(No Model.) 3 Sheets—Sheet 1.

W. F. DRAPER & J. H. NORTHROP.

LOOM.

No. 590,092. Patented Sept. 14, 1897.

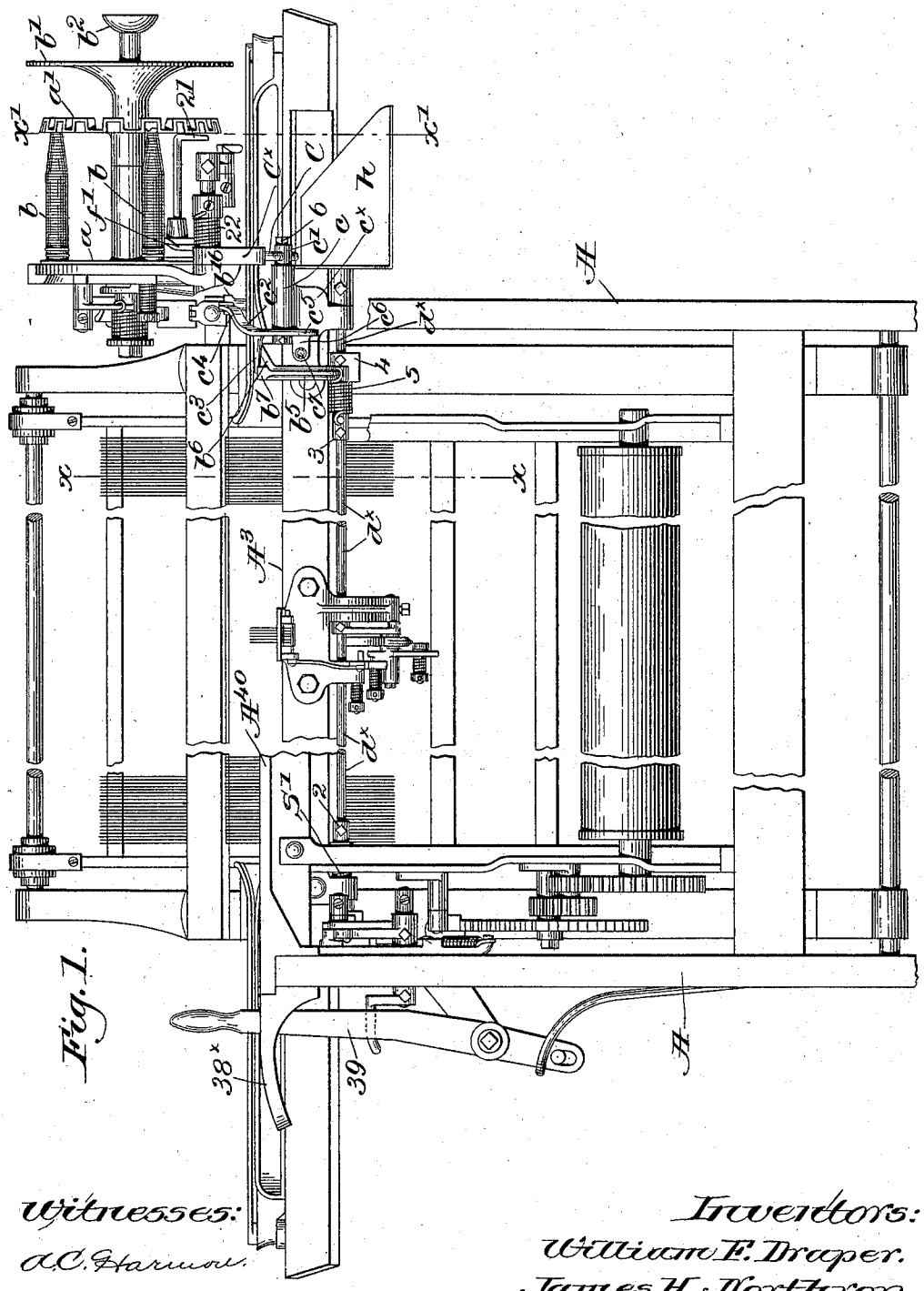


Fig. 1.

Witnesses:
A. C. Harwood.
Thomas J. Drummond.

Inventors:
William F. Draper.
James H. Northrop.
by Crosby Gregory & Co. Attys

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(No Model.) 3 Sheets—Sheet 2.

W. F. DRAPER & J. H. NORTHROP.

LOOM.

No. 590,092. Patented Sept. 14, 1897.

Fig. 2.

