

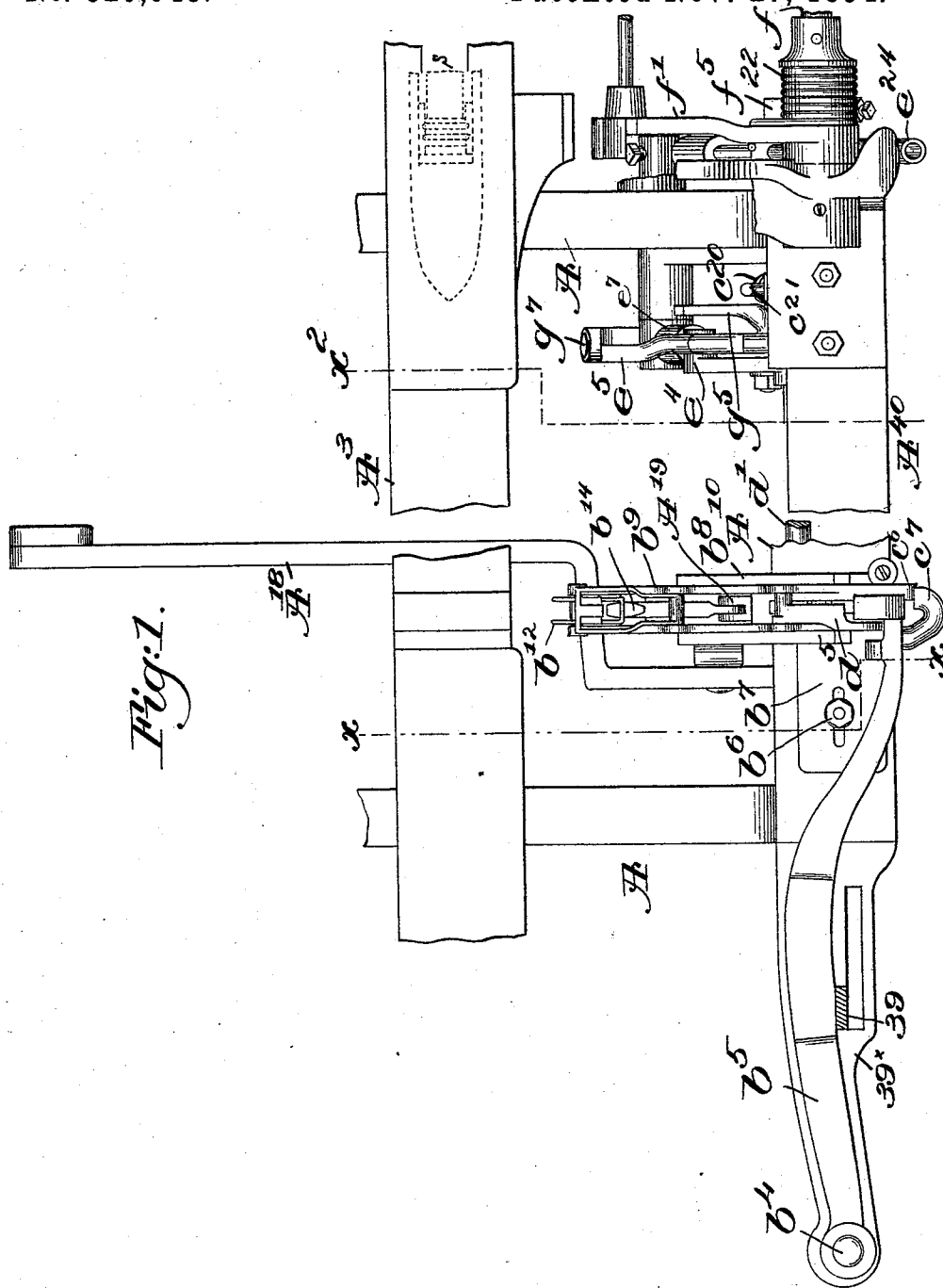
(No Model.)

6 Sheets—Sheet 1.

J. H. NORTHROP.
LOOM.

No. 529,943.

Patented Nov. 27, 1894.



Witnesses.

