(No Model.) 2 Sheets—Sheet 1.

J. H. NORTHROP.

WARP STOP MOTION FOR LOOMS.

No. 554,605. Patented Feb. 11, 1896.

Fig. 3.

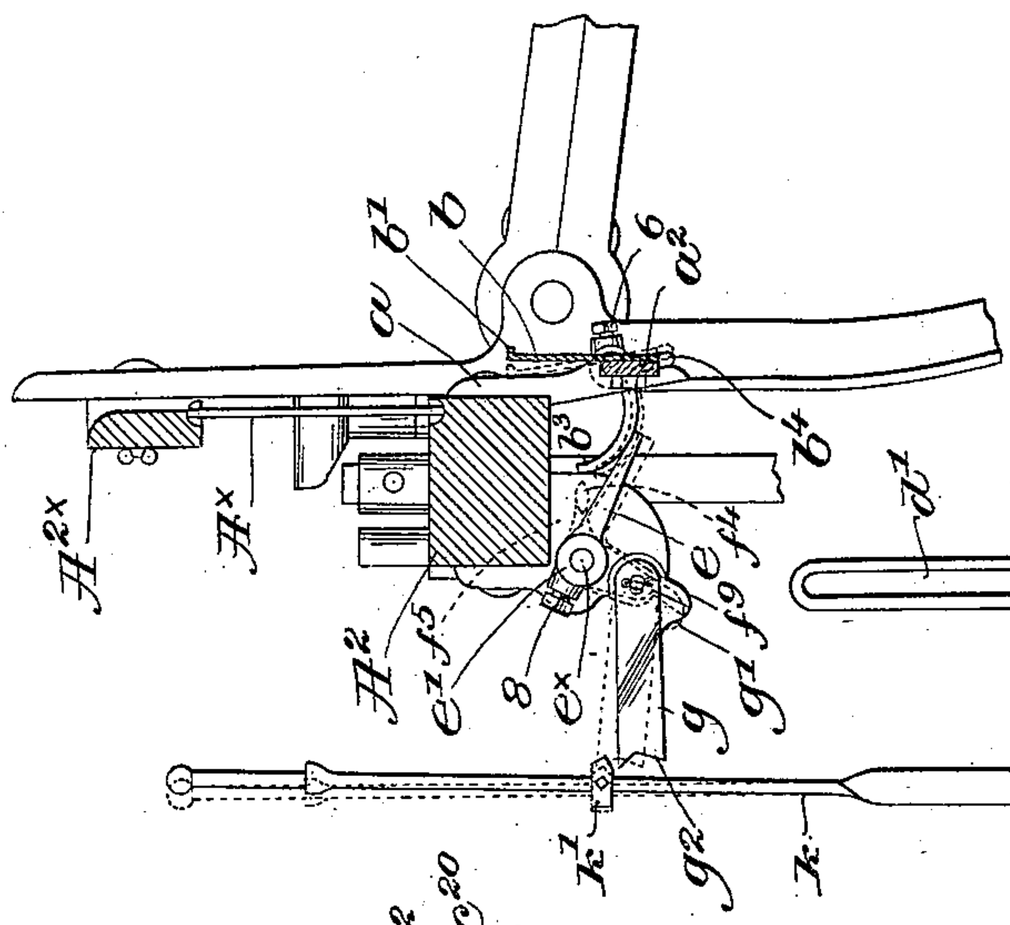

Fig. 5.

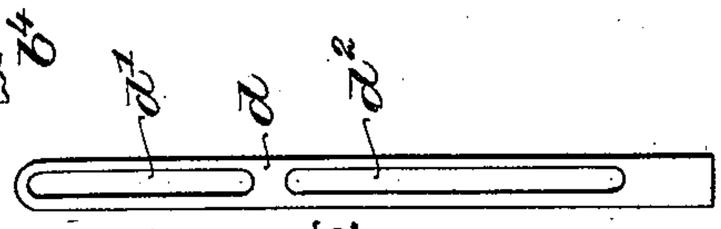

Fig. 7.

