(No Model.)

J. H. NORTHROP.

WARP STOP MOTION FOR LOOMS.

No. 576,882. Patented Feb. 9, 1897.

Fig. 1.

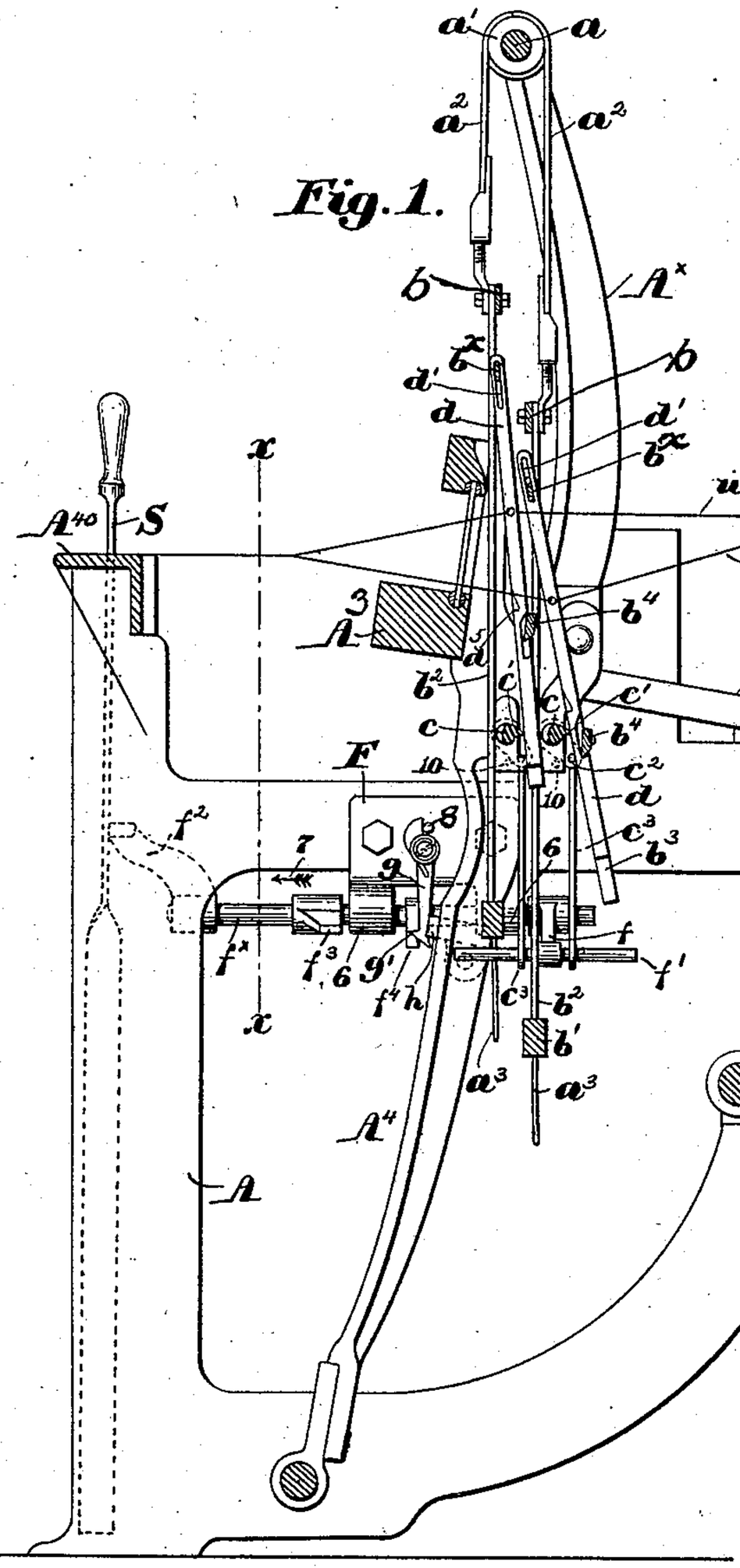


Fig. 3.

