

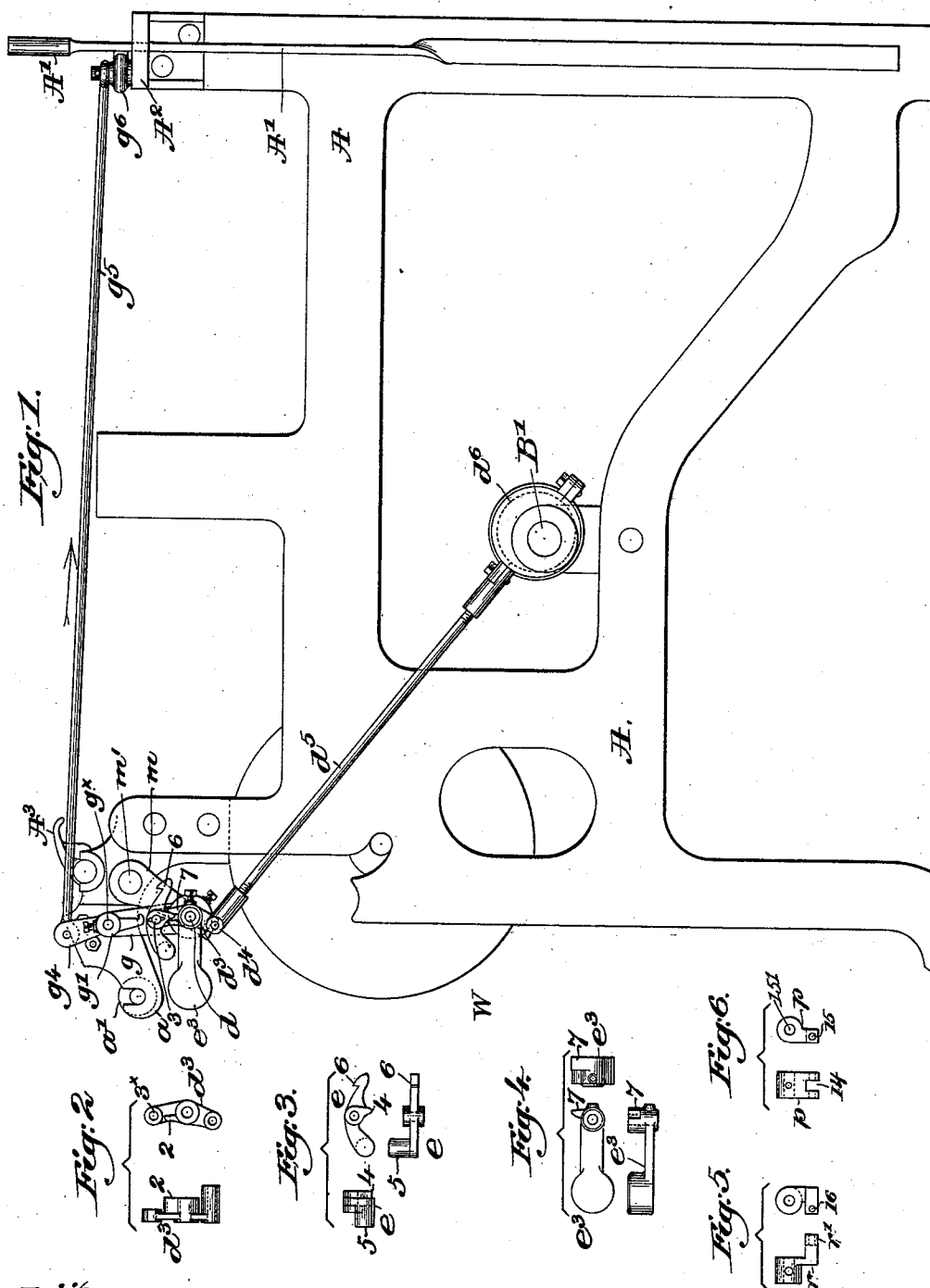
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3 Sheets—Sheet 1.

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

No. 540,596.

Patented June 4, 1895.