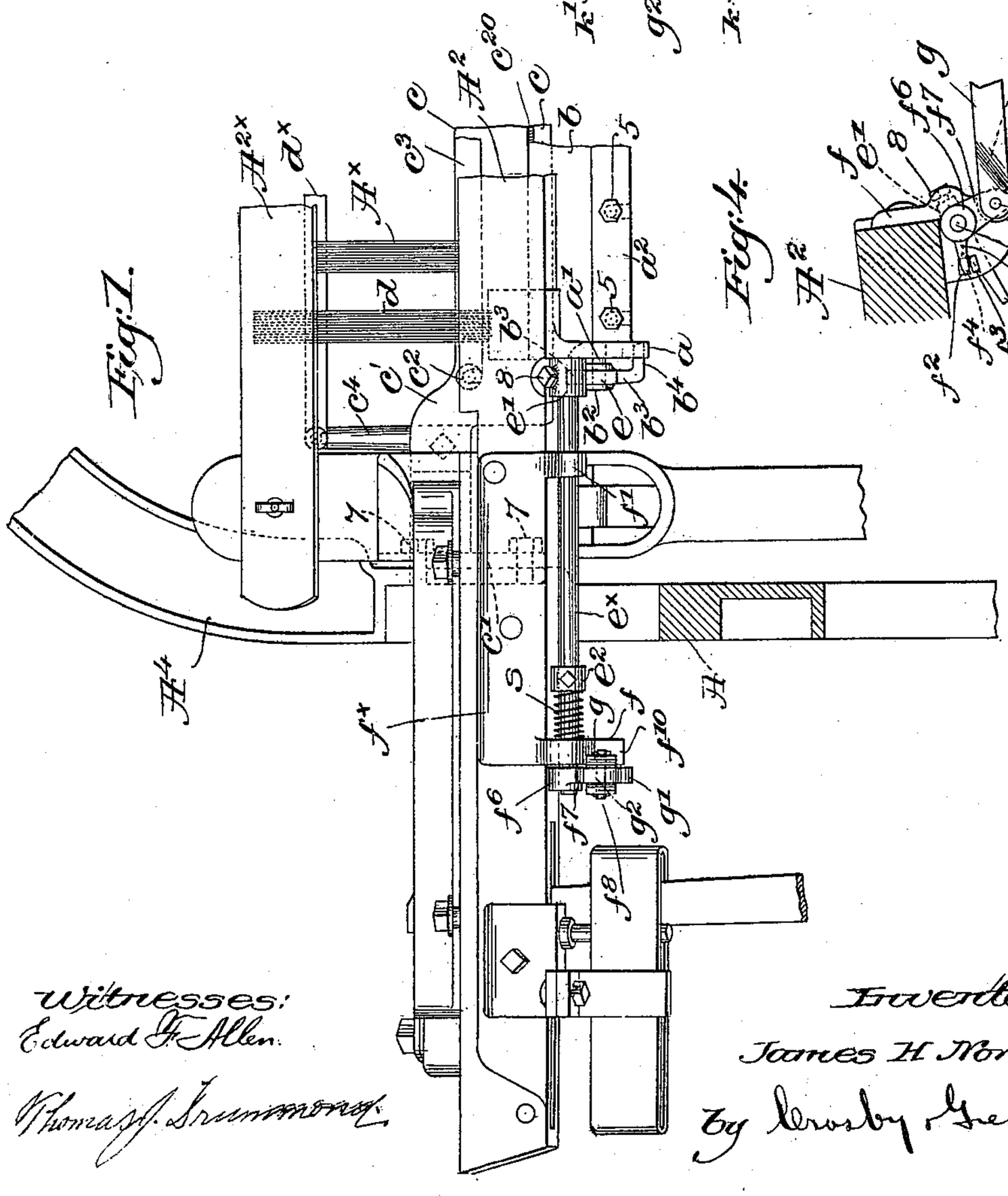

Fig. 4.

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Edward F. Allen.
Thomas J. Drummond.

Inventor:
James H. Northrop
by Crosby & Gregory
Attys.

(No Model.) 2 Sheets—Sheet 2.