Fred S. Greenleaf.
Thomas J. Drummond

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

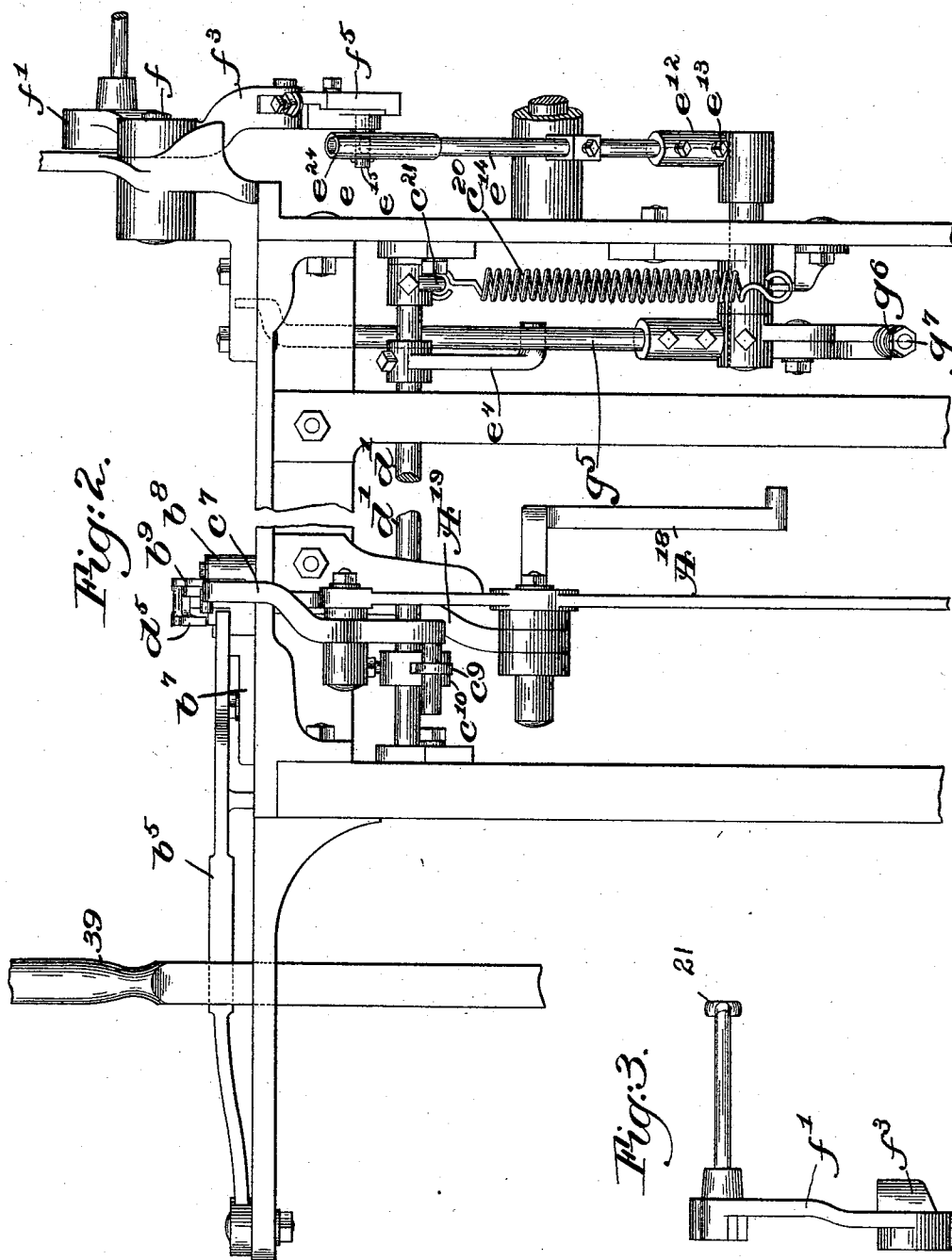
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6 Sheets—Sheet 2.

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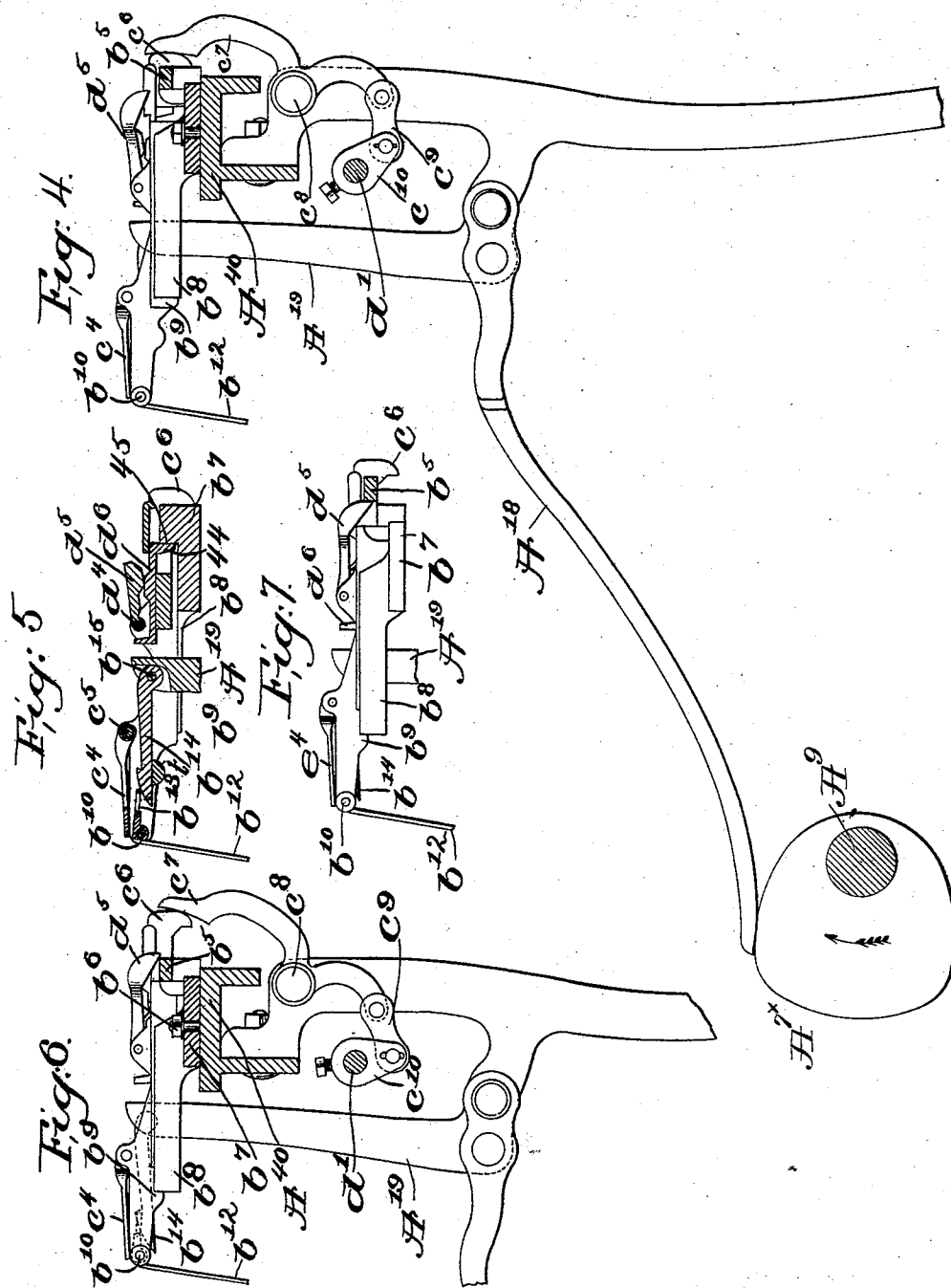
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J. H. NORTROP.
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6 Sheets—Sheet 3.

