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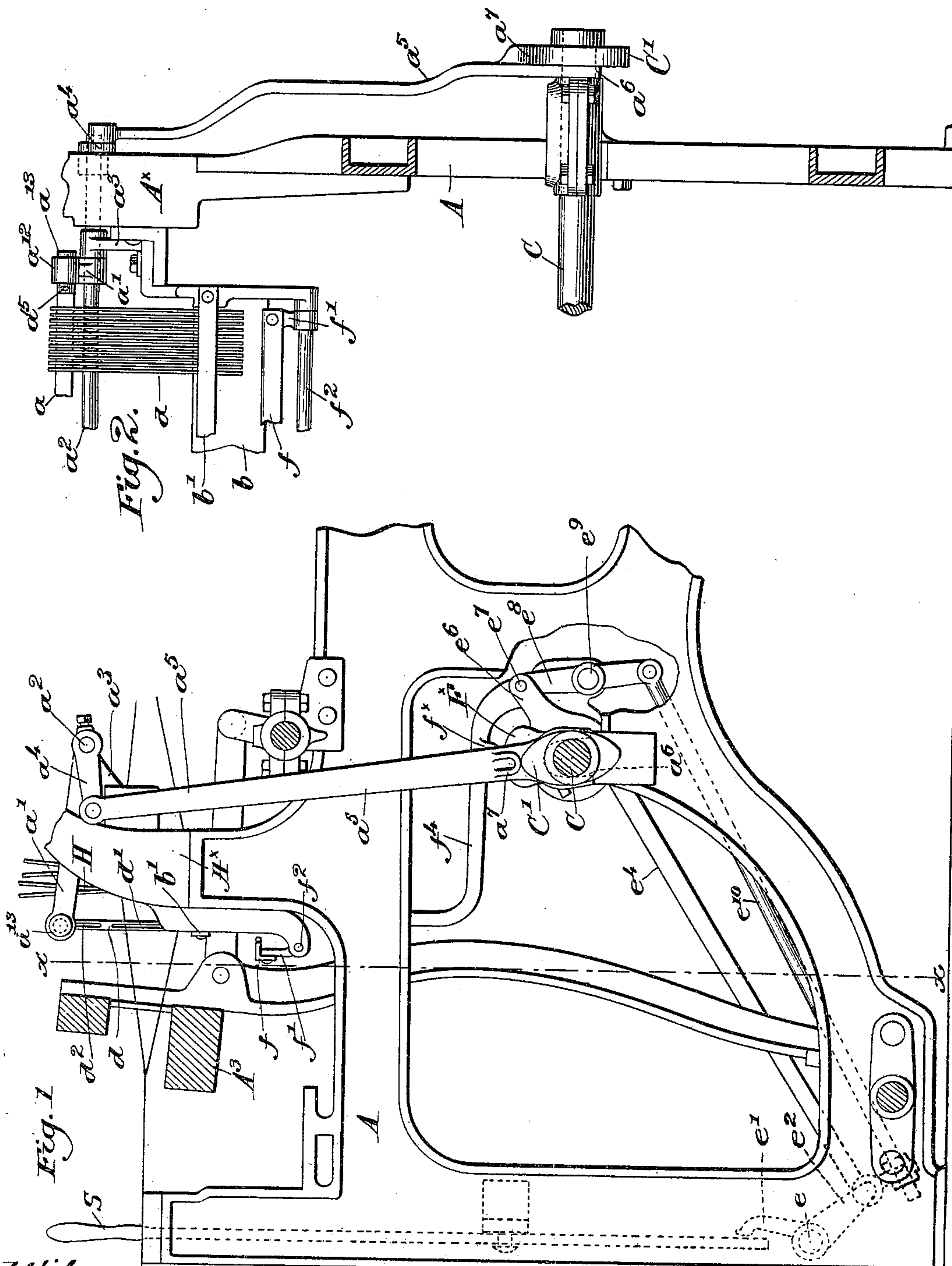
Patented Mar. 14, 1899.

J. H. NORTHROP.
WARP STOP MOTION FOR LOOMS.

(Application filed Aug. 4, 1898.)

(No Model.)