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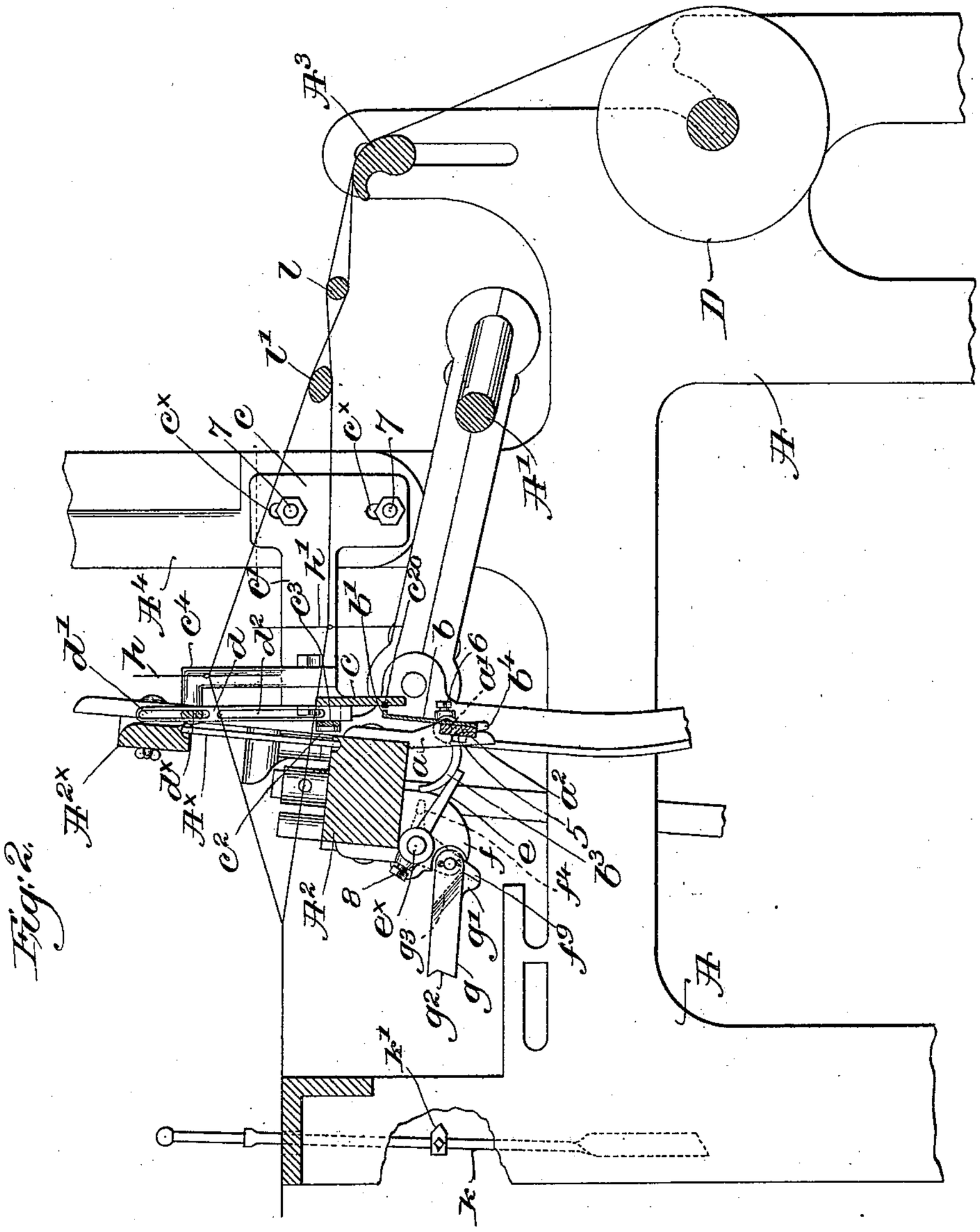

Fig. 2.

Witnesses
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Thomas J. Drummond.

Inventor:
James H. Northrop.
by Crosby Gregory. Attys.

UNITED STATES PATENT OFFICE.

JAMES H. NORTHROP, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO GEORGE DRAPER & SONS, OF SAME PLACE.

WARP STOP-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 554,605, dated February 11, 1896.

Application filed April 16, 1895. Serial No. 545,926. (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.

This invention has for its object the production of an improved warp stop mechanism.

In my invention the detectors, which are normally supported by the warp-threads, are located between the harness mechanism and the lay, so that they are brought as closely as possible to the fell or weaving-point, such position bringing the said detectors nearer the usual breaking-point of the warps, which point is for the most part in front of the harness mechanism. Being located in front of the harness the operator or attendant can readily see any dropped detector, due to warp breakage, and so locate it to repair the warp more readily than if he were required to look through the harnesses to see a dropped detector, as is necessary with the usual location of warp stop mechanism. The location of the detectors in a stationary horizontal plane at the back of the lay makes them free from the frictional action on the warp that would ensue were they carried by the lay.