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Patented Nov. 27, 1894.



Witnesses
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(No Model.)

J. H. NORTHROP.
LOOM.

6 Sheets—Sheet 4.

No. 529,943.

Patented Nov. 27, 1894.

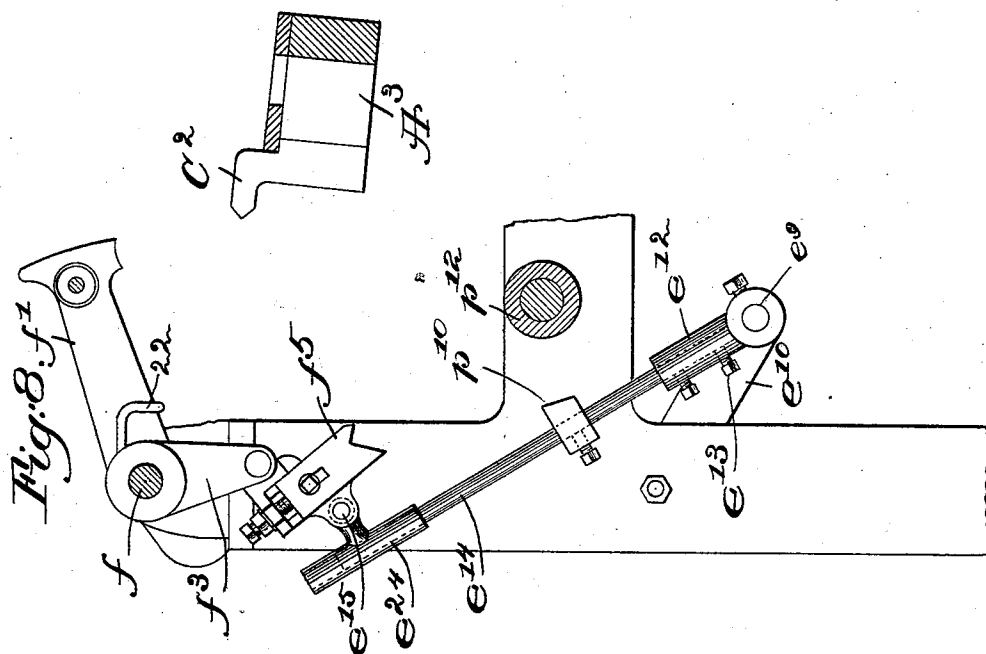
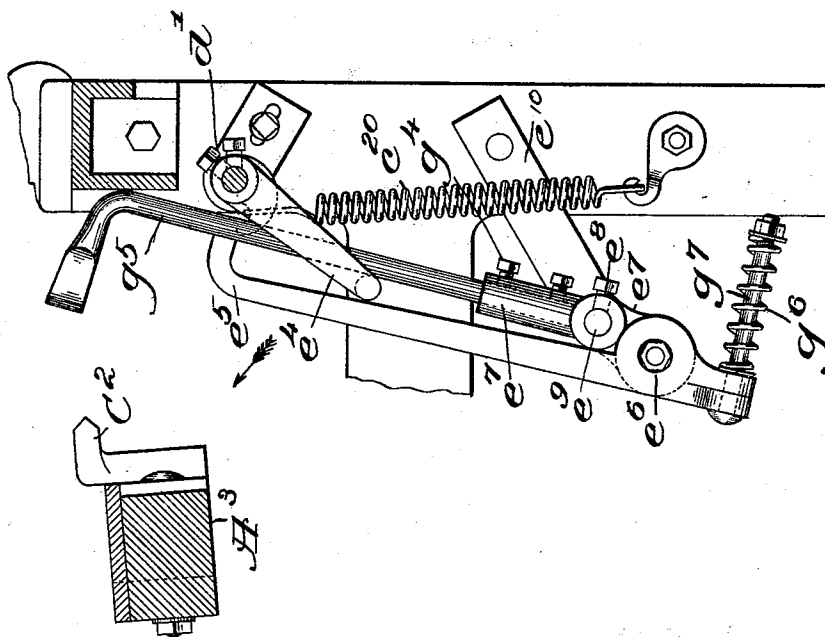


Fig. 11.