Witnesses.
A. C. Harmow.
Thomas J. Drummond

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

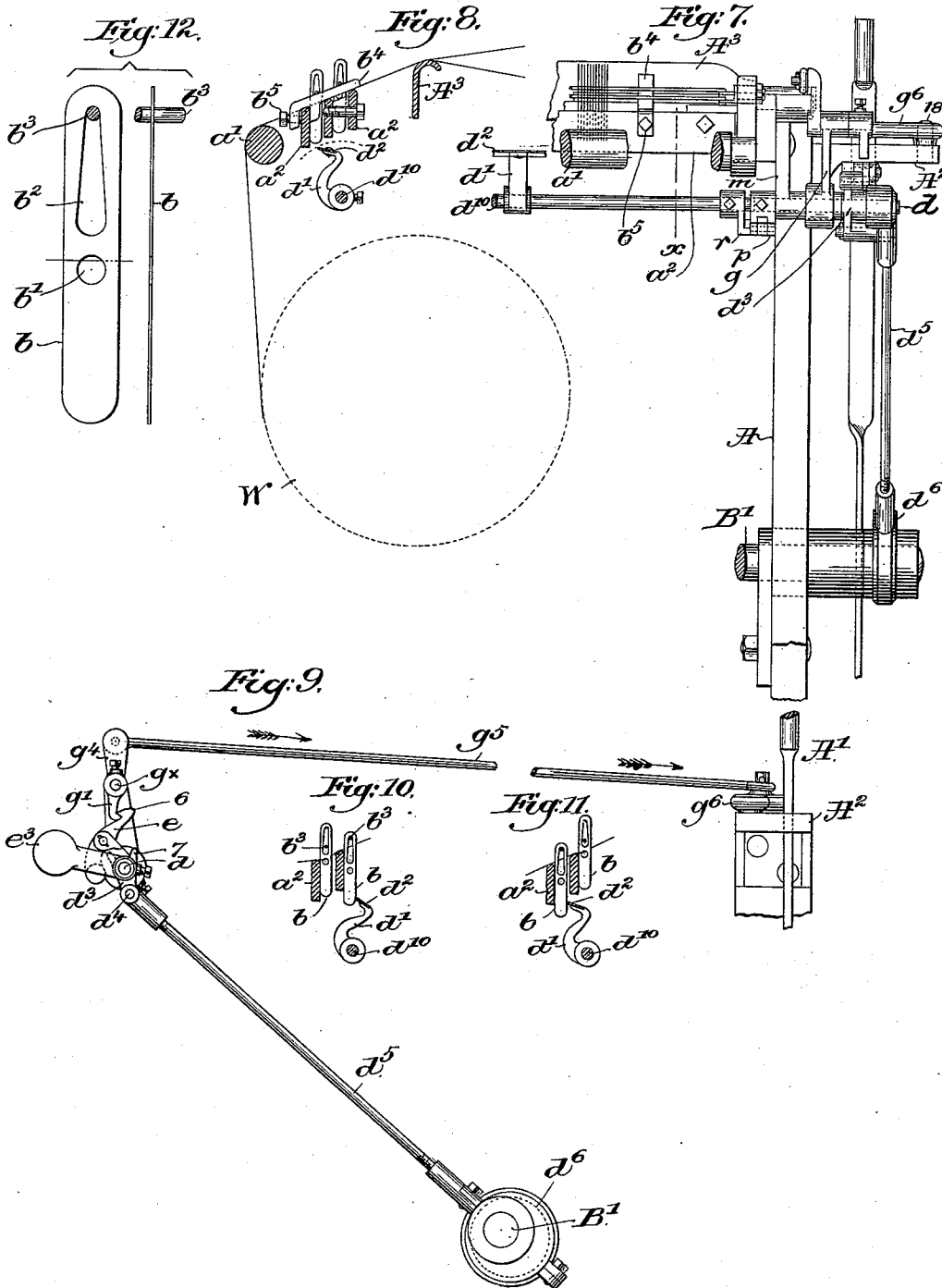