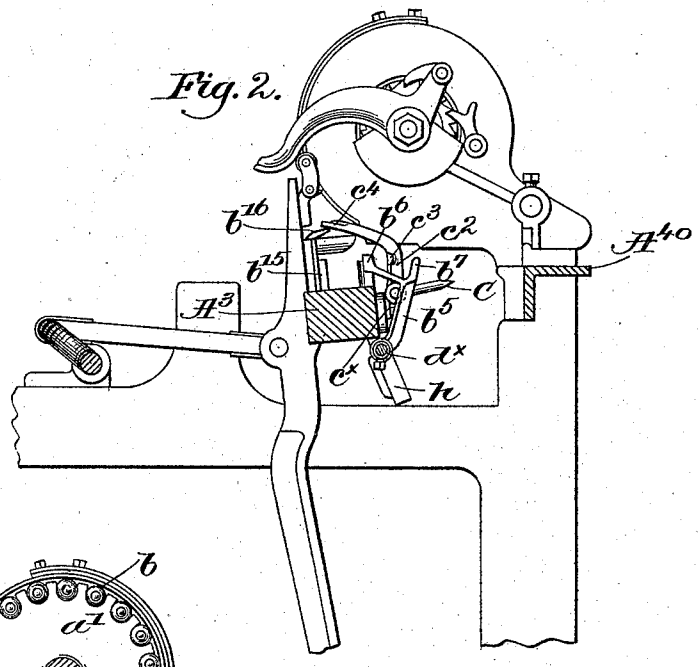


Fig. 4.

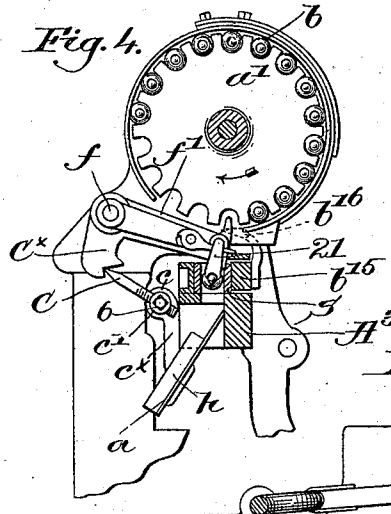


Fig. 3.

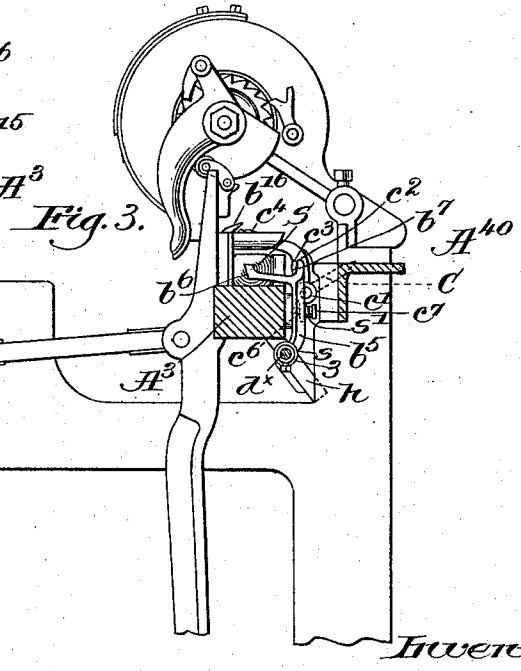
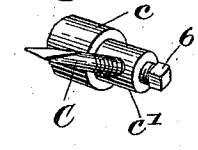


Fig. 5.



Witnesses:
A. C. Harrison
Thomas J. Drummond.

Inventors
William F. Draper.
James H. Northrop.
by Crosby Gregory attys.

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(No Model.) 3 Sheets—Sheet 3.

W. F. DRAPER & J. H. NORTHROP.

LOOM.

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Fig. 6.

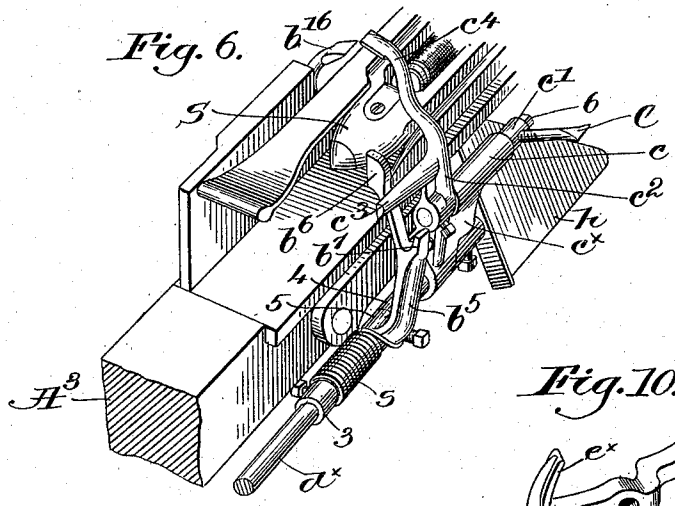


Fig. 10.

