vibrating detector which is actuated by means moving in unison with the lower loom or
50 harness-operating shaft, whereby the action

of the detector will be slower than in usual looms of this class.

As in United States Patent No. 536,968, dated April 2, 1895, to which reference may be had, the slots in the heddles through
55 which the actuators are extended are longer than the width of the latter, so that when the actuator is descending it will act upon the heddles at the lower ends of their slots, pushing the heddles down to put the warps
60 carried thereby into the lower plane of the shed.

Should a warp in the lower plane of the shed break or unduly slacken, its heddle, by reason of the slot in its end, would drop relatively to its actuator to thereby put the end of the dropped heddle into proper position
65 to coöperate with and put into operation stop-motion mechanism, of which the detector forms a part, to stop the loom.

The detector is so constructed as to engage a dropped heddle in either harness.

The stop-motion mechanism comprises various novel features, which will be hereinafter described, and particularly pointed out
75 in the claims.

Figure 1 is a front elevation, centrally broken out to save space, of a loom embodying my invention, the breast-beam and lay being omitted for the sake of clearness.
80 Fig. 2 is a vertical transverse sectional view of the loom shown in Fig. 1, taken on the line $x x$, looking toward the left. Fig. 3 is a detail plan view of the releasing mechanism for the shipper-handle, taken below the line
85 $x' x'$, Fig. 1. Fig. 4 is a perspective view of one of the stands or boxes at the end of the transverse heddle-separator. Fig. 5 is a similar view of one of the bearings for the heddle-frame slide-rods, to be described, and
90 showing the supports for the heddle-guide. Fig. 6 is a sectional detail of a part of the shipper-handle-releasing mechanism, to be described, and Fig. 7 is a detail plan view of the separator-bar and the detectors or feelers.
95

The loom-frame A, crank or lay shaft A' therein, having suitable fast and loose pulleys, (not shown,) the cross or cam shaft A², the lay A³, carrying a reed R, the breast-beam B, the shipper-handle A⁴, and the
100

notched plate A^5 to hold it in place while the loom is running properly are and may be all as common in looms.

I have attached to the uprights A^x at each side the frame suitable like boxes or stands A^6 , made hollow, as shown at A^7 , through which are extended the pitmen A^8 , connecting the crank-shaft A' and the lay A^3 , as shown in Fig. 2, each stand having secured thereto or forming a part of it a cross-girth a , extended across the loom from side to side and forming a separator for the heddles.

I have herein shown two independent heddle-frames, each frame being composed, essentially, of a cross-bar b , connected rigidly to side bars or slide-rods b^2 , and each frame has suitably attached thereto, as by bolts 2, heddle-carrying bars or actuators b^x .

As best shown in Fig. 2, the heddles c are each composed of a flat strip, preferably of metal, having, preferably, a round warp-receiving eye c^x and an elongated slot c' at its upper end, said slots receiving through them the actuator-bars b^x , the slots being longer than said bars are wide to let the heddles have a vertical movement independently of the vertical movement of the heddle-frame.

The side or slide bars b^2 of the heddle-frames are mounted to slide vertically in bearings e , forming a part of stands or brackets E , two such bearings being herein shown side by side (see Fig. 5) to receive the slide-bars at adjacent ends of the two heddle-frames, the brackets E having depending feet e' , which straddle the separator-bar a , and a shelf e^2 , which rests upon and is secured to the top of the box or stand A^6 by bolts 3.

Referring to Figs. 1 and 2, the lower ends of the slide-rods b^2 are shown as threaded at b^3 to receive check-nuts b^4 , which hold in adjusted position on the rods collars b^5 , to which are jointed levers b^6 b^7 , pivoted on a cross-girth b^8 of the loom-frame, the levers b^6 being connected to one and the levers b^7 to the other heddle-frame. The levers are provided, respectively, with upturned curved arms b^{6x} b^{7x} , which preferably carry rolls 6 7, resting upon the tops of and being acted upon by suitable cams C^6 C^7 , carried by the shaft A^2 referred to, said cams being arranged in pairs at or near each side of the loom. As the adjacent slide-rods b^2 are side by side, the connections between them and their respective levers are of different lengths, the collars b^5 on the rods b^2 of the front heddle-frame being connected by long studs 60 to the inner levers b^6 , while the rods of the rear heddle-frame are connected to their levers b^7 by shorter studs 70, thereby affording ample room for their respective actuating-cams C^6 C^7 . Weights W^6 W^7 are shown as adjustably secured to the levers b^6 b^7 , respectively, by suitable set-screws 66 77 to retain the rolls 6 7 at all times on the peripheries of the cams, adjustment of the weights providing means for regulating the operation of the heddle-frames with light or heavy warps.

It will be seen that the shaft A^2 is above the levers and between them and their rolls 6 7, the two heddle-frames being entirely independent of each other in their vertical movement.