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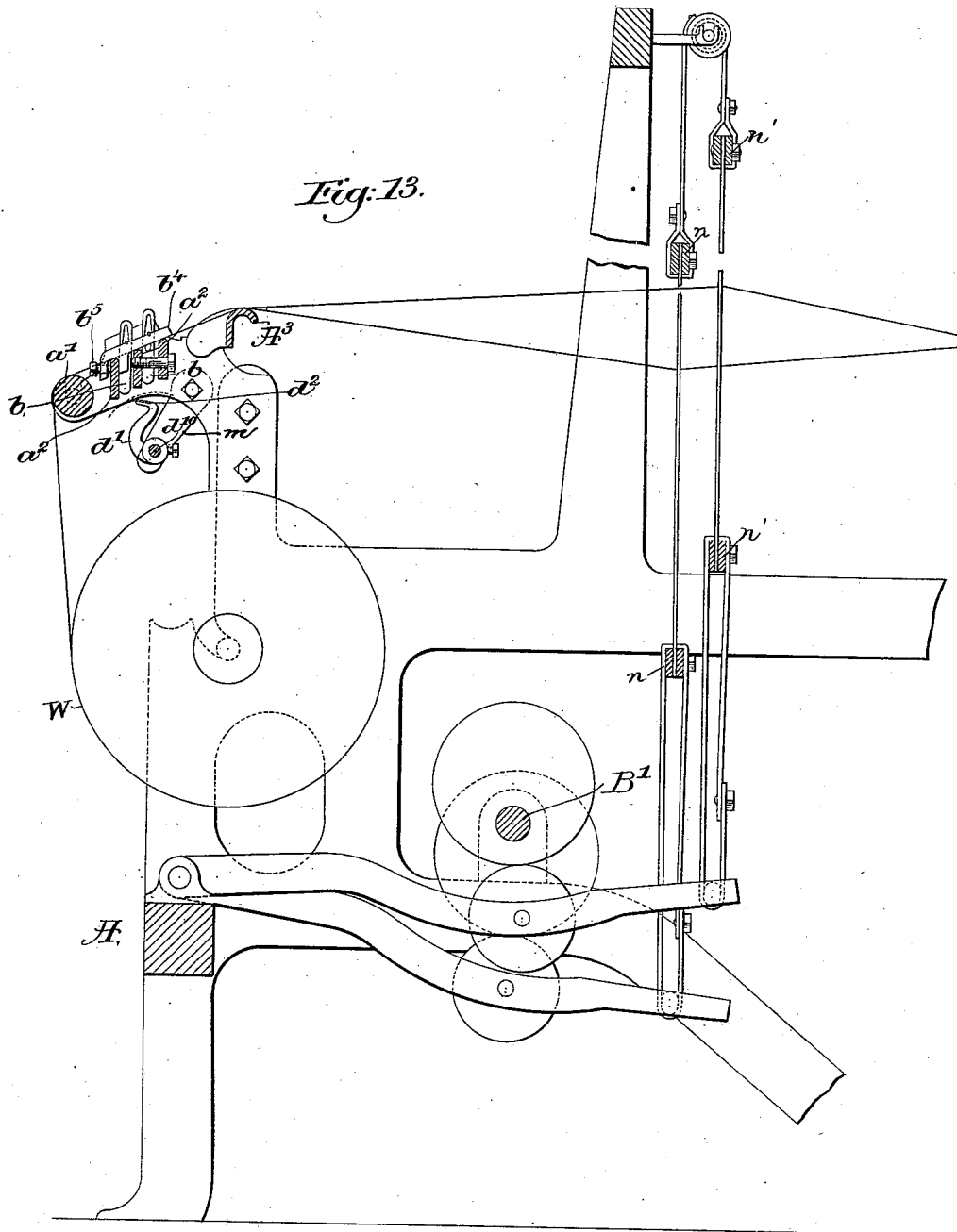
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Patented June 4, 1895.