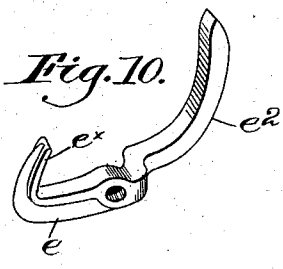


Fig. 8.

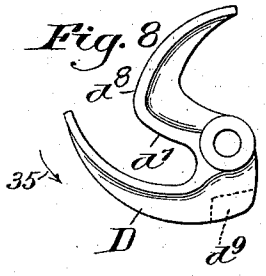


Fig. 7.

Fig. 11.

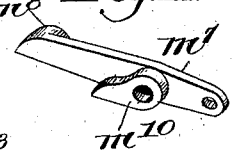
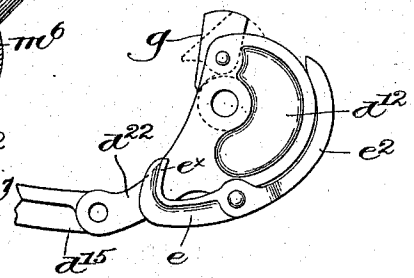


Fig. 9.



Witnesses:
A. C. Harrow.
Thomas J. Drummond.

Inventors:
William F. Draper.
James H. Northrop.
by Crosby & Gregory Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM F. DRAPER AND JAMES H. NORTHROP, OF HOPEDALE, MASSACHUSETTS, ASSIGNORS TO THE NORTHROP LOOM COMPANY, OF SAME PLACE AND SACO, MAINE.

LOOM.

SPECIFICATION forming part of Letters Patent No. 590,092, dated September 14, 1897.

Application filed December 31, 1896. Serial No. 617,597. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM F. DRAPER and JAMES H. NORTHROP, of Hopedale, in the county of Worcester and 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.

This invention relates more particularly to that class of looms for weaving wherein means are provided for automatically transferring a fresh filling-carrier from a suitable source of supply to the shuttle in the shuttle-box of the lay adjacent said source of supply upon failure of the filling. A loom of this class forms the subject-matter of United States Patent No. 529,940, the filling-carriers being mounted in or carried by a rotatable feeder or hopper so located and operated as to bring the filling-carriers one after another into position to be acted upon by an automatically-operated pusher, to transfer a filling-carrier from the feeder to the shuttle, the fresh filling-carrier ejecting the old filling-carrier from the shuttle through a slot in the shuttle-box.

In our present invention we have combined an automatic filling-supplying mechanism with a center filling-detector of novel construction, the latter, however, not being broadly claimed herein, as it forms the subject-matter of another application, Serial No. 614,409, filed December 4, 1896, by one of the applicants herein, and we have also provided a novel shuttle-positioning device or feeler to prevent the transferring mechanism from operating to transfer a filling-carrier if the shuttle is improperly positioned in the shuttle-box or if the shuttle fails to enter therein.

Various features of our invention will be hereinafter described in the specification and particularly pointed out in the claims.

Figure 1, in front elevation and centrally broken out, represents a loom embodying our present invention, the greater part of the breast-beam being omitted. Fig. 2 is a transverse sectional view thereof, taken on the line x x, Fig. 1, looking toward the right, with the lay part way back. Fig. 3 is a similar view, the lay, however, being shown as fully forward and the shuttle properly positioned in the shuttle-box ready to receive a fresh filling-carrier. Fig. 4 is a transverse sectional view taken on the line x' x', Fig. 1, looking to the left, with the lay forward and showing the transferring mechanism in position to transfer a filling-carrier to the shuttle. Fig. 5 is an enlarged perspective detail of the actuating-bunter for the transferrer. Fig. 6 is an enlarged perspective view of a portion of the shuttle-box, the shuttle-positioning device or feeler, and the parts controlled thereby. Fig. 7 is a perspective view, also enlarged, of a portion of the lay with the center filling-detector thereon and the mechanism controlled by the position of said detector; and Figs. 8 to 11 are detail views of portions of the mechanism shown in Fig. 7.