2 Sheets—Sheet 1.



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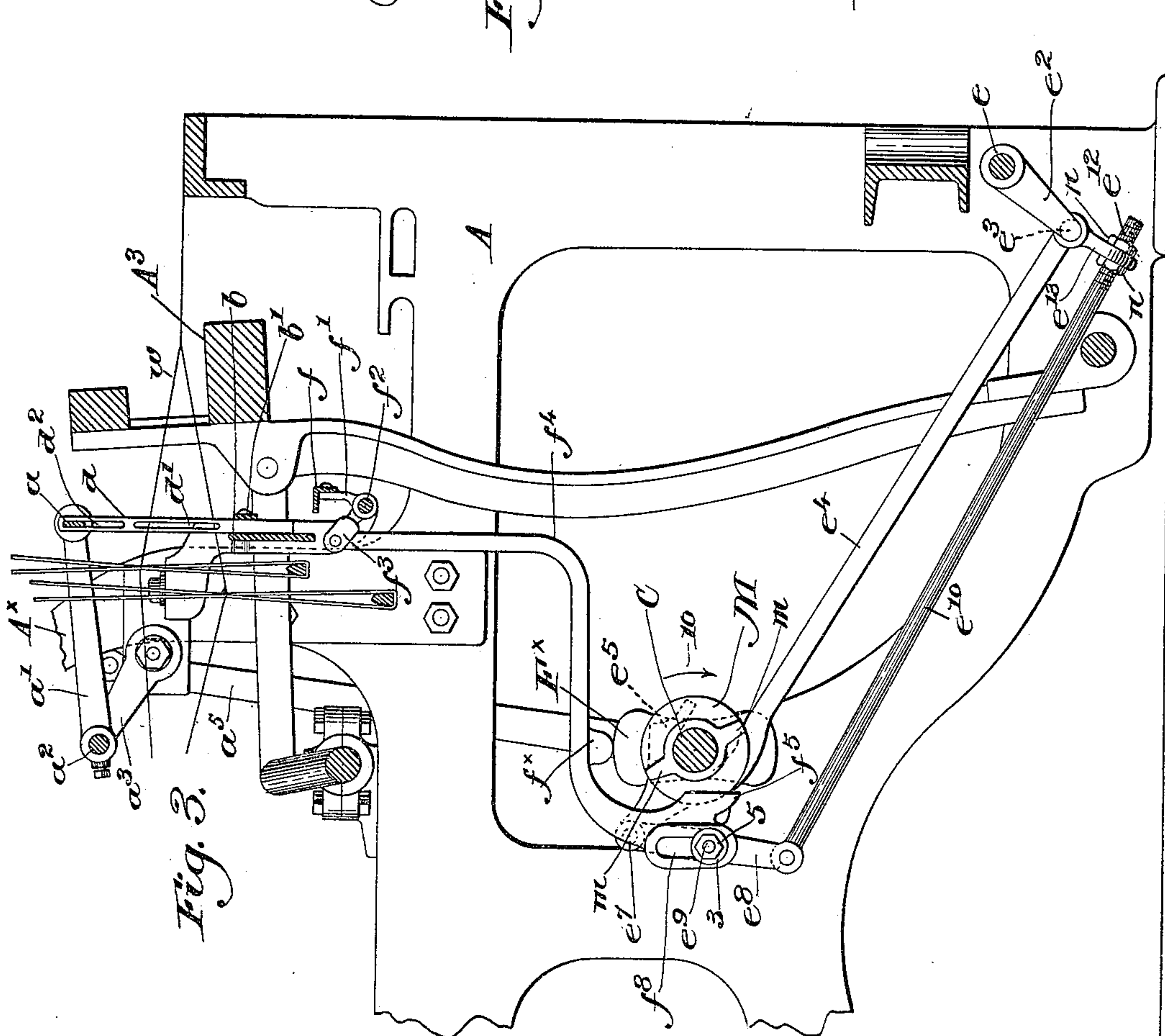