Witnesses.
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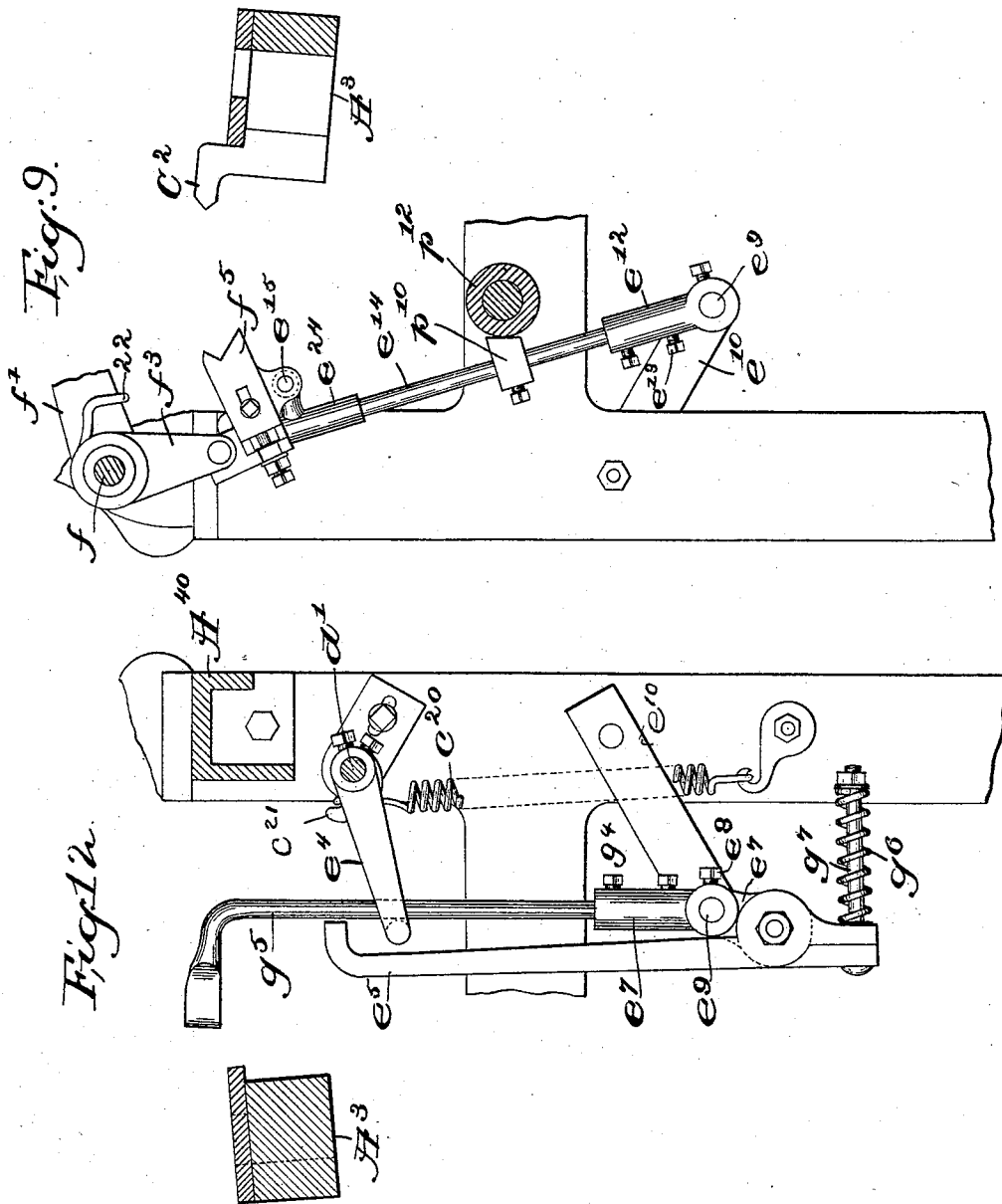
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6 Sheets—Sheet 5.

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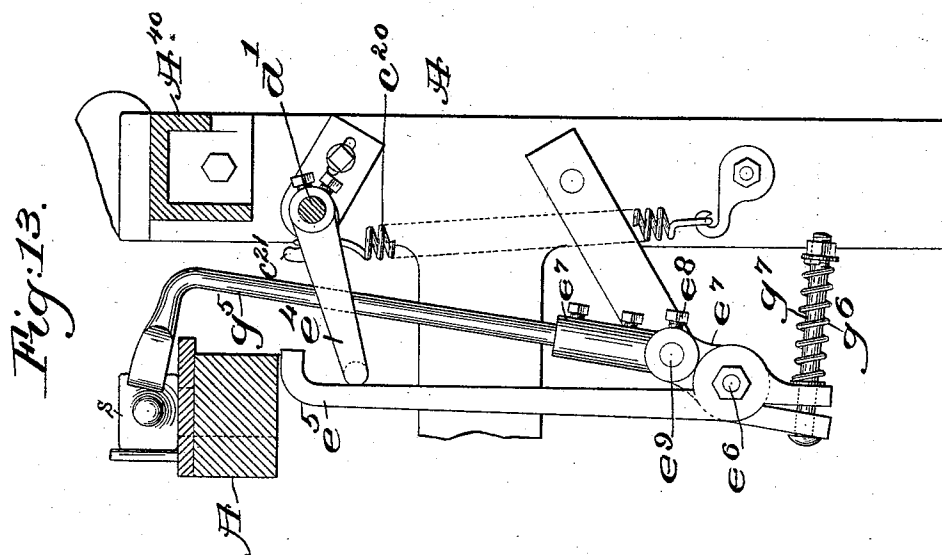
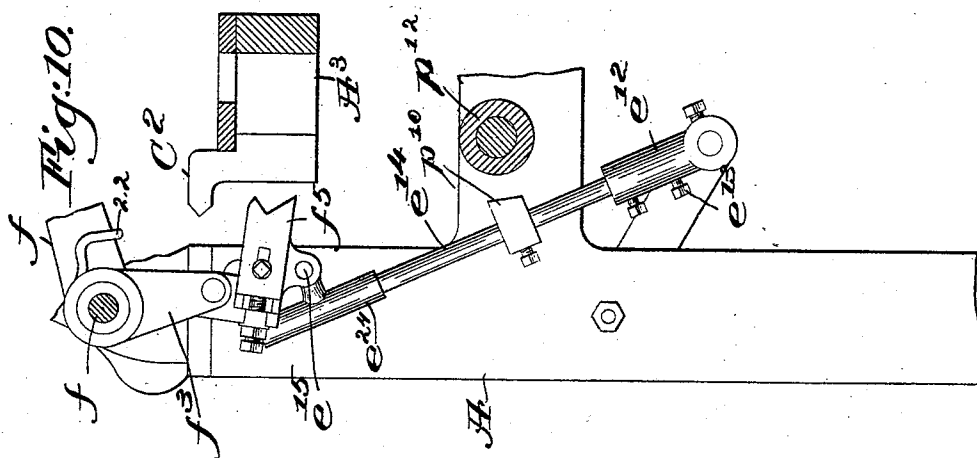
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J. H. NORTROP.
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6 Sheets—Sheet 6.