The loom-frame A, breast-beam A^{40}, the lay A^3 and its actuating mechanism, the shipper-lever 39 and its notched plate $38^{\times}$, the filling-carrier feeder, comprising, essentially, the connected rotatable plates a a', suitably shaped to receive the opposite ends of the filling-carriers b, the weft-thread-supporting plate b' rotatable with the feeder, the holder b^2, with which the weft end of each carrier is connected, the stud f, the pusher f', mounted thereon and having a projection 21, and the spring 22 to raise the pusher are and may be all as represented in said Patent No. 529,940 referred to, wherein like letters are used to designate like parts. An operating-shaft $d^{\times}$, corresponding to the shaft d' in said patent, is mounted to rock in suitable bearings on the lay A^3, said shaft being extended beyond the loom side at the right hand, Fig. 1, and having rigidly secured thereto a chute or director h, made, preferably, of sheet metal.

When a filling-carrier is to be transferred to the shuttle S, the rock-shaft $d^{\times}$ is turned, as will be described, to move said chute h into inclined position below the slotted shuttle-box, as shown in Fig. 4, to receive the ejected filling-carrier and to direct it into a suitable receptacle, (not shown,) the return

of the operating-shaft to normal position moving the chute out of the path of the usual picker-stick.

A spring S′, Fig. 1, attached at one end to the lay and at its other end to a collar 2 on the operating-shaft $d^{\times}$, Fig. 1, returns the latter to normal position.

Upon the operating-shaft near the shuttle-box are secured two collars 3 4, Fig. 6, between which is loosely mounted an upturned arm b^5, controlled by a spring s, one end of which is secured to the arm and the other end to the collar 3, the arm being held from longitudinal movement by the spring and the collar 4, a lug 5 on the collar engaging the arm and preventing rotation thereof on the shaft $d^{\times}$ toward the lay. The upper end of the arm is bent over at b^6 and adapted to move across the raceway of the lay in front of the shuttle-box when the operating-shaft is rocked, as will be described, when the filling-detector operates to detect the presence or absence of the filling, the offset b^6 forming a shuttle-positioning device or feeler.

If the shuttle S is properly positioned within the shuttle-box, as shown in Fig. 6, the movement of the feeler b^6 is unrestricted, but if the shuttle is improperly positioned to receive a filling-carrier from the feeder it will be engaged by the feeler and will hold the latter from further movement as the rotative movement of the operating-shaft $d^{\times}$ is completed, the spring s yielding at such time.

A bracket $c^{\times}$, secured to the lay beyond the shuttle-feeler, has a bearing c for a short rock-shaft c', into the outer end of which is screwed the threaded shank of an adjustable actuator or bunter C, (shown separately in Fig. 5,) held in adjusted position by a set-screw 6 in the end of the rock-shaft, the actuator or bunter being thus rendered readily adjustable to take up wear and for regulation.

The inner end of the bunter-shaft c' has fast thereon an arm c^3, provided with a finger c^3, extended into the path of movement of a lug or projection b^7 on the shuttle-feeler arm b^5, so that if the shuttle is in proper position to receive a filling-carrier the complete throw of the feeler will cause the projection b^7 to engage the finger, swinging the arm c^2 and turning the rock-shaft c' to bring the actuator or bunter C into position to engage and operate the dog $C^{\times}$, Fig. 4, the latter being rigidly secured to the pusher f', so that as the lay beats up the pusher will transfer a filling-carrier from the feeder to the shuttle. If, however, the shuttle is improperly positioned in the shuttle-box, the feeler b^6 will be held thereby from moving far enough to operate the bunter rock-shaft c', as described, and the actuator or bunter C will remain in inoperative position out of range of the dog $C^{\times}$ as the lay comes forward and the transferring mechanism will remain inoperative.

As it sometimes happens that the shuttle may be in the opposite box when the center fork detects the absence of filling, and inasmuch as the transfer of a filling-carrier at such time would be useless, we have provided means for preventing the transfer of a filling-carrier from the feeder at such time.

The usual movable binder b^{15} is provided with an upturned stop b^{16}, Figs. 2, 3, 4, and 6, which is in the path of the bent-over end c^4 of the arm c^2 when the binder is in, the shuttle-box being empty, so that even though the feeler b^6 may tend to complete its movement across the shuttle-path and move the bunter C into operative position the stop b^{16} will engage the end of the arm c^2 and prevent rocking of the shaft c' by engagement of the projection b^7 with the finger c^3, so that the bunter will not operate.