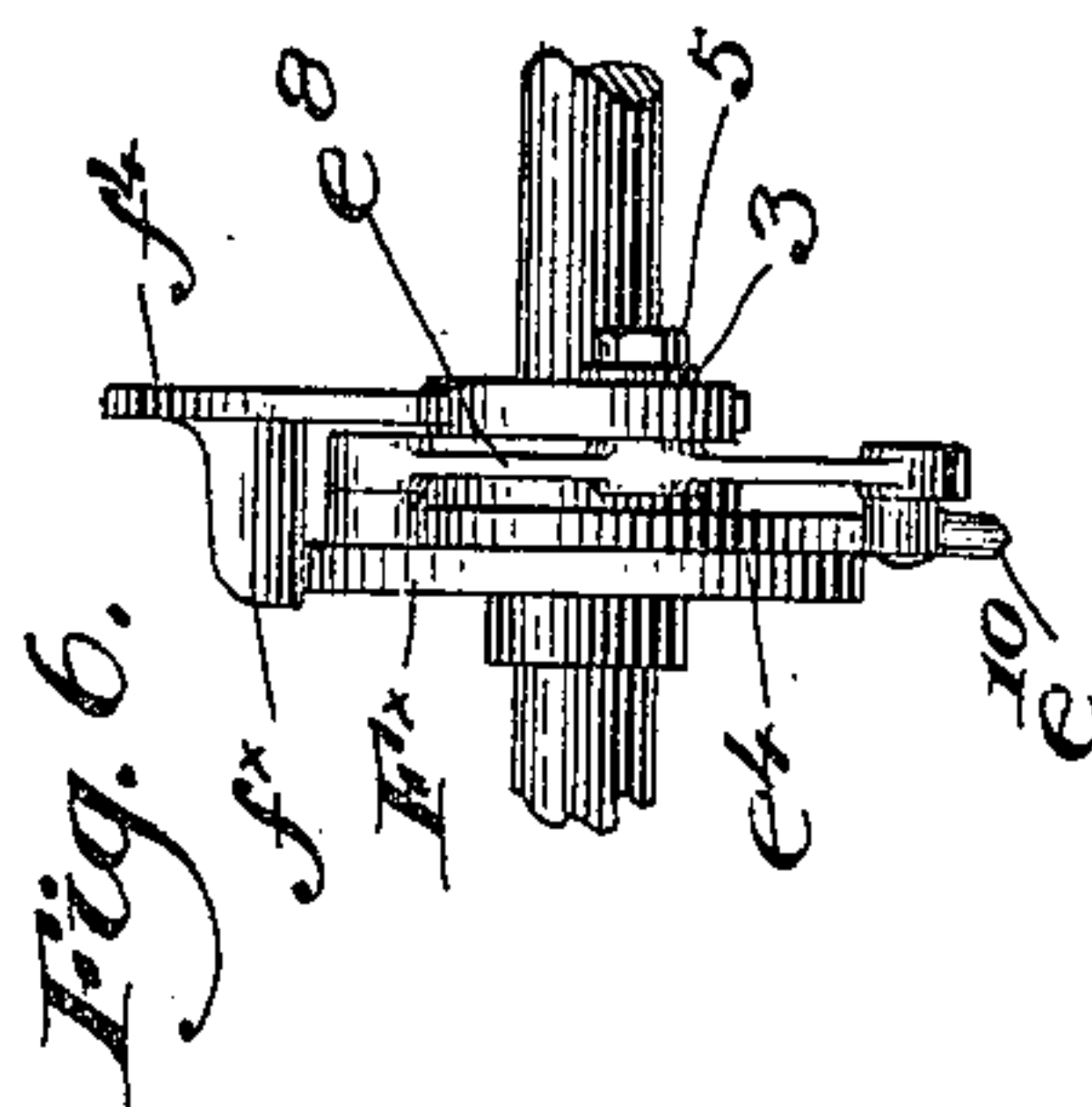
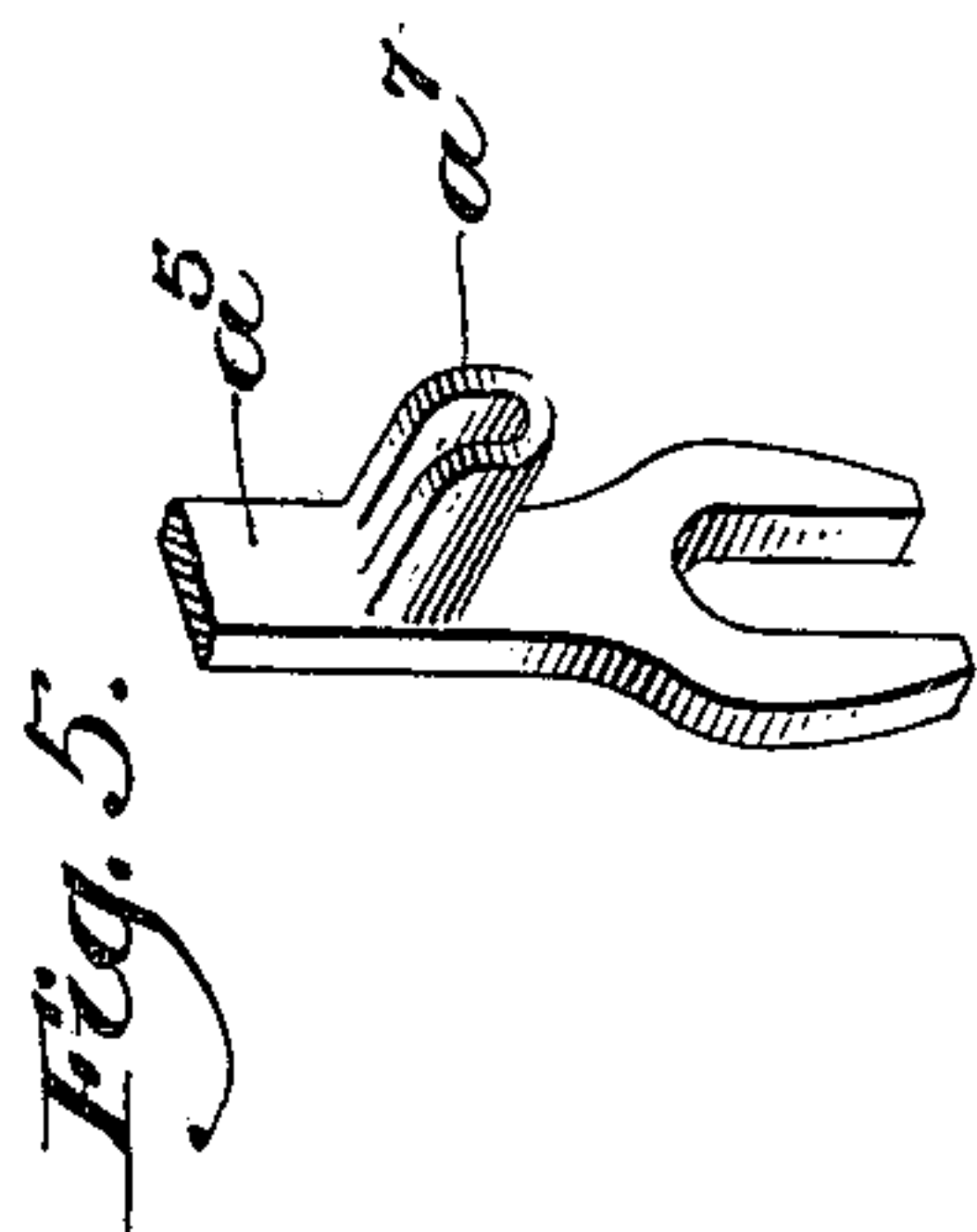
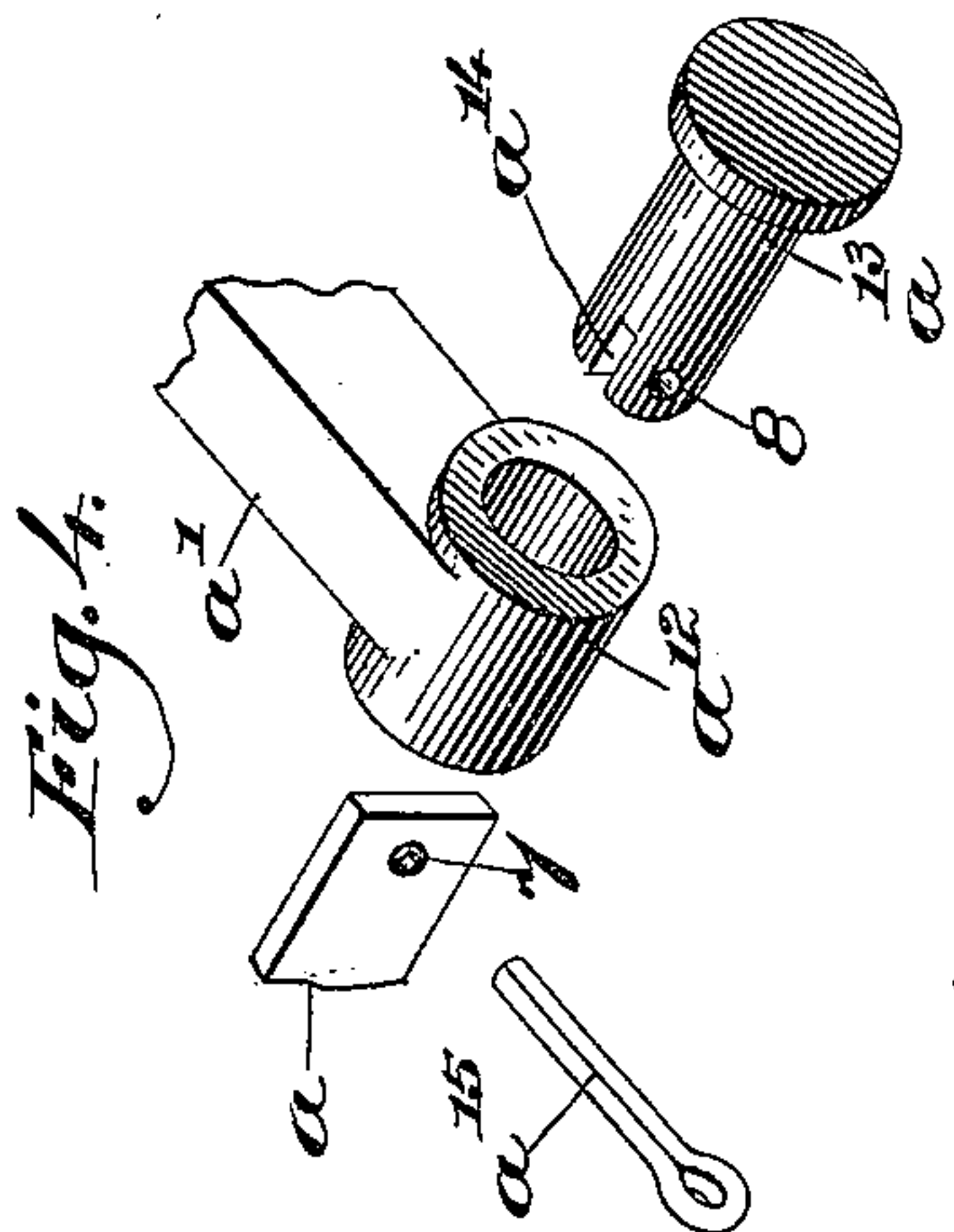
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(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