I have shown the loom as provided with guides e^x , extended from one to the other side of the loom and secured to the ears e' of the brackets E , the heddles c , bearing lightly against said guides during their vertical movement, the lower ends of the two series of heddles entering the space between the guides and being separated at their lower ends by the separator a , so that the heddles of one series cannot interfere with those of the other series.

The guides steady the heddles and prevent movement thereof in the direction of the warp, and the separator a has secured to or formed upon its lower end a foot a' , notched along each edge, (see Fig. 7,) to act in engaging the edge of a dropped heddle to better advantage, so as to prevent its twisting when being acted upon by the detector or feeler, to be described.

Suitable hangers f , slotted at f' , Fig. 2, are secured to the inner sides of the loom-frame by bolts 12 and have bearings f^2 for a rocker-shaft F , held from longitudinal movement therein by suitable collars f^x , the said shaft having arms f^3 rigidly secured thereto and forked or bifurcated at their outer ends.

Two bars f^4 (shown in Fig. 2 as angle-irons) are bolted to the bifurcated ends of the arms f^3 , the inner oppositely-turned edges of said bars being preferably notched or toothed to embrace the edge of a dropped heddle of one or the other series, obviating twisting or throwing the heddles laterally out of place on their actuator-bar.

As shown in Fig. 2, the tops of the bars f^4 , which form detectors or feelers, move toward and from the opposite edges of the foot a' . The normal throw of the detector in one direction is illustrated, the vibration of the detector being attained by the movement of the rock-shaft F under normal or proper working conditions.

The rock-shaft F has fast thereon an arm f^5 , having oppositely-curved extensions on its free end, the upward extension being provided with a slotted ear f^6 , while the down-turned extension has a lug or projection f^7 thereon, extended laterally beneath an arm f^8 , loosely mounted on the shaft F and weighted at f^9 at its free end, the arm f^8 being held by the weight f^9 normally against an actuating-cam C^8 on the shaft A^2 . (See Fig. 2.) The arm f^8 has secured thereto an upturned curved rod f^{10} , extended through the slotted ear f^6 of the arm f^5 , a spring s surrounding the guide-rod f^{10} between the ear and the arm f^8 , the strength of the spring being sufficient to normally hold the lug f^7 against the under side of the arm f^8 . When said arm is moved by the cam C^8 into the position shown in Fig. 2, the yielding connection described between it and the shaft F will rock the latter,

moving the detector to the left, the weight f^9 depressing the arm f^8 in the further revolution of the cam C^8 and, acting against the lug f^7 , depresses the arm f^5 to rock the shaft F in the opposite direction, moving the detector f^4 to the right. If, however, a heddle in either series should drop by reason of the breakage or undue slackening of its warp-thread, the said warp-thread then being in the lower plane of the shed and normally supporting its heddle, the detector-bar f^4 on that side of the separator a would engage the heddle and the vibration of the detector, and consequently the rock-shaft F would be stopped.

By virtue of the yielding connection between the rock-shaft and its actuator f^8 the latter would be free to be moved by the cam C^8 , the spring s being compressed when the arm f^8 was raised if a heddle in the rear series should drop, and if a heddle of the front series dropped the lug f^7 on the arm f^5 would uphold the arm f^8 , so that it could not fall to its full extent.

As shown in Fig. 1, the shaft F is extended beyond the left-hand bearing f^2 and has rigidly secured to it a rocker-arm f^{12} , longitudinally slotted at f^{13} , Fig. 2, to receive therein a stud g' on a dagger g , pivotally mounted at g^2 on one arm g^3 of an elbow-lever, the other arm g^4 of which (see Fig. 3) normally rests against the shipper-handle A^4 as it is held in the notched plate A^5 .

A moving part of the loom, herein shown as one of the lay-supports A^{10} , has secured thereto a notched lug h , which when the lay moves back will engage the lip g^x of the dagger g at times, the continued backward movement of the lay moving the dagger in the direction of its length to swing the arm g^4 of the elbow-lever in the direction of arrow 25, Fig. 3, to press the shipper-handle A^4 out of its retaining-notch in the plate A^5 , the shipper-handle as soon as thus released shifting the belt by means of the usual belt-fork (not shown) from the fast to the loose pulley, all in usual manner, to stop the loom. When the loom is running properly, however, the oscillation of the rock-shaft F will, through the rocker-arm f^{12} and the slot and stud connection, swing the dagger g in a vertical plane in such manner that the lip g^x thereof will be moved out of the path of the lug h on the lay-support A^{10} , so that the shipper-releasing mechanism will normally remain inoperative.

As a matter of course when the oscillation of the rock-shaft F is stopped, as by a dropped heddle, the lip of the dagger will not be moved out of the path of its actuator, and the loom will be stopped before the lay can again beat up the filling.

The resetting of the shipper-handle by the operative acts upon the lever-arm g^4 to return the parts of the releasing mechanism into normal position, the slot-and-stud connection between the rocker-arm f^{12} and the dagger g permitting the longitudinal move-

ment of the latter to actuate the releasing mechanism.