The feeler-controlling spring s yields when the feeler is stopped, permitting the operating-shaft $d^{\times}$ to complete its movement. In the ordinary operation of the loom, however, the shuttle when in the shuttle-box presses the binder b^{15} out to move the stop b^{16} out of the path of the bunter-controlling arm c^2, as in Fig. 3, so that the latter may be freely moved, as described, to render the bunter operative, the filling-transferring mechanism being actuated thereby.

The arm c^2 is downturned at c^5, Figs. 1, 3, and 6, and has a lateral ear c^6 thereon, through which is loosely extended a headed stud c^7, attached to the lay, a spring s' surrounding the stud between its head and the ear c^6, said spring normally acting upon the rock-shaft c' to maintain the bunter in inoperative position, the depending end c^5 of the arm resting against the bracket $c^{\times}$ to limit movement of the rock-shaft by the spring.

We have herein shown a center filling-detector with means operated by the movement of the lay and controlled by the position of the filling-detector to rock the operating-shaft $d^{\times}$ and thereby move the bunter C into operative position. Upon failure of the filling the filling-detector will act to bring the filling-transferring mechanism described into operation and a fresh filling-carrier will be transferred to the shuttle if the latter is properly positioned in the shuttle-box.

Inasmuch as the center filling-detector and the means controlled thereby for rocking the operating-shaft $d^{\times}$ form the subject-matter of the other application hereinbefore referred to such parts will not be described herein with such strict detail.

The operating-shaft $d^{\times}$ has a bearing in a bracket F, secured to the lay at substantially the center of the shuttle-raceway, an arm d^2, fast on said shaft, being provided with a roll d^8 to coöperate with a controlling-cam D, shown separately in Fig. 8 and mounted to rock freely on a shaft d^6, held in the bracket.

When the cam D is rocked in the direction of the arrow 35, Fig. 8, the faces d^7 and d^8 act to swing the arm d^2 first quickly and then more slowly, rotating the operating-shaft $d^{\times}$

against the action of the coiled spring S', Fig. 1, secured at one end of the shaft and fixed at its other end.

The pawl-carrier d^{12} is mounted on the shaft d^6, and it has pivoted thereon a pawl e, having an upturned end $e^\times$, adapted at times to engage a projection d^9 on the cam D. The pawl is held in the position shown in Figs. 7 and 9 by a spring s^2, with its cam-arm e^2 against the periphery of the pawl-carrier, the latter being rocked at each movement of the lay by a link d^{15}, jointed at one end to the breast-beam and at its other end pivoted to the foot A^{22} of the pawl-carrier. Unless the pawl is turned to bring its upturned end $e^\times$ into engagement with the lug b^9 on the cam D the latter will not be turned to rock the operating-shaft.

The lay is transversely recessed at A^{30}, over which the filling t passes when properly laid, the filling-detector (herein shown as a series of tines m) being pivotally mounted in bearings m^2 on the bracket and adapted to enter the recess A^{30} upon failure of the filling.

A crank-pin m^5 on a disk m^3, secured to the body of the detector, is connected by a link m^6 to a lever m^7, pivotally mounted on a depending portion of the bracket F and controlled by a spring s^3, said lever having a toe m^8 on its inner end to either travel over the exterior of the cam-arm e^2 or to enter between said arm and the periphery of the pawl-carrier d^{12}. In the latter case the pawl e is moved against the stress of its spring s^2 to engage and rock the cam D. The spring s^3 tends to depress the toe m^8 and also to depress the detector into the pocket A^{30}, such tendency being prevented by presence of the filling, the spring only having sufficient force in connection with the small leverage of the link m^6 to move the detector-tines into the depression A^{30} unless obstructed by even so fragile a thing as the filling. If the filling is present, the toe m^8 will be lifted sufficiently to pass over the arm e^2, the curvature of the latter acting to lift the detector from the filling as the lay comes forward to avoid crinkling or straining of said filling.

A stop-pin 90, Fig. 7, enters a notch in the plate m^3 and prevents undue rocking movement of the detector in either direction.