JAMES H. NORTHROP, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO THE
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WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 621,310, dated March 14, 1899.

Application filed August 4, 1898. Serial No. 687,684. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. NORTHROP, 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 This invention relates to warp stop-motion mechanism particularly applicable to looms, whereby the abnormal positioning of a controlling or actuating detector is made effective to accomplish, through suitable translating means, the automatic stoppage of the loom, such abnormal positioning of a detector occurring when a warp-thread normally coöperating therewith fails or becomes improperly slack. It has been found that the
20 weight of a detector applied to a warp-thread tends to cause trouble by scraping off lint, making extra breakage, and depressing the warp-threads, so as to interfere with the proper formation of the shed when the detector is located in front of the harness.
25 When warp-threads are so depressed, the point of the shuttle may pass over instead of under the warps forming the upper plane of the shed, making an overshot.

30 My invention has for its main object the production of means to relieve the warp-threads from the pressure of the detectors at intervals, preferably when the shuttle is passing through the warp.

35 Figure 1 is a right-hand side elevation of a sufficient portion of a loom to be understood with one embodiment of my invention applied thereto. Fig. 2 is a partial longitudinal section of the loom, taken on the line $x x$, Fig.
40 1. Fig. 3 is a transverse sectional view, taken between the loom sides, with the lay and other parts of the loom omitted, which form no part of my invention. Figs. 4 and 5 are perspective details to be hereinafter referred to. Fig.
45 6 is a left-hand view, referring to Fig. 3, of a portion of the mechanism for actuating the feeler and effecting the stopping of the loom.

I have herein shown the detectors d , which control or serve to effect the operation of the
50 stopping means for the loom, as located be-

tween the lay a^3 , Fig. 1, and the harness H, said detectors being preferably made as thin flat strips of sheet metal having each an elongated thread-receiving opening d' and a second elongated slot d^2 at the upper end
55 thereof, a flat lifter-bar a , of a less depth than the length of the slots, being extended through the slots d^2 of the series of detectors. The lower ends of said detectors slide vertically in plates or bars $b b'$, suitably secured
60 to the loom sides, the former serving also as a back-stop when a detector is abnormally positioned, as will be described. The lifter-bar a is swiveled or mounted at its ends to rock in two arms a' , one at each side of the
65 loom, and fast upon a rock-shaft a^2 , having its bearings in suitable brackets a^3 , which may be conveniently bolted to the arch A^x of the loom.