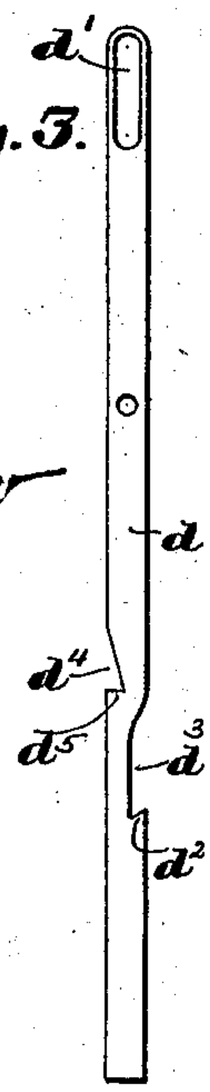


Fig. 2.

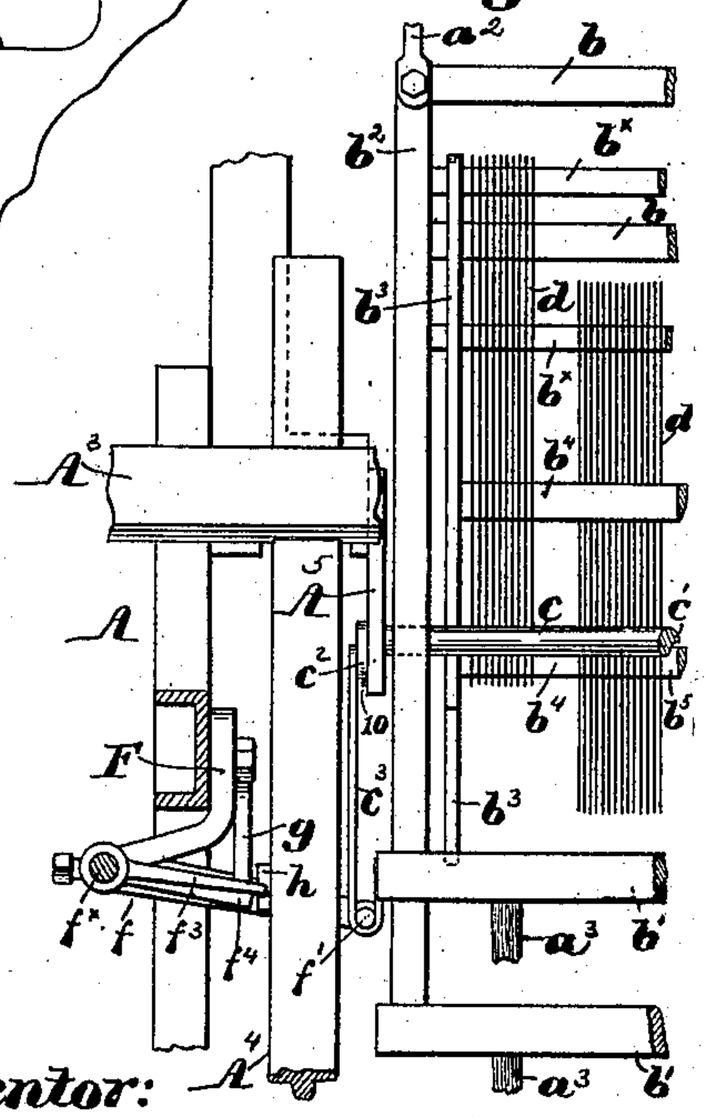
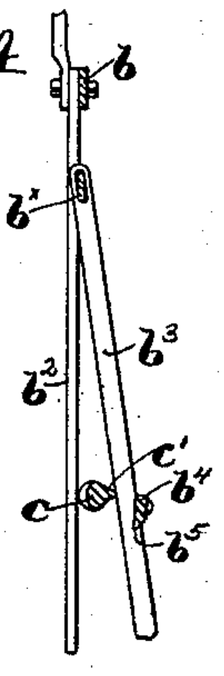


Fig. 4



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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.

WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 576,882, dated February 9, 1897.

Application filed November 19, 1896. Serial No. 612,675. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. NORTHROP, of Hopedale, in the county of Worcester and 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 that class of looms wherein stop-motion-actuating detectors are utilized to act upon controlling means for stopping mechanism, upon failure or undue slackening of the warp-threads, to set the stopping mechanism into operation and thereby stop the loom. The warp-threads are led through the actuating-detectors, which are herein utilized as heddles and reciprocated to change the shed, and so long as the warp-threads remain unbroken and properly taut the detectors are maintained inoperative to effect the stoppage of the loom. Upon failure or undue slackness of the warps, however, one or more of the detectors will move into abnormal position to engage an actuator-bar forming a part of the controlling means for the stopping mechanism, and subsequent movement of the detectors at the next change of shed will rock the actuator-bar and effect the stoppage of the loom.