Figure 1 represents in elevation the front and left-hand end of a sufficient portion of a loom to be understood, with my invention applied thereto, the breast-beam and take-up roll being omitted. Fig. 2 is a side elevation thereof, looking to the left, Fig. 1, and partially in section, showing the harness, the detectors raised by the unbroken lifted warp, and the lay back with the vibrator at the rearward end of its path. Fig. 3 is a similar view of a portion of the mechanism shown in Fig. 2, the lay being forward, the vibrator, the releasing-lever of the stopping mechanism, and the intermediate connections being shown in normal position by full lines and by dotted lines in abnormal position, due to a dropped detector. Fig. 4 is a detail of the connections intermediate the vibrator and stopping mechanism, viewed from the left, Fig. 1, in normal position; and Fig. 5 is a side elevation of one of the detectors enlarged.

The loom-frame A, the crank or lay-shaft A′ therein, having suitable fast and loose pulleys (not shown) to receive a belt under the control of a suitable belt-shipper, the lay A^2 carrying a reed $A^\times$, the reed-cap $A^{2\times}$ the whip-roll A^3, and the shedding mechanism are and may be all as common in looms. A depending bracket *a* is secured to the back of the lay A^2 at each end thereof to form bearings for the projecting journals *a′* of a vibrator-support a^2 extending below the lay the length of the reed, and to which is secured, as by bolts 5, a vibrator *b*. (Shown as a flat plate extended upwardly above the support a^2 and overturned or rearwardly flanged at its upper edge at *b′* for a purpose to be described.) On the projecting end of one of the journals *a′* I have secured, by a set-screw 6, a hub b^2 provided with a feeler b^3, curved forward and upward, and having a laterally-bent depending toe b^4 to form a detent adapted at times to bear against the bracket *a* and limit the rearward movement of the vibrator *b*.

A plate or web *c*, Figs. 1 and 2, in a substantially vertical plane, is extended across the loom substantially the length of the reed, between the harnesses *h h′* and the rear end of the path of the lay, the ends of the said plate or web being shown as secured to or forming part of the inwardly-bent and downturned ends of standards *c′*, preferably adjustably attached to the inner sides of the parts A^4 of the frame by suitable bolts 7 extended through slots $c^\times$ in the standards. The bosses c^2 on the front side of the web *c* support a considerably-narrower plate c^3, opposite but separated from the upper portion of the web *c*, said web and narrow plate c^3 forming the back and front of the detector-guide, open at top and bottom, the front of the guide being open at its lower portion, as clearly shown, to normally permit the flanged top *b′* of the vibrator to enter the lower part of the guide. This guide is located between the harness and the lay, and very near the latter when in its rearmost position, as shown in Fig. 2, and in the guide I have placed a series of detectors *d*, each detector being herein shown as com-

posed of a flat strip or piece of metal having two slots or openings d' and d^2 therein, the detectors being placed side by side in the guide and laterally movable therein. A support $d^\times$, (shown as a flat bar) is extended through the slots d' in the series of detectors to prevent them from falling entirely out of the guide, the said support being secured at its ends to arms c^4, attached to the standard c', the height of the support and the length of the slots d' in the detectors being so arranged that the detectors may be raised out of the path of the vibrator b or dropped thereinto, according to circumstances.

The flat sides of the detectors are adjacent in the guide, and they are adapted to be readily moved up and down therein, the lower part of the front and back longitudinal edges of the detectors resting against the plate c^3 and web c, respectively.

The number of detectors used depends upon the number of warp-threads and also upon the number of threads which will be led through the slot d^2 in and to co-operate with each detector, the detectors being located between the lay and the harnesses h h' of the shed-forming devices (not shown) and which may be of any usual construction.

In practice the warps contained on a warp-beam or equivalent device D, Fig. 2, will be led forward over the whip-roll A^3 around the lease-rods l and l' and to the harnesses, two harnesses only being herein shown. After passing through the eyes of the heddles or harnesses the warp-threads will be led through the slots or openings d^2 in the detectors, passing thence between the dead-spaces of the reed $A^\times$ and to and over the breast-beam. The length of the slots d^2 is such that the warp-threads therein may cross each other and be fully opened or shed below the support $d^\times$, as shown in Fig. 2, and while I have herein shown two warp-threads in each detector-slot d^2 it will be understood that more may be used, according to the particular class of work done, provided the movement of the harnesses is such that one thread at a time in each group will be raised into the upper plane of the shed during its formation, there being as many harnesses as there are threads in each group, the inactive threads remaining in the lower plane of the shed.