Referring to Figs. 1 and 2, the rock-shaft
70 a^2 has at one end, shown as outside of the loom-frame, an attached rocker-arm a^4 , from which depends a pivotally-connected link a^5 , slotted at its lower end, as at a^6 , (see Fig. 5,) to straddle the usual cam-shaft C, as herein
75 shown, while a toe a^7 (shown in Fig. 5 as forming a part of the link and having a convexed lower end) is adapted to travel on a double-throw cam C' , so that the link will be
80 raised and lowered twice for each revolution of the shaft C, such movement of the link acting to raise the lifter-bar a and with it the series of detectors.

The throw of the lifter-bar is such that
85 each time it is elevated the detectors will be moved collectively away from the warp-threads w , which pass through the slots d' , so that at intervals the warp-threads will be entirely relieved of the weight of the said detectors. As herein shown in the drawings,
90 this release of the warp-threads from strain due to the detectors is effected as the lay turns back and the shuttle is thrown through the shed; but obviously by changing the time of the controlling mechanism for the bar a
95 the time of the release of the warp-threads may be changed. The weight of the link a^5 maintains its toe a^7 on the surface of the cam C' , and when the bar a is lowered the detectors operatively engage and are supported
100

by such of the normally-conditioned warp-threads as are in the upper shed, the term "normally conditioned" being used to indicate those warp-threads which are unbroken and under proper tension. Should, however, a warp-thread break or become unduly slack at the time the detectors are feeling the warps, the detector coöperating with such broken or slack thread will descend into active or abnormal position, it being remembered that at such time the bar a is depressed sufficiently to permit such active movement of the detector. When a detector so moves into active position, it will be engaged by and stop the movement of a normally-vibrating feeler f , shown as a bar extended across the loom adjacent the lower ends of the detectors and normally vibrating beneath the lower ends thereof, said feeler being attached by suitable arms f' to a rock-shaft f^2 , having a rocker-arm f^3 , to which is pivotally connected an actuating-link f^4 . This link is shown as bent at its lower end toward the back of the loom and then again downwardly at the rear of the shaft C, a toe f^x on the link being held by the weight of the latter on a cam F^x , fast on the shaft C.

The portion of the link f^4 back of the shaft C is shaped to form a bunter f^5 , which in the movement of the link is brought into and out of the path of movement of one or more toes or tappets m of a tappet M, (see Fig. 3,) the engagement of the feeler with an abnormally-positioned detector preventing the descent of the bunter f^5 out of the path of the tappet, so that the rotation of the cam M in the direction of the arrow 10, Fig. 3, will cause one of the tappets m to engage the bunter and move it and the link f^4 bodily to the left, viewing Fig. 3.

The retractive movement of the feeler f is effected by engagement of the toe f^x with the high part of the cam F^x , and under normal conditions the said toe will leave the high part before one of the tappets can strike the bunter, and the stroke of the feeler toward the detector is completed by gravity. If the feeler is stopped by a detector in active position, then the bunter is retained in the path of and to be engaged by one of the tappets to thereby effect release of the shipper-lever by connections to be described.

A detector in active position is prevented from falling out of the series by the bar a .

A rock-shaft e , mounted in the loom-frame A, has fast upon it a knock-off arm e' (see dotted lines, Fig. 1) to engage and release the usual shipper-lever S from its holding-notch at the proper time, the rock-shaft e having fast thereon a second arm e^2 , jointed at e^3 to an upwardly and rearwardly extended link e^4 , bent over or hooked at its free end, as at e^5 , Fig. 3, to partially embrace the shaft C between the feeler-controlling cam F^x and the tappet-cam M, the rear end of the link e^4 being extended, as at e^6 , and having fulcrumed upon it at e^7 a lever e^8 , provided with a stud e^9 , which is ex-

tended through a slot f^8 in the depending end of the link f^4 and held in place by a suitable washer 3 and nut 5. A rod e^{10} is pivotally connected at one end to the lower end of the lever e^8 , and its threaded opposite end e^{12} is extended through an ear e^{13} , rigidly mounted on the stud e^3 of the arm e^2 and held in adjusted position in said ear by suitable check-nuts n .