I have herein provided means for changing the angle of the detectors as they are reciprocated, the said detectors being swung, as it were, in the direction opposite to the travel of the warp, this change in angularity, coacting with the up-and-down or longitudinal movement of the detectors, having a peculiarly beneficial effect in facilitating the passage therethrough of knots or bunches in the warps.

Other novel features of my invention will be hereinafter fully described, and particularly pointed out in the claims.

Figure 1 is a transverse vertical section of a loom with one embodiment of my invention applied thereto, some of the well-known and common features of a loom being omitted for the sake of clearness. Fig. 2 is a longitudinal section of a portion of the loom, taken on the line x-x, Fig. 1. Fig. 3 is an enlarged side elevation of one of the detectors, and Fig. 4 is a sectional detail of one of the detector-frames with the detectors omitted.

The loom-frame A, of suitable shape to provide suitable bearings for the operative parts, the lay A^3, lay-sword A^4, the breast-beam A^{40}, whip-roll W, and the shipper-lever S to ship the belt by usual mechanism (not shown) are and may be all of common and well-known construction.

The loom-frame is provided with uprights $A^\times$, only one of which is shown in Fig. 1, having bearings for a rock-shaft a, provided with sheaves a', to which are attached the overhead flexible connections a^2 for the heddle-frames, which latter are reciprocated in usual manner by treadles (not shown) connected to straps a^3, Figs. 1 and 2.

I have herein shown the stop-motion-actuating detectors d as adapted to act as heddles in effecting the change of sheds and supported on cross-bars $b^\times$, forming part of the heddle-frames, said bars being extended through longitudinal slots d' at or near the upper ends of the detectors, said slots being longer than the depth of the bars, whereby the detectors have a limited vertical movement relatively thereto. The heddle or detector frames comprise top and bottom bars b b', respectively, rigidly secured to side bars b^2 in any suitable manner.

I have pivotally mounted on the supporting-bar $b^\times$ of each frame depending links b^3, to which is attached a depressor-bar b^4, adapted to swing toward or from the detectors, and preferably beveled at its lower edge, as at b^5, to engage a shoulder d^2 on the detector, preferably formed by notching the latter, as clearly shown at d^3, Fig. 3, the upper end of the notch being rounded or beveled. When the frame descends, the depressor-bar b^4 engages the shoulders d^2 of the detectors and acts to depress the latter positively against any extra tension of the warp-threads, the depressor-bar being herein shown as located at the rear of the series of detectors.

Brackets A^5 are secured to and within the loom sides to provide bearings for actuator-bars c, one for each series of detectors located in front of them, each actuator-bar having a longitudinal rib or lip c', across which the de-

tectors normally slide in the reciprocation of their supporting-frames.

The detectors d are preferably notched at d^4 in their front edges to form square shoulders d^5 at the lower ends of the notches, to at times engage the lip or rib c' on the adjacent actuator-bar c.

As shown clearly in Figs. 1 and 4, the actuator-bars c are behind the vertical plane of reciprocation of the detector-frames, so that when the latter descends the detectors mounted thereon will, as they slide over the bars c, be more and more inclined, while as the frames ascend the detectors will more nearly attain a vertical position. This latter movement of the detectors is in a direction opposite to the travel of the warps w, Fig. 1, and it facilitates the passage of knots or bunches therethrough by pressing the detectors against them.

Each actuator-bar c has secured thereto an arm c^2, to which is pivotally attached a link c^3, hooked at its lower end to engage a rod f', extended laterally from an arm f, fast on a rock-shaft $f^\times$, mounted to also slide longitudinally in bearings 6 of a stand F, secured to the loom side. This rock-shaft $f^\times$ is provided with a knock-off arm f^2, which normally rests against the shipper-lever S as the latter is held in its usual notched plate, so that when the shaft is slid longitudinally the knock-off arm f^2 will act upon and release the shipper-lever and stop the loom.