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Thomas J. Drummond

Inventor:
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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. 529,943, dated November 27, 1894.

Application filed November 6, 1893. Serial No. 490,078. (No model.)

To all whom it may concern:

Be it known that I, JAMES H. NORTHROP, a subject of the Queen of Great Britain, residing at Hopedale, county of Worcester, 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.

In that class of loom represented in United States Patent No. 454,810, dated June 23, 1891, wherein provision is made for automatically supplying a shuttle with a bobbin to replace a bobbin when the thread with which the bobbin is threaded has been broken or exhausted, and wherein the thread of the newly supplied bobbin is automatically threaded into the delivery eye of the shuttle, it sometimes happens that the thread of the bobbin last inserted in the shuttle, fails to be threaded into the delivery eye thereof at the first shot of the shuttle through the shed, and in such event, the weft fork mechanism acts and causes the full bobbin first put into the shuttle to be ejected before its thread has been at all used, and the loom will continue to run, and will, at every other pick, move the pusher, take a bobbin from the hopper or other source of supply for bobbins and put it into the shuttle, this operation being continued until the thread from the bobbin has been left in the shed in suitable position to tip the filling fork, and if the filling fork is not tipped by the weft the operation will continue until all the bobbins have been taken from the hopper or other source of supply for bobbins, and during such operation no cloth will be woven.

The loom referred to will continue to run even after the bobbins have been taken from the hopper, for the weft fork mechanism instead of acting as in ordinary looms to effect the stopping of the loom when the weft fails in the shed, is made instrumental only to determine the time at which the pusher shall be actuated to put a bobbin into the shuttle.

In ordinary looms for weaving cotton cloth, whenever the weft fails, the weft fork is not tilted, and consequently the tail piece of the

weft fork is caught by the usual weft hammer and the weft fork slide is moved outward toward the front of the breast beam to effect the stopping of the loom through a knock-off lever and usual controlling mechanism, not shown, of which there are many variations in use, all of which operate in substantially the same manner, but as above stated it will be remembered that the weft fork mechanism in said patent performs a very different duty.

In another application, Serial No. 414,831, filed December 12, 1891, I have shown a loom which is intended as an improvement upon the loom shown in Patent No. 454,810, one of the essential features of said application being a rotary bobbin feeder, it being employed instead of a hopper.

The invention to be herein described is applicable not only to the loom referred to in the said patent, but in the loom referred to in said application.

This present invention, as does the application referred to, contains appliances whereby the weft fork not only controls the movements of the pusher, but also effects, by its movements, the stopping of the loom under circumstances to be hereinafter more fully described; and so also herein, as provided for in said application, the weft fork mechanism has been so devised that it will not operate the knock-off lever and stop the loom until after more than one beat of the lay following the failure of the weft, the first movement of the weft fork slide after the absence of the weft being utilized to effect what I denominate as a primary movement of the weft fork slide, a movement, however, sufficient in extent to put into position the parts upon which depend the movement of the pusher. In case, however, the weft should fail at one shed and a bobbin should be inserted into the shuttle, and the weft from said bobbin when the shuttle is thrown across the shed should fail to be left opposite the weft fork, then in such case the weft fork for a second time will not be tilted, and the slide bar carrying it will be given an additional or secondary movement sufficient to knock off or stop the loom; but in case the

weft from the new bobbin last inserted in the shuttle should be presented in position to tilt the weft fork, then the movement of the weft-hammer will restore the weft fork mechanism into its normal condition and enable the loom to be run. It also sometimes happens in the loom referred to that the shuttle fails to be in just the proper position in the shuttle-box at the time that the pusher should act to push the fresh bobbin into the shuttle, and in case this occurs some of the working parts are broken or injured. In said application I have described devices for positioning the shuttle in case the shuttle rebounds in the shuttle-box, but herein I have invented appliances whereby for the first time the movement of the pusher, to put a bobbin into the shuttle in the shuttle-box, will be stopped, and can be made only when the shuttle is in the shuttle-box in proper position to receive the bobbin. To effect this movement, I have in this present embodiment of my invention employed a feeler which contacts with the shuttle, provided the same has rebounded from the shuttle-box and is out of its proper position with relation to the pusher, said feeler, by its contact with the shuttle, operating through suitable intermediate connections to put a dog or device carried by or connected with the pusher, out of position with relation to a bunter or other equivalent device carried by the lay and employed to strike a blow which results in a depression of the pusher, and consequently the pusher is not depressed.