By means of the rod e^{10} and the adjusting devices—viz., the check-nuts—the position of the bunter f^5 may be regulated more or less toward or from the path of the toes or tappets m by reducing or increasing the distance from the lower end of the lever e^8 to the ear e^{13} when setting up the apparatus.

It will be readily understood that the lever e^8 depends from the extension e^6 of the link e^4 , and as the feeler-actuating link f^4 rises and falls such motion is provided for by the slot-and-pin connection $f^8 e^9$ between said link f^4 and lever e^8 .

It will be obvious that upon engagement of the feeler with an abnormally-positioned detector one of the tappets m will engage the bunter f^5 and move it to the left, Fig. 3, and such movement will be transmitted through the stud e^9 to the lever e^8 , and inasmuch as the upper and lower ends of the lever are connected with the arm e^2 by the link e^4 and rod e^{10} , respectively, said arm will be swung to rock the shaft e and move the knock-off arm e' against and to release the shipper-lever S from its holding-plate.

It is very desirable that the presence of a broken or improperly-slack warp-thread shall be detected promptly and such condition of affairs be transmitted as rapidly as may be to the stop-motion of the loom in order that the latter may be stopped as quickly as possible after the occurrence of the break or slackening of the thread, and by locating the stop-motion-actuating detectors between the fell of the cloth and the harness I am enabled to effect the stoppage of the loom very quickly upon the detection of an abnormally-conditioned warp-thread.

In order that the detectors may travel in substantially vertical paths, the lifter-bar a is swiveled or pivotally mounted in the arms a' , and in Fig. 4 the details of such mounting are shown, the arm a' being provided at its outer end with a hub a^{12} , which receives loosely in it a headed stud a^{13} , the inner end of which is slotted at a^{14} to embrace the end of the bar a , a cotter-pin or other suitable fastening a^{15} being then passed through the holes 7 and 8 in the bar and stud, respectively, to connect the two together, the bar thus being provided with readily-separable journals, which latter rock in the hubs a^{12} . Obviously other convenient forms of connection could be provided by which the rocking or swiveling of the lifter-bar could be effected.

While I have shown one convenient form of feeler-vibrating mechanism and coöperat-

ing connections between it and the shipper-lever, my invention is not restricted thereto, as any suitable feeler-actuating means may be used in connection with the requisite connections between such means and the shipper-lever, so long as the stopping means of the loom is operated by or through the active movement of a detector into abnormal position.

10 So far as I am aware it is broadly new in a warp stop-motion to at intervals positively move the detectors to relieve the warp-threads from strain due to the engagement therewith of said detectors, and accordingly my invention is not restricted to the construction and arrangement herein shown and described, the latter being a practical and operative embodiment of one form of the invention.

20 While each detector is herein shown as co-operating with a single warp-thread, it will be obvious that two or more warp-threads could be used in connection with each detector so long as said different warp-threads would move into the upper plane of the shed at different times.

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

30 1. In a loom, shed-forming devices a series of stop-motion-controlling detectors independent of the devices and capable of collective movement when desired, and also capable of individual movement into operative position upon failure or undue slackness of a warp-thread, means to positively act upon and effect the collective movement of the detectors into and out of position to engage and feel warp-threads in normal condition, and a stop-motion for the loom, operated by or through a detector in its operative or active position.

45 2. In a loom, the lay, shed-forming devices a series of stop-motion-controlling detectors independent of the lay and said devices, and adapted to coöperate with and feel intermittently the warp-threads, and to severally move into active or operative position upon failure or undue slackness of a warp-thread, means to support said detectors independently of the warp-threads between their detecting periods, and stopping means for the loom, operated by or through a detector in its active or operative position.

55 3. In a loom, shed-forming devices, a series of stop-motion-controlling detectors located in front of the shed-forming devices, adapted to intermittently feel warp-threads in normal condition and to be held thereby from individual movement into active or operative position, means to at intervals act upon and withdraw the detectors from feeling engagement with the warp-threads, and a stop-motion for the loom, operated by or through a detector in its active or operative position.

65 4. In a warp stop-motion for looms, shed-forming devices a series of controlling-de-

tectors independent of said devices and capable of collective movement into and out of feeling engagement with warp-threads in normal condition, said detectors having also individual movement into active or operative position upon failure or undue slackness of a warp-thread, a normally-vibrating feeler to coöperate with a detector in active or operative position, and means to positively move the detectors at predetermined intervals to relieve the warp-threads from the weight thereof.