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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. 540,596, dated June 4, 1895.

Application filed June 28, 1894. Serial No. 515,967. (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
5 Warp Stop-Motions for Looms, of which the following description, in connection with the accompanying drawings, is a specification, like letters and numerals on the drawings representing like parts.

10 This invention has for its object to improve that class of stop motion wherein the breaking of a warp thread determines the stopping of the loom.

In ordinary looms containing a warp-beam
15 it is customary to place in the warp between the warp-beam or whip-roll on one side and the harness mechanism, what are known as "lease rods," and sometimes the up-and-down
20 movements of the whip-roll are utilized to operate let-off devices, the whip-roll in all cases serving as a rest or support for the warp-threads.

Attempts have been made to apply a stop-motion device to the warp-threads between
25 the harness mechanism and the whip-roll, but the drop-plates or wires used in that position must, it will be obvious, partake of the movement imparted to the warp-threads as the harness mechanism operates to form sheds,
30 and such movement of the warp-threads causes them to be rubbed or drawn across the drop-plates or wires, which results in breaking the warp-threads rapidly, and, it will be understood that the rubbing back and forth
35 of a thread across the edge of a plate will cause it to break even when the thread is subjected to but comparatively little strain, and hence it becomes of the greatest importance that the drop plates or wires used should be
40 so supported as to prevent any injurious rubbing or chafing of the threads by the drop-plates or wires during the shed forming operation.

In my experiments to provide stop motion
45 mechanism for modern rapidly operating looms, I have devised an apparatus which is entirely separate from the harness mechanism, an apparatus in which the drop blades used are so located that they are not raised
50 and lowered by the action of the harness when opening the sheds my improved drop-plates

being applied to the warp-threads at the rear of the usual whip-roll, in a position where they cannot jump or rise and fall and thus abrade the warp-threads during the shed forming operation. It will be understood that the whip-roll is so located at the rear of the loom that it stands substantially over the warp-beam, and in that position any motion imparted to the warp by the harness mechanism does not extend back beyond the whip-roll.

I have devised drop plates which are sustained by the warp threads near the usual whip roll and preferably back of said whip
65 roll and between it and the warp roll located above the warp beam, the said drop plates having warp eyes and slots, the latter to co-operate with suitable guide rods crossing the loom. Below the drop plates I have mounted
70 a vibrator which is adapted to strike any one of the several series of drop blades which may happen to descend by the breakage of the warp within the range of movement of the vibrator.

The back of the loom is provided with a
75 rock-shaft to which is connected a rod extended to a knock-off lever located at the front of the loom and close to the usual shipper handle, the release of which effects the stopping
80 of the loom through usual belt-shipping devices.

Figure 1, in side elevation, shows a sufficient portion of a loom with my improvements added to enable my invention to be understood. Figs. 2 to 6, inclusive, show details of particular parts or pieces to be hereinafter described; Fig. 7, a partial rear elevation of the parts shown in Fig. 1; Fig. 8, a sectional detail parallel to the warp-threads, chiefly to show the drop-plates and the vibrator, the line of section being in the dotted line x , Fig. 7. Fig. 9 shows some of the parts of Fig. 1, but in a different position, the rod d^5 having been moved in the direction of the arrow after resting the bar d^2 . Figs. 10 and 11 are detail views to be referred to, illustrative of the operation of the drop-plates. Fig. 12 shows a drop-plate enlarged, and Fig. 13 is a sectional detail showing some of my warp stop devices
95 in use with a harness mechanism of an ordinary loom.

The loom frame A, the shipper handle A', the shipper handle holding plate A²,—it in practice having a usual slotted notch—, the whip roll A³, the warp beam W, and cam shaft B' are and may be all as common in looms now in use.

I have provided the loom frame at its rear end with suitable stands *a* having suitable bearings for a warp roll *a'* and for the journals of the whip roll A³, the latter, in practice, being supported in a yielding manner and connected operatively with the let-off mechanism, said connections and let-off mechanism being of any usual or suitable well known construction, and consequently not herein necessary to be shown. The stands *a* contain between them, in this instance of my invention, three like bars *a*², said bars being located, it will be seen, between the warp roll *a'* and the whip roll, and in the spaces between these bars I have placed a series of drop plates *b*, one for each warp thread, said drop plates having each a proper warp eye *b'* and an elongated slot *b*², the slots receiving through them guide rods *b*³ suitably mounted on or with relation to said stands, the said guide rods being, if desired, supported midway their ends by suitable rests *b*⁴, see Figs. 7 and 8, held in place by suitable set screws *b*⁵.

The warp threads are led from the warp beam W over the warp roll *a'*, thence through the warp eyes *b'* of the drop plates *b*, over the whip roll,—which is and may be of any usual or suitable construction common to looms—, and thence through the eyes of the heddles carried by the harness frames *n*, *n'*, which may be of any usual construction and be actuated in any usual or suitable manner to form sheds.