I have chosen to illustrate my invention hereinbefore referred to as applied to that particular form of loom adapted to automatically supply a shuttle with bobbins, which is represented in my application, Serial No. 414,831, it differing chiefly from my Patent No. 454,810 referred to, in the substitution of a rotating feeder to carry and present the bobbin to the pusher, rather than the pusher taking a bobbin from a hopper, as provided for in the patent. My present invention, therefore, comprehends broadly providing a loom having a pusher to put a bobbin into the shuttle, with a stop motion, whereby when the shuttle is not in proper position in the shuttle-box to receive the bobbin, the pusher can not be operated. I have also so constructed said stop motion devices that they are under the control of the weft fork.

The particular features of my present invention will be herein further described and made subject of claim at the end of the specification.

Figure 1 of the drawings represents a sufficient portion of the top of a loom with my improvements added to enable my invention to be understood, the lay, breast-beam, and other parts being broken out centrally in order to save space upon the drawings, part of the pusher being also omitted, the shuttle being partially represented by dotted lines. Fig. 2 is an elevation from the front of the loom of

the parts shown in Fig. 1. Fig. 3 in top view shows the part of the pusher omitted from Figs. 1 and 2. Fig. 4 is a section to the right of the dotted line x Fig. 1. Fig. 5 is a longitudinal sectional detail at the top of the devices shown in Fig. 4. Fig. 6 shows a different position of the parts represented in Fig. 4, the weft fork being supposed to have completed its farthest movement toward the breast-beam. Fig. 7 shows the position in which the weft fork mechanism will be left after the weft hammer shall have returned to its normal position. Fig. 8 is a detail showing part of one end of the loom, and the pusher with part of the lay in section, the lay carrying the bunter, said parts being shown in the position they will occupy when the loom is running regularly. Fig. 9 shows the same parts, but in a different position, viz:—in a position to enable the pusher to be actuated by the forwardly moving lay. Fig. 10 is a view of the same parts in, however, the position in which they will be put during the forward motion of the lay provided the shuttle is not in proper position to receive a bobbin. Fig. 11 is a section in the line x^2 Fig. 1, the parts having however been moved into another position, the pusher at the opposite end of the loom being then in the position represented in Fig. 8. Fig. 12 shows the parts represented in Fig. 11, but in a yet different position, the pusher at the opposite end of the loom occupying the position shown in Fig. 9, and Fig. 13 shows the parts represented in Fig. 12, but in yet another position, viz:—the position they will occupy when the shuttle strikes the arm or shuttle feeler g^5 .

The loom-frame A ; the lay A^3 ; the breast-beam A^{40} ; the rod or rock-shaft d' ; the weft hammer A^{19} ; its connected lever A^{18} ; the shipper-handle 39; the pusher f' supported on the stud f and adapted to be kept normally elevated by spring 22, said pusher having a depending ear F^3 and a projection 21 to act upon the tip of the bobbin; the dog f^5 pivoted upon the portion f^3 of the pusher; and the bunter C^2 connected to the lay, are and may be all substantially as shown in my application, Serial No. 414,831, filed December 12, 1891, wherein like letters are employed to designate like parts.

It will be understood that the shuttle-box at that end of the lay immediately below the pusher, will, in practice, be slotted to let a bobbin ejected from the shuttle by an incoming bobbin pass outwardly through the shuttle-box, as provided for in United States Patent No. 454,808. It will also be understood that the shuttle S , but partially shown in Fig. 1 by dotted lines, will be like that represented in said application, Serial No. 414,831, or in United States Patent No. 454,810, the bobbin employed in said shuttle being also as represented in the latter patent, it being what is known as a self-threading shuttle, or a shuttle in which the thread of a bobbin after the same shall have been taken from

the bobbin feeder or device containing bobbins and put into the shuttle by the pusher, will be automatically threaded into the delivery eye of the shuttle, all as fully provided for in the Patent No. 454,810, or in said application, Serial No. 414,831.

I will now proceed to describe my invention to be made the subject of claim in this application.

10 At that side of the loom farthest from the pusher and near the usual shipper-handle 39, I have pivoted at b^4 a knock-off lever b^5 , said lever resting normally against or close to the shipper lever, its free end being carried forward to be acted upon by the weft fork mechanism when it is desired to release the shipper handle from its usual notched plate 39^x and let it, through any suitable usual mechanism, stop the running of the loom. The
20 breast-beam has mounted upon it by a screw b^6 a stand b^7 having a suitable guideway b^8 , in which is adapted to reciprocate a slide b^9 upon which is pivoted at b^{10} the weft fork b^{12} , said weft fork having a tail piece b^{13} which
25 presents a suitable projection adapted to be engaged by a hook b^{14} pivoted at b^{15} on the upper end of the weft hammer A^{19} , as best shown in Fig. 5 said hook sliding on a support t carried by the said slide. The slide b^9
30 is shown as provided with a check c^4 pivoted at c^5 , said check aiding in turning the weft fork about its pivot b^{10} after it has been tilted. The weft fork slide has at its rear end a projection c^6 against which normally acts a lever
35 c^7 pivoted at c^8 , said lever, in this instance of my invention, being joined by a link c^9 to an arm c^{10} of the rock-shaft or rod d' , before referred to; the normal condition of said lever c^7 and said rock shaft, as when the
40 loom is weaving regularly, being as represented in Fig. 4, it being acted on by a spring c^{20} connected at one end to the loom frame, see Fig. 13, and at its other end to an arm c^{21} fast on the shaft d' .

45 The weft fork slide has pivoted upon it at d^4 a latch d^5 having at its under side a cam represented as a lump, as best shown in Fig. 5, where the said latch is shown in section, the free end of the latch being represented in
50 Fig. 7 as turned down and adapted to co-operate with the knock-off lever b^5 , as will be hereinafter described, said knock-off lever being shown in section in Figs. 4, 6 and 7.