5. In a loom, shed-forming devices, a series of detectors adapted to rest upon and thereby feel warp-threads in normal condition, each detector being adapted to move into operative position upon failure or undue slackness of its corresponding warp-thread, means independent of the shed-forming device to raise said detectors collectively at intervals, to thereby relieve the warp-threads of their weight, and a stop-motion for the loom, operated by or through a detector in operative position.

6. In a loom, the lay, shed-forming mechanism, a series of stop-motion-controlling detectors located between said mechanism and the lay, each detector being adapted to move into operative position upon failure or undue slackness of its warp-thread, and adapted when in feeling position to be supported by warp-threads in normal condition, means to positively move said detectors out of feeling engagement with the threads at predetermined intervals, and a stop-motion instrumentality for the loom, operated by or through a detector in abnormal operative position.

7. In a loom, a series of detectors capable of vertical movement and provided each with an elongated warp-thread-receiving opening, a movable support located above the warp-threads, from which said detectors are suspended and relative to which they have a limited longitudinal movement, elevation of the support moving the detectors independently of and relieving the warp-threads of their weight, means to raise and lower the support at intervals, the detectors being arranged to be supported by normally-conditioned warp-threads as the support completes its downward movement, each detector being adapted to move into abnormal or operative position upon failure or slackness of its warp-thread, a vibrating feeler to be engaged and stopped by a detector abnormally positioned, and stopping means for the loom, operated by stoppage of the feeler.

8. In a loom, the lay, a series of stop-motion-controlling detectors independent of the lay and capable of collective movement, and also capable of individual movement into operative position upon failure or undue slackness of a warp-thread, means to positively effect collective movement of the detectors out of feeling engagement with the warp-threads as the shuttle passes through the warp, to thus relieve the warp-threads from strain due

to the detectors, and a stop-motion for the loom, operated by or through a detector in operative position.

9. In a loom, the harnesses, a series of stop-motion-controlling detectors independent of the harnesses and adapted to descend by gravity upon and be supported by normally-conditioned warp-threads, and individually to have a further downward movement into operative position upon failure or undue slackness of a warp-thread, a common lifting device for the detectors, operative intermittently to lift them from resting upon the warp-threads, and a stop-motion for the loom, operated by or through a detector in abnormal position.

10. In a loom, a series of longitudinally-slotted stop-motion-controlling detectors adapted to rest upon and be sustained by normally-conditioned warp-threads and adapted each to move into operative position when its corresponding warp-thread breaks or slackens unduly, a rock-shaft, arms fast thereon, a lifting-bar swiveled in said arms and extended through the slots in and to lift said detectors collectively and thereby remove their weight from the warp-threads, means to rock said shaft at intervals, the swiveling of the bar permitting the detectors to travel in substantially vertical paths, and a stop-motion for the loom, operated by or through detector in abnormal position due to failure or slackness of its warp-thread.

11. In a loom, shed-forming devices, a series of stop-motion-actuating detectors arranged to be at times controlled as to their position by coöperation with normally-conditioned warp-threads, and adapted to move into operative position on failure or undue slackening of the warp-threads, a stop-motion for the loom, arranged to engage and be

operated by or through a detector when in operative position due to failure or slackness of its corresponding warp-thread, when the detectors are in position to be controlled by the warp-threads, and means independent of the shed-forming devices to positively move said detectors at intervals from the control of the warp-threads and at such times sustain the detector of a broken or slack thread.

12. In a loom, stop-motion-actuating detectors movable into active position upon breakage or slackness of their coöperating warp-threads, a normally-vibrated feeler to engage and be stopped by a detector in active position, stopping means for the loom, including a pivotally-supported bunter governed as to its position by the feeler, a bunter-actuating cam, and means to adjust the bunter relatively to its actuating-cam.

13. In a loom, stop-motion-actuating detectors movable into active position upon breakage or slackness of their coöperating warp-threads, a normally-vibrated feeler to engage and be stopped by a detector in active position, a pivotally-supported bunter operatively connected with the feeler and governed as to its position thereby, and an actuator for the bunter, combined with a knock-off arm, connections between it and the bunter, movement of the latter by its actuator operating the knock-off arm to effect stoppage of the loom, and an independent, adjustable connection between said arm and the bunter, to adjust the latter relatively to its actuator.

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

JAMES H. NORTHROP.

Witnesses:

GEORGE OTIS DRAPER,
ALBERT H. COUSINS.