It will be understood in my invention that the warp threads between the whip roll and the warp roll which supports them have no other movement than that in a substantially right-line between one and the other roll, the slight vibration of the whip roll in use not effecting any materially vertically movement of the warp threads back of the whip roll, and consequently in the formation of the sheds the warps, at the points where the drop plates hang upon them are not moved up and down, nor are they crossed one past the other, and I have, therefore, been enabled practically to do away with all backward and forward rubbing or sawing of the warp threads across or with relation to the edges of the warp eyes made in the drop plates, and I have, therefore, been enabled to reduce to the minimum the tendency of the warp threads to break.

To effect the stopping of the loom in case the warp threads happen to break, I have located under the drop plates a vibrator, it, in this instance of my invention, being shown as a bar *d*² connected to arms *d'* of a rock-shaft *d*¹⁰, the said rock-shaft having fast upon it near one end, see Fig. 7, a block *r*, shown separately in Fig. 5, having a projection *r'* provided with a pin hole 16. Substantially

in line with this rock-shaft *d*¹⁰ is a short rock-shaft *d* having secured to its end a block *p*, see Fig. 7, said block being shown detached in Fig. 6, it having a notch 14 and a pin hole 15, and a bore 151 the notch receiving the projection *r'* on the block *r*, the said two blocks being jointed together by a pin inserted through the holes 15 and 16 the bore 151 receiving the end of shaft *d*. The portion *d* of the rock-shaft referred to has its bearing in a stand *m* connected to the stand *a* by a suitable bolt *m'*, said stand having a sleeve-like hub upon which is properly secured an arm *g* having a bearing hub in which is mounted loosely a short rock shaft *g*^x provided at its outer end with a catch *g'*, the inner end of said rock-shaft having an arm *g*⁴ to which is jointed loosely one end of a rod *g*⁵, in turn jointed loosely, preferably to a pin, on a knock-off lever *g*⁶ pivoted at 18 upon the usual notched plate A². The portion *d* of the rock-shaft has also mounted loosely upon it a lever *d*³, shown separately in Fig. 2, said lever having a hole at one end for the reception of a pin *d*⁴ by which to join it loosely to a connecting rod *d*⁵, having, as herein shown, at its other end an eccentric strap which surrounds an eccentric *d*⁶ fast on the usual cam shaft B' of the loom. The lever *d*³ has a toe 2, and at its upper end it has a hole 3^x, see Fig. 2, for the reception of a stud 3, upon which is pivoted the overbalanced latch *e*, shown separately in Fig. 3, having a toe 4 and a hook 6. The outer end of the portion *d* of the rock-shaft has fixed to it a weighted arm *e*³, shown detached in Fig. 4, said arm having a toe 7, said toe normally acting against the toe 4 of the latch *e* and pressing the said toe 4 against the toe 2 of the lever *d*³, said toe 4 being so held between the toes 7 and 2 that it will remain in the position indicated by Fig. 1, during the rocking of the rock-shaft, but in case the bar *d*² of the vibrator meets a drop plate, as in Figs. 10 or 11, and the movement of the rock-shaft *d*¹⁰ or its portion *d* is obstructed, the movement of the weighted lever *e*³ is also at the same time obstructed, but the lever *d*³ continues to move, and in its movement the toe 4 of the latch *e* is carried away from the toe 7 of the weighted lever, thus enabling the overbalanced latch *e* to turn upon the stud 3 supporting it as in Fig. 9, far enough to cause the hook 6 of said latch to rise and engage the catch *g'* before described, said latch during its further movement by or through the eccentric *d*⁶ turning the rock-shaft *g*^x, and thereby moving the connecting rod *g*⁵ in the direction of the arrow on it in Fig. 1, see also Fig. 9, where the said latch is in engagement with the said catch, causing said connecting rod, in engagement with the knock-off device *g*⁶, to act against the shipper handle *a'* and release it from the usual notch in the holding plate *a*², and cause said shipper handle in its movement to effect, in usual manner, the stopping of the loom. The rock-shaft is divided into two parts *d*¹⁰ and *d*, as

described, more especially to enable the portion d^{10} and the attached vibrator to be taken out of the loom temporarily when a new warp is being mounted therein, but this invention is not limited to making the actuating shaft for the vibrator in two parts.