The weft fork slide is provided with a suitable longitudinal passage for the reception of a wedge d^6 , the shape of which is best shown in Fig. 5, said wedge having a cam or lump and having its ends enlarged, one end in the present embodiment of my invention, viz:—
60 that nearest the weft hammer A^{19} , being turned upwardly, while the other end nearest the breast-beam is turned downwardly, the downturned end, marked 44, meeting, under conditions to be hereinafter described, a
65 shoulder 45, see Fig. 5, forming part of the stand b^7 , said shoulder being projected upwardly sufficiently to be engaged at its opposite

side by the hook c^6 when the weft fork occupies its position farthest from the breast-beam toward the lay.

In practice the weft fork mechanism will normally stand in the position shown in Figs. 1, 4 and 5.

Now, if the loom is operated, and the weft is laid so as to meet and tilt the weft fork
75 b^{12} , the hook b^{14} connected with the weft hammer A^{19} and operated by cam A^{7x} on a suitable cross shaft A^9 of the loom, will be moved to the left, viewing Fig. 5, and then back again, without, however, engaging the tail of
80 the weft fork, and consequently the weft fork slide will not be pulled outwardly with relation to the breast-beam. The tail of the weft fork when it rises will act upon the check c^4 , and in case the tilting movement of the
85 fork is sufficient, the tail itself may lift the check c^4 , the lay having receded from the breast-beam permitting the weft fork to resume its normal position. In case, however,
90 that the weft fork is not tilted, as it will not be in case the weft is not in the shed opposite the weft fork when the lay comes to tilt the same, then the hook b^{14} when it comes forward and goes back will catch the tail piece
95 of the weft fork and will draw the slide b^9 with it, the downturned end of the wedge d^6 meeting the shoulder 45 of the stand and remaining in stationary position, letting the cam lump of the latch d^5 drop, so that it will
100 drop from the position Fig. 4 upon the knock-off lever b^5 into the position Fig. 6. During this first movement of the weft fork slide, due to the absence of weft at the weft fork, the lever c^7 will be turned into the position
105 Fig. 6, and the rock shaft or rod d' will be rocked to elevate the arm e^4 , see Fig. 11, attached near its opposite end, from the position Fig. 11 into the position Fig. 12, it, during such movement acting against an arm e^5
110 mounted upon a stud e^6 carried by a stand e^7 fastened by a screw e^8 , upon a loosely mounted stud e^9 , having suitable bearings in a stand e^{10} secured preferably to the loom side, the movement of said arm e^5 in the direction of
115 the arrow Fig. 11, resulting in turning the rock shaft e^9 in its bearings and in turning the stand e^7 , said rock shaft at a point just outside the loom frame having an arm e^{12} in which is secured by suitable set screws e^{13} a
120 rod e^{14} fitted to slide in a sleeve e^{24} having a suitable crank pin or projection e^{15} which enters a hole in the dog f^5 , common to said application, Serial No. 414,831, and lifts said dog into the position Fig. 9, so that as the
125 bunter c^2 attached to the forwardly moving lay meets said dog, it will turn the pusher f' about the stud f , and will, as provided for in said last named application, put a bobbin into the shuttle, provided, however, the shuttle is in its proper position in the shuttle-box.

Assuming that the shuttle has been automatically provided with a bobbin, and that the same has been thrown through the shed and the weft is moved opposite the filling

fork, then the lay in its next forward movement,—the weft being present—will meet and tilt the weft fork, and the weft hammer will be moved forward and back in usual manner, but the hook b^{14} ,—the weft fork having been tilted,—cannot engage the tail piece of the weft fork, but as the upper end of the weft hammer completes its movement toward the breast-beam it strikes the inner upturned end of the sliding wedge and pushes it to the right, viewing Fig. 5, causing said wedge to again lift the latch d^5 into the position Fig. 4, its normal position in the loom. The catch d^5 , is, it will be seen, permitted to drop upon the knock-off lever, as in Fig. 6, during the outward movement of the weft fork slide b^9 ; and it will also be understood that by reason of a weight or spring co-operating with the rock-shaft d' as soon as the upper end of the weft fork hammer starts toward the lay or away from the breast-beam, the lever c^7 acts upon the end c^6 of the weft fork slide and pushes it with it for a sufficient distance to enable the latch d^5 to fall behind the end of the knock-off lever, as represented in Fig. 7. On the contrary, however, should the shuttle,—it having been supplied with a new bobbin,—be thrown through a shed and not leave weft opposite the weft fork when the latter is in the position represented in Fig. 6, then the weft fork will not be tilted, and the hook b^{14} will move forward and as it comes back will engage the tail piece of the weft fork and will draw back with it a second time the weft fork slide, causing the downturned end of the catch d^5 , then resting against one side of the knock-off lever b^5 as in Fig. 7, to push the said knock-off lever far enough to release the shipper handle 39 from its notch in the usual notch-plate 39^x, to stop the loom in usual manner.

I will now describe that part of my invention which precludes the operation of the pusher in case the shuttle has rebounded from, or is not in the proper position in the shuttle-box to receive a bobbin.