As best shown in Figs. 1 and 6, a stand k , bolted to the loom side, has extended downwardly therethrough a headed sleeve k' , on which the hub g^5 of the elbow-lever g^3 g^4 is rotatably mounted, a stud-bolt k^2 holding the hub in position on the sleeve, while preferably a washer w is interposed between the head of the stud and the lower end of the hub. Above the hub a plate k^3 surrounds the sleeve k' and is shown in Fig. 6 as having one or more projections k^4 to enter depressions in the stand k to retain said plate from movement, the plate having a depending toe k^5 which acts as a stop to prevent undue movement of the elbow-lever in the direction opposite to the arrow 25, Fig. 3.

By oscillating the rock-shaft F from the lower cam-shaft A^2 a slower movement is imparted thereto than has been heretofore possible, giving the heddles more time to drop into position to engage the detector when a warp-thread slackens unduly or breaks when in the lower plane of the shed, so that the liability of the loom to run for one or more picks after a warp-thread has broken or slackened improperly is very greatly lessened.

To prevent improper lateral movement of the heddles in the series, I have shown herein a stop a^{10} , Figs. 1, 2, and 4, represented as a U-shaped piece of metal straddling the separator a at each end of the series of heddles c and between them and the stand A^6 , although it will be obvious that the stop could be formed integral with the stand or the separator.

My invention is not restricted to the precise construction and arrangement of parts herein shown and described, as the same may be modified in various particulars without departing from the spirit and scope of my invention.

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

1. In a loom, a plurality of heddle-frames, and a series of metallic heddles supported in each frame and adapted to slide vertically independent of the movement of the frame, combined with a fixed guide for the lower ends of the heddles, a separator interposed between and separating the lower ends of the heddles of one series from the lower ends of the heddles of the adjacent series, a vibrating detector to meet the edge of a dropped heddle, stopping mechanism for the loom, and connections between it and the detector, substantially as described.

2. In a loom, a plurality of heddle-frames, a series of metallic heddles supported by and adapted to slide vertically in each frame, a fixed guide for the lower ends of the heddles, a separator interposed between the lower ends of each two series of heddles, and a detector to meet the edge of a dropped heddle, combined with an actuating-shaft, connec-

tions between it and the heddle-frames, means operating in unison with said actuating-shaft, to vibrate the detector, stopping mechanism for the loom, and connections between it and the detector, substantially as described.

3. In a loom, a plurality of frames, a series of metallic heddles supported by and adapted to slide vertically in each frame, a separator interposed between the lower ends of the heddles of each two series, a detector having oppositely-turned portions to engage a dropped heddle in one or the other series, the separator at such times supporting the inner edge of the dropped heddle, and means to normally vibrate the detector in the direction of the length of the warp, stopping mechanism for the loom, and connections between it and the detector, substantially as described.

4. In a loom, a pair of reciprocating heddle-frames, and a series of heddles on each frame, combined with a stationary guide into which the lower ends of the heddles enter, and a fixed separator to separate the lower ends of the heddles of one series from the lower ends of the heddles of the other series, substantially as described.

5. In a loom, a pair of reciprocating heddle-frames, and a series of heddles on each frame, combined with a stationary guide into which the lower ends of the heddles enter, a fixed separator interposed between the lower ends of the two series of heddles, and a notched foot on the separator, to receive the edge of a dropped heddle, substantially as described.

6. In a loom, a pair of reciprocating heddle-frames, a series of heddles on each, a stationary guide into which the lower ends of the heddles enter, a separator extended across said guide between its sides and separating the lower ends of the heddles of one series from the lower ends of the heddles of the other series, and a heddle-stop at each side of the separator, at the ends of and to maintain each series of heddles from undue lateral movement, substantially as described.

7. In a loom, a shipper-handle, releasing mechanism therefor, including a dagger, a reciprocating bar, a series of heddles thereon free to slide vertically to a limited extent, a vibrating detector, means including a rocking arm, to normally vibrate it, and a yielding connection between said arm and the detector, said detector engaging and being stopped by a dropped heddle, connections between the detector and dagger to control the position of the latter, and means independent of the said rocking arm to engage and move the dagger to release the shipper-handle when the detector engages a dropped heddle, substantially as described.

8. In a loom, a shipper-handle, a detent therefor, releasing mechanism for the shipper-handle, including an elbow-lever, and a dagger pivotally connected thereto, and means to engage and move the dagger when in operative position to release the shipper-handle, combined with a normally-vibrated detector, connections between it and the dagger, including a slotted rocker-arm and a cooperating stud on the dagger, to move the latter by vibration of the detector, and a series of vertically-reciprocated heddles, dropping of a heddle by breakage of a warp-thread in the lower plane of the shed causing stoppage of the detector and thereby movement of the dagger into operative position, substantially as described.

9. In a loom, reciprocating heddle-frames, and a series of metallic heddles normally free to slide vertically to a limited extent on said frames, combined with heddle-stops to limit the lateral movement of the heddles on the frames, substantially as described.

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

JAMES H. NORTHROP.

Witnesses:

GEO. OTIS DRAPER,
S. F. SMITH.