The bar d^2 is represented as inclined in order that should a drop plate fall behind it, the said bar, on its return movement toward the lay, may strike and lift said plate sufficiently to allow the bar to pass under it, the bar engaging said plate properly at its next stroke toward the rear of the loom. This invention is not, however, limited to inclining this bar, for it will be obvious that if the bar was made of sufficient width to never pass wholly beyond the drop plates, that the said bar could not be obstructed in its return movement toward the lay, and consequently the bar might be flat or horizontal.

In Fig. 12 it will be noticed that the slot b^2 of the drop plate b is narrowest at the top.

In the running of the loom when the warp threads are not broken, the rods b^3 normally occupy a position in the larger parts of the slots, as at the right in Fig. 10, thus allowing the drop plates to drop freely when a thread breaks. The contraction of the slot b^2 is also of importance because when a drop plate drops, the inner end of the slot will engage the guide rod b^3 , and the drop plate will thereby be held firmly against twisting strains to which it is subjected when being acted upon by the bar d^2 of the vibrator.

Figs. 1 and 13 show the parts in the position they will occupy when the loom is running, and weaving is being done with all the warp threads unbroken, and during such time the rock-shaft carrying the vibrator will be oscillated back and forth continuously, and the hook 6 of the latch will pass just below the lower end of the catch g' referred to, and at such time the drop plates, held up by the warp threads, will not be in the path of movement of the vibrator; but in case a warp thread breaks and a drop plate descends, or if said thread should be unduly slack so that the drop plate descends as shown in Figs. 10 and 11, then the vibrator, in its movement, will strike the lowered drop plate and will be stopped, the weighted arm e^3 being also stopped; but as stated, the arm d^3 will continue its movement to effect the release of the latch and enable the toe to tip about its fulcrum and engage the catch g' and effect the release of the shipper handle, as before described.

It will be seen that the drop wires are arranged in two banks, and that they are separated properly by the plates a^2 , so that they are kept in rows, and they are prevented from dropping entirely below said plates and to the floor by means of the guide rods b^3 .

Believing myself to be the first to locate a series of drop plates back of the whip roll, viewing the loom from its front, this invention is not limited to the exact form of vibra-

tor shown, nor to the exact devices shown for actuating the said vibrator, nor to the exact devices shown between the vibrator shaft and the knock-off lever or device g^6 , as it will be obvious to one skilled in the art, that the particular construction of these devices might be variously modified by only the skill of the mechanic, and without the exercise of invention.

By the expression "drop plate" I mean to include any wires or equivalents shaped and adapted to operate as hereinbefore described.

I have designated the device A^3 as the whip-roll, the usual term employed to designate the device which supports the warp substantially above the warp-beam, and from which the warp passes to the harnesses of the shed-forming mechanism, and by the term whip-roll I mean to include any usual roll or bar, a bar being shown in the present instance.

In my invention the whip-roll must be so located with relation to the warp-beam that the warp-threads going into the upper plane of the shed will not be raised and lowered so as to be removed from and then again come in contact with the whip-roll, and if the whip-roll or any warp-support should be located so near the harness mechanism as to enable the warp-threads entering the upper plane of the shed to break their contact with said roll or support, then the drop-plates or wires could not be practically used between said whip-roll or warp-rest and the harness mechanism.

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

1. A series of slotted drop-plates resting on individual warp-threads, and a guide-rod or bar extended through the slots in said plates and sustaining them in vertical position, said slots being narrower in their upper than their lower halves, for the purposes described.

2. A series of drop-plates having warp eyes, and a guide for said plates, combined with a vibrator having a bar inclined rearwardly and upwardly relatively to the edges of said drop-plates, to pass under and raise a drop-plate should one fall into its path when the bar is moving backwardly, substantially as described.

3. A shipper handle, a retaining device for the same, a knock-off device to release the shipper handle, a connecting rod, and a rock-shaft having an arm to which said connecting rod is attached, and a catch, combined with a series of drop plates, a latch, means to move it, and a device to release said latch in order that it may engage said catch upon the dropping of a drop plate, 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,
R. A. COOKE.