In the formation of the sheds the active warp-thread in each group as it rises into the upper plane of the shed acts upon its particular detector at the upper end of the slot d^2 to lift the detector so that its lower end is above the upper edge of the vibrator b, so that when the vibrator is moved to the rearmost end of its path of movement by the backward movement of the lay the said vibrator can move freely into the lower part of the detector-guide, as shown in Fig. 2, the loom then running properly.

Should an active warp-thread about to be lifted into the upper plane of the shed slacken or break, its detector will not be lifted, and the lower end of the detector will stay down in the path of movement of the vibrator b. A dropped or depressed detector acts to turn the vibrator on its journals toward the lay, as shown by dotted lines, Fig. 3, thereby depressing the feeler b^3. The said feeler is adapted to co-operate at such time with a finger e extended into the path of movement of the feeler and forming part of a hub e' adjustably secured by a set-screw 8 to a rock-shaft $e^\times$ mounted in ears f f' on a stand $f^\times$ secured to the front of the lay at one end thereof, the rock-shaft having a collar e^2 thereon between the ears, (see Fig. 1,) and a spiral spring s is interposed between the collar and the ear f, as herein shown, to normally move the shaft $e^\times$ longitudinally to the right, viewing Fig. 1.

The ear f extends below and beneath the lay, as shown in Figs. 2, 3 and 4, the outer side of said ear having therein two slightly-separated depressions or pits f^2 f^3, concentric to the rock-shaft $e^\times$ (see Fig. 4) in the path of and adapted to be entered, the one or the other, by a lateral lug or projection f^4 on the adjacent inner side of an arm f^5, the hub f^6 of which is fast on the end of the rock-shaft $e^\times$ projecting beyond the ear f. The spring s maintains the lug f^4 pressed against the outer side of the ear f in one or the other of said depressions, according to the angular position of the rock-shaft $e^\times$, forming a friction locking device for said shaft. A short arm f^7 extends downwardly from the hub f^6 and is straddled by the forked end of a dagger g pivoted to the arm at f^8 and having on its under side a stop g' to bear against the extended tip f^9 of the arm and thereby limit the downward movement of the dagger, the tip and stop normally supporting the dagger in full-line position, Fig. 3, and as also shown in Figs. 1, 2 and 4. The ear f is cut away at f^{10} to avoid interference with the inner end of the dagger g, and the latter is preferably notched at its outer end, as at g^2, to at times engage a preferably adjustable collar k' on the releasing-lever k of the stopping mechanism, of any usual and well-known construction.

As shown by dotted lines, Figs. 1 and 4, the dagger is beveled at g^3 between its forked ends to permit it to turn upward on its pivot f^8 for a short distance.

When the loom is running properly the parts are in the position shown by full lines, Figs. 1 and 3, the friction locking device holding the rock-shaft and its attached parts in inoperative position, the path of movement of the outer end of the dagger g being below the collar k' on the releasing-lever k when the lay is forward. (See Fig. 3.) The finger e at such time bears against the feeler b^3, and the vibrator b and its flange b' are free to enter the detector-guide in the back stroke of the lay, as in Fig. 1, all of the detectors d being lifted. A dropped detector, however, will encounter the flange b' of the vibrator, the web c supporting the rear edge of the detector when the lay moves back, and the vibrator will be

turned into dotted-line position, Fig. 3, depressing the curved feeler b^3, as described. The depression of the feeler turns the finger e into its dotted-line position, thereby partially rotating the rock-shaft $e^\times$, withdrawing the lug f^4 from the depression f^2 in the ear f and moving it into the depression f^3, the spring s permitting sufficient longitudinal movement of the rock-shaft for such purpose. This rotative movement of the rock-shaft elevates the outer end of the arm f^7, causing its tip f^9 to act against and lift the dagger g, the said parts assuming thereby the position shown in dotted lines, Fig. 3, so that the forward movement of the lay will bring the dagger into engagement with the stop k' of the releasing-lever k and knock it out from its usual holding-notch, permitting the lever to fly outwardly in the usual manner and moving the belt-shipper (not shown) to stop the loom.