I have herein shown the lay-sword A^4 provided with a bunter h to engage a finger f^3 on the shaft $f^\times$ when the latter is rocked into operative position by elevation of the arm f, as will be described, to thereby effect the longitudinal movement of the rock-shaft in the direction of arrow 7, Fig. 1, and the consequent release of the shipper-lever.

A spring-controlled dog g on the stand F has a beveled end and a shoulder g' to engage a detent f^4, fast on the rock-shaft $f^\times$, when the latter is rocked, to maintain it in operative position until the bunter h engages the finger h^3, a stop-pin 8 preventing movement of the dog in one direction.

The parts are shown in normal position in Fig. 1 when the loom is running properly, suitable stops 10 acting on the rocker-arms c^2 to prevent undue movement thereof and maintain the actuator-bars with their lips c' in normal position.

So long as the warp-threads w remain unbroken and under proper tension they uphold the detectors d when in the lower plane of the shed, with the shoulders d^5 of the detectors above the actuator-bars, but when a warp fails or unduly slackens its detector drops into abnormal position and the lip c' of the actuator-bar c enters the notch d^4. At the next change of shed the dropped detector is raised by the upward movement of its supporting-frame, and the shoulder d^5, acting on the lip of the actuator-bar c, rocks the latter, lifting its link c^3 and through the arm f partially rotating the rock-shaft $f^\times$ until its detent f^4 is caught and held by the dog g, the shoulder of the detector releasing the lip c' of the bar at the end of its rocking movement. While the bar is being rocked the forward movement of the lay causes the bunter h to engage the finger f^3 of and to move said rock-shaft $f^\times$ longitudinally, so that the knock-off arm f^2 will release the shipper-lever S and thereby stop the loom, the longitudinal movement of the rock-shaft releasing the detent f^4 from the dog. After such movement of the rock-shaft it is free to turn back to its initial position, due to the weight of the arm f, finger f^3, and detent f^4, all of which extend from the shaft in the same general direction. The outer end of the knock-off arm f^2 is moved by the shipper-lever when the latter is returned to its holding-notch, to thereby move the rock-shaft longitudinally to initial position.

The dropped detector is easily distinguished from its fellows and is lifted into place when its warp-thread is pieced up, and when the shipper-lever is replaced in its holding-notch it acts on the curved knock-off arm f^2 to push the rock-shaft $f^\times$ back into normal inoperative position to again operate when a detector moves into abnormal position. Owing to the length of the slots d' in the detectors the latter will not be moved when the frame rises until the supporting-bar $b^\times$ engages the upper ends of the slots, but the depressor b^4 moves in unison with the frame, so that it is withdrawn from the shoulders d^2 of the detectors before they begin to rise. When a detector moves into abnormal position, the rounded upper end of its notch d^3 slides easily over the depressor, and it will be noticed that the notches d^3 and d^4 are not oppositely located on the detector, so as to avoid weakening the same and to coöperate properly with their respective parts.

The actuator-bar and the depressor for each series of detectors form a species of open guide for the lower ends thereof and maintain them in proper operative position.

The actuator-bars, the sliding rock-shaft $f^\times$, and the coöperating parts form controlling means for the stopping mechanism for the loom, and it will be seen that said controlling means is completely at rest under normal conditions or when the loom is running properly, thereby greatly reducing the wear and tear.

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

1. In a warp stop-motion for looms, a series of stop-motion-actuating detectors moved into abnormal position by failure or undue slackening of the warp-threads, and means to reciprocate said detectors vertically, combined with stopping mechanism for the loom, and controlling means therefor, including an actuator-bar to be engaged by a detector in ab-

normal position and rocked when the latter is raised, to operate the stopping mechanism, substantially as described.

2. In a warp stop-motion for looms, a series of stop-motion-actuating detectors moved into abnormal position by failure or undue slackening of the warp-threads, and means to positively reciprocate said detectors vertically, combined with stopping mechanism for the loom, and controlling means therefor to connect the same with and to be operated by a moving part of the loom, said means including an actuator-bar to be engaged by a detector in abnormal position and to be rocked when the latter is moved at the next change of shed, substantially as described.

3. In a warp stop-motion for looms, a series of stop-motion-actuating detectors, and means to positively reciprocate them at each change of shed, combined with stopping mechanism for the loom, an actuator-bar to be engaged by a detector in abnormal position due to a broken or slack warp-thread, movement of the detector at the next change of shed rocking said bar, and connections between the actuator-bar and stopping mechanism to operate the latter when the bar is rocked, substantially as described.