The stand or arm e^7 of the rock-shaft e^9 before referred to, see Fig. 11, has secured to it, as herein shown, by a set screw g^4 the shank of a feeler g^5 so located that its free end when the rock-shaft e^9 is turned by the arm e^4 of the rock-shaft d' , as before referred to, will be moved forward toward the advancing lay at a point near the inner end of the shuttle-box in which then rests the shuttle, which, let it be supposed, is about to receive a bobbin. If the said shuttle is in proper position in the shuttle-box to receive a bobbin, then the feeler will not touch the shuttle, the dog will be in line with the bunter, and the pusher will be operated as before described; but if the shuttle is not in its proper position in the shuttle-box with relation to the pusher, then the shuttle in the forward movement of the lay meets the feeler and the latter is pushed with the lay toward the breast beam, see Fig. 12, such movement of the feeler causing the

rock-shaft e^9 to be turned sufficiently to cause the arm e^{14} to lower the dog f^5 from the position Fig. 9 into the position Fig. 10, so that the bunter will not meet the said dog, and consequently the pusher will not be actuated.

Fig. 13 shows the shuttle as having struck the feeler and as having been moved back from its position Fig. 12. As the feeler is so moved back the arm e^6 is also moved back with it until said arm meets the end of the arm e^4 , when it stops, the spring g^6 surrounding the rod g^7 extended through the lower end of the said arm e^4 and the arm e^7 at such time yielding, as represented in Fig. 13. The arm e^6 will remain in the position Fig. 13 and will hold arm e^4 in the position therein shown until the lay starts back away from the breast beam, when spring c^{20} before described co-operating with the rock-shaft d' , acts to turn said rock-shaft and let the spring g^6 bring the upper end of the arm e^6 against arm of the feeler g^5 , as shown in Fig. 11, which movement will permit the rock-shaft e^9 to be turned sufficiently to, through the arm e^{14} , lower the dog f^5 into the position Fig. 8. This done, the shuttle will be again thrown through the shed to the opposite box, and no thread will be presented to the filling fork, and consequently the loom will be stopped by giving to the weft fork slide its secondary movement, as before provided for. The spring c^{20} by its connection with a lug c^{24} on the rock-shaft d' causes the pin or projection at the end of arm e^4 to act on the feeler g^5 and put it into its normal position Fig. 11.

This invention is not limited to the exact mechanical devices employed to arrest or suspend the operation of the pusher in case the shuttle is out of its proper position in the shuttle-box when the pusher should operate.

This invention shows as to the weft fork, its slide, and latch, a species of my improved weft fork mechanism more broadly claimed in my application, Serial No. 414,831.

The feeler and the connections used between it and the dog f^5 constitute a detector mechanism to prevent the movement of the pusher should the shuttle be out of position, and instead of the particular detector mechanism shown, I may employ any equivalent devices and yet be within the scope of my invention.

This invention is not limited to the making the dog f^5 of the exact shape shown, so long as it is adapted to be put into position with relation to the pusher and the lay to effect the movement of the pusher when desired.

I have provided the rod e^{14} with an adjustable stop p^{10} having a beveled face which meets a rigid part, as p^{12} , of the loom, to thus limit the forward movement of the said rod, the adjustment of the stop vertically enabling the movement of the rod to be stopped sooner or later, as may be desired.

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

1. In a loom to automatically supply a shuttle with a bobbin while the shuttle is in the shuttle-box, the following instrumentalities, viz;—a lay having its shuttle-box slotted for the passage through it of a bobbin, a shuttle
 5 for the passage through it of a bobbin, a bobbin pusher, a bunter, a co-operating dog, and stop motion devices co-operating with said shuttle to put the dog into its inoperative position when the shuttle to be supplied
 10 with a bobbin is not in proper position in the shuttle-box, substantially as described.

2. In a loom for automatically supplying a shuttle with filling while the latter is in the shuttle-box, the following instrumentalities, viz;—a weft fork; its slide; a bobbin-pusher;
 15 a lay having a shuttle-box provided with a slot for the passage outwardly therethrough of a bobbin; a bunter; a dog interposed between said pusher and bunter; connecting devices between said dog and said slide to insure a movement of the pusher when the shuttle is in proper position in the shuttle-box and weft is not presented to the weft fork, substantially as described.
 25

3. The rock-shaft d' , its arm e^4 , the lay having a shuttle box slotted for the outward passage of a bobbin or cop; a shuttle likewise slotted; a pusher to put a bobbin into said shuttle when in said shuttle-box; a dog co-operating with said pusher; a rock-shaft e^3 , and connections between it and said dog, combined with an arm or shuttle-feeler yieldingly mounted with relation to said rock shaft e^0
 30 and actuated in one direction by said arm e^4 and adapted to meet a shuttle whereby the

operation of the pusher is suspended in case the shuttle is not in proper position in the shuttle-box to receive within it a bobbin, substantially as described.
 40

4. The weft fork slide, its pivoted weft fork, the pivoted catch, a shipper handle adapted to be operated thereby the movable wedge-bar to turn the catch, and a stand in which said slide is reciprocated, combined with a weft hammer having a connected hook, the combination being and operating substantially as described.
 45

5. A weft fork, a weft fork slide; its guiding stand; a check cooperating with said fork, and a weft hammer having a connected hook; combined with a support for said hook to operate, substantially as described.
 50

6. In a loom adapted to automatically supply a shuttle with weft, the following instrumentalities, viz;—a lay having a shuttle box slotted for the discharge of a bobbin or cop, a shuttle slotted for the discharge through it of a bobbin, and a pusher to push a bobbin or cop into said shuttle, and a detector mechanism operating in connection with the pusher to render the latter inoperative when the shuttle is not in proper position to receive a supply of weft, substantially as described.
 55
 60

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.
 65

JAMES H. NORTHROP.

Witnesses:

GEORGE OTIS DRAPER,
 C. E. LONGFELLOW.