It will be seen that the connections between the detectors and the stopping mechanism will be moved into operative position at the first back stroke of the lay after a detector is dropped, and that the next forward stroke of the lay causes the stopping mechanism to stop the loom. All the intervening devices which thus control the stopping mechanism by the position of the vibrator are carried by the lay and are very simple and efficient, as well as rapid in their operation.

The web c is preferably grooved longitudinally in its inner face, as shown in Figs. 1 and 2, to receive therein a metal strip c^{20}, milled along its front side, which projects slightly beyond the face of the web, to aid in keeping the detector from being twisted when acted on by the vibrator.

The support $d^\times$ prevents any of the detectors from falling out of the bottom of the guide in case all the threads passed through its slot or opening d^2 should break, and in case of a break the attendant can move the detectors laterally at each side of the dropped detector the more readily to lift it and connect the ends of the broken thread or remedy the defect therein if due to slackness.

The dagger g has its front end lifted into position to strike the projection k' as the lay completes its back stroke, and as the lay is again moved forward the dagger strikes the same projection k', but the force of the blow of the dagger against the projection is sufficient to first cause the movement of the dagger to be arrested long enough to effect the turning of the rock-shaft $e^\times$ far enough to enable the finger e in turn to act on the feeler b^3 and reset the vibrator. The latter, in the forward movement of the lay, having retired from the dropped detector and the vibrator having been reset, the further movement of the lay and dagger knocks the lever k out of its usual holding-notch. The loom having been stopped, the operator lifts the dropped detector and mends the warp, and when the lay moves back again the stopping mechanism is in proper position to act again without any necessity for the attendant to pay any attention to it.

I may incorporate with the loom containing my improvements any well-known form of mechanism for automatically effecting the stopping of the loom or to transfer the driving-belt from the fast to the loose pulley.

By using separate slots in the detectors for the support $d^\times$ and for the warp-threads I obviate all chance of the threads and support interfering the one with the other.

By locating the detectors between the lay and the harness I can use a large number of harnesses in the space between the detectors and the lease-rods.

If the detectors should be placed back of the harnesses, it is evident that any change in the number of harnesses would necessitate rearrangement and resetting of the detectors and their co-operating mechanism.

I claim—

1. In a loom, the following instrumentalities, viz:—harness to form sheds, a lay, a series of slotted detectors located between the harness and the lay, a support extended through slots in the detectors, a guide for the front and back edges of the detectors, a vibrator mounted on the lay and adapted to engage any dropped detector when the lay is back, and stopping mechanism for the loom controlled by the said vibrator, substantially as described.

2. In a loom, the following instrumentalities, viz:—harness to form sheds, a lay, a series of detectors located between the harness and the lay, a stationary support for the detectors, a vibrator on the lay to engage a dropped detector when the lay is back, a stopping mechanism for the loom, and devices movable with the lay, intermediate the stopping mechanism and the vibrator, and controlled by the latter, to stop the loom when a dropped detector is engaged by the vibrator, substantially as described.

3. In a loom, the following instrumentalities, viz:—harness to form sheds, a lay, a series of detectors located between the harness and the lay and independent of the latter, a vibrator to engage a dropped detector, a feeler moved by said vibrator into operative position at such time, a dagger, and connections between the feeler and dagger and including a finger to actuate the dagger and lying in the path of the feeler when the latter is operative, all carried by the lay, and a stopping mechanism for the loom, operated by the dagger when moved into abnormal position by engagement of the said feeler and finger, engagement of a detector by the vibrator in the back stroke of the lay moving the dagger into position as described to operate the stopping mechanism at the next forward stroke, substantially as described.

4. In a loom, the following instrumentalities, viz:—harness to form sheds; the lay; a

rock-shaft and a spring-controlled locking device therefor, a dagger moved by said rock-shaft, a vibrator to rotate the latter, and connections intermediate said rock-shaft and vibrator, all carried by the lay; a series of detectors located between the harness and the lay, lifted out of the path of the vibrator while the warp-threads are intact; and a stopping mechanism for the loom, controlled by the dagger, engagement of a dropped detector by the vibrator moving the dagger into operative position, 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,
WALTER HASTINGS.