4. In a warp stop-motion for looms, a series of independently-supported heddles, means to positively reciprocate them, a shipper, and controlling means therefor, including an actuator-bar to be engaged by a heddle in abnormal position due to breakage or undue slackening of its warp-thread, vertical movement of the engaged heddle operating to rock said actuator-bar, substantially as described.

5. In a warp stop-motion for looms, a series of heddles each having a shoulder on one of its longitudinal edges, and a frame for and in which the heddles are vertically movable for a limited distance, combined with stopping mechanism for the loom, and controlling means therefor, including an actuator-bar having a projection to be engaged by the shoulder or detector in abnormal position, movement of the heddle at the next change of shed rocking the actuator-bar to operate the controlling means, substantially as described.

6. In a warp stop-motion for looms, the lay, a bunter movable therewith, a series of stop-motion-actuating detectors moved into abnormal position by failure or undue slackening of the warp-thread, and a reciprocating support for said detectors, combined with stopping mechanism for the loom, controlling means therefor, comprising a longitudinally-movable rock-shaft provided with a finger to coöperate with the bunter, an actuator-bar adapted to be engaged by a dropped detector and to be rocked by subsequent vertical movement thereof, and connections between said actuator-bar and sliding rock-shaft, to rock the latter and move its finger into the path of the bunter, substantially as described.

7. In a warp stop-motion for looms, a series of stop-motion-actuating detectors positively reciprocated at each change of shed, a shipper-lever, and controlling means therefor, said means including a sliding rock-shaft having a finger, a detent and coöperating dog to retain the shaft in position when rocked, and an actuator-bar connected with and to rock the shaft upon failure or undue slackening of a warp-thread, and a bunter to slide the rock-shaft longitudinally, a dropped detector engaging the actuator-bar and thereafter rocking it as the detector is moved at the next change of shed, substantially as described.

8. In a warp stop-motion for looms, a series of stop-motion-actuating detectors moved into abnormal position by failure or undue slackening of the warp-threads, each detector having a shoulder at one of its longitudinal edges, and means to positively reciprocate said detectors, combined with stopping mechanism for the looms, and controlling means therefor to connect the same with and to be operated by a moving part of the loom, said means including an actuator-bar having a longitudinal lip to be engaged by the shoulder of an abnormally-positioned detector and to be rocked thereby when said detector is moved at the next change of shed, substantially as described.

9. In a loom, a frame provided with a cross-bar, a series of shouldered heddles supported thereby and having a limited vertical movement relatively to said bar, a swinging depressor-bar pivotally mounted on the frame, and adapted to engage the shoulders on the heddles, to depress the latter positively in the lower plane of the shed, substantially as described.

10. In a loom, a reciprocating frame and a series of shouldered heddles supported therein and having a limited vertical movement relative thereto, and a depressor-bar reciprocating in unison with the frame and movable toward and from the heddles, to engage the shoulders thereof and depress the heddles positively in the lower plane of the shed, substantially as described.

11. In a warp stop-motion for looms, a reciprocating frame and a series of heddles supported therein having limited vertical movement relative thereto, each heddle having a shoulder on its front and rear longitudinal edges, and a depressor-bar on the frame to engage the shoulders on one edge of the heddles, to positively depress them in the lower plane of the shed, combined with a shipper-lever, and controlling means therefor, including an actuator-bar to be engaged by the shoulder of a heddle in abnormal position due to failure or slackening of its warp-thread, subsequent movement of the heddle at the change of shed rocking said bar to release the shipper-lever, substantially as described.

12. In a warp stop-motion for looms, a series of stop-motion-actuating detectors moved into abnormal position by failure or undue

slackening of the warp-threads, each detector having a shoulder at its edge, and reciprocating means to support said detectors at their upper ends, combined with a shipper-lever, and controlling means therefor including a stationary actuator-bar over which the detectors slide and by which they are maintained in an inclined position, a detector in abnormal position engaging said bar and rocking it by subsequent movement of the detector, substantially as described.

13. A flat, metallic warp stop-motion-actuating detector for looms, having a longitudinal slot at or near its upper end, and notched at its opposite longitudinal edges to form shoulders, which serve as operating-surfaces, 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,
HERBERT S. MANLEY.