A dog g, controlled by a spring s^4, is pivotally mounted on the pawl-carrier d^{12}, the convexed upper end of the dog being in the path of a projection m^{10} on the lever m^7 back of the fulcrum thereof, so that when the lay is moving back and the loom running properly the dog will hold the said lever in position to raise the detector and permit the passage of the shuttle. When the lay is all the way back, the dog releases the lug m^{10} and leaves the detector free to be acted upon by its controlling-spring to feel for the filling. As the lay moves forward the pawl-carrier d^{12} is rocked by means of the link d^{15}, connected at one end with the lay and at the other end to the extension d^{22} of the pawl-carrier d^{12}, and the controlling-spring s^{14} of the dog g permits the latter to turn, as in dotted lines, Fig. 9, to wipe under the lug on the controlling-lever.

The detector is positively moved toward and to detect the filling, if present, by means of its controlling-spring s^3, and if the filling is present the detector is moved away therefrom as the lay beats up by engagement of the toe m^8 with the exterior of the curved arm e^2. When the filling fails, the detector moves into the depression A^{30}, when the dog releases the controller-lever m^7 and the toe m^8 of the lever will pass between the arm e^2 and the pawl-carrier. As the carrier is turned on its fulcrum as the lay moves forward the toe m^8 then acts to rock the pawl e and move it into position to engage and actuate the cam D.

The pawl-carrier d^{12} and the arm e^2, operated by movement of the lay, constitute a controlling device for the spring s^3, which acts to positively move the detector to detect the filling.

If the filling is not laid properly for several picks, the detector will at each pick act, as described, to cause the rocking of the shaft $d^\times$ and the operation of the filling-supplying mechanism, the latter, however, only acting, it will be remembered, if the shuttle is properly positioned in the shuttle-box.

The loom in Fig. 1 is herein shown as provided at the left-hand side with take-up mechanism and controlling means therefor operative upon failure of the filling, the operating-shaft $d^\times$ being extended across the loom to act upon said controlling means, the same, however, forming no part of this invention.

Our invention is not restricted to the precise construction and arrangement of parts herein shown, as the same may be modified or rearranged in various particulars without departing from the spirit and scope of our invention.

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

1. In a loom, the lay, a filling-detector mounted thereon, and means controlled by movement of the lay to cause the detector to detect the presence or failure of the filling, combined with filling-supplying mechanism, and an actuator therefor, moved by or through said detector into operative position upon failure of the filling, substantially as described.

2. In a loom, the lay, a filling-detector mounted thereon, and means controlled by movement of the lay to cause the detector to detect the presence or failure of the filling, combined with a shuttle-feeler moved by or through the detector upon failure of the filling to feel for the shuttle, filling-supplying mechanism, and an actuator therefor controlled by the shuttle-feeler, substantially as described.

3. In a loom, the lay, a filling-detector mounted thereon, means to positively move

it to detect the filling, a controlling device for said means, operated by movement of the lay, and a shuttle-feeler moved by or through the detector upon failure of the filling, to feel for the shuttle, combined with filling-supplying mechanism, and a normally inoperative actuating-bunter therefor moved by the shuttle-feeler into abnormal position when the shuttle is properly positioned, substantially as described.

4. In a loom, the lay, a center filling-detector, a shuttle-feeler, and a bunter, all mounted on the lay, means controlled by movement of the lay to positively actuate said detector to detect the presence or failure of the filling, connections between the detector and shuttle-feeler, and independent connections between the shuttle-feeler and bunter, combined with filling-supplying mechanism, said bunter being governed as to its position by the shuttle-feeler, substantially as described.

5. In a loom, the lay having a shuttle-box, a movable binder therefor provided with a stop, a shuttle-feeler and a filling-detector, both mounted on the lay, and means controlled by the detector to operate the shuttle-feeler upon failure of the filling, combined with filling-supplying mechanism, and a coöperating bunter moved into operative position by the shuttle-feeler, the binder-stop engaging the shuttle-feeler and preventing operation of the bunter when the shuttle is in the opposite shuttle-box, substantially as described.

6. In a loom, the lay, a filling-detector and an operating-shaft mounted thereon, means, operative upon failure of the filling and controlled by the detector, to rock said shaft a shuttle-feeler yieldingly mounted on said shaft, and a bunter moved into operative position by the shuttle-feeler when the shuttle is properly positioned, combined with a filling-supplying mechanism operated by the bunter, substantially as described.

7. In a loom, the lay having a shuttle-box, a filling-detector and a shuttle-feeler, both mounted on the lay, means controlled by the detector to operate the shuttle-feeler upon failure of the filling, an actuator to positively move said detector to detect the filling, and a controlling device for said actuator, operated by movement of the lay, substantially as described.

8. In a loom, the lay, a filling-detector and an operating-shaft, both mounted on the lay, means, operative upon failure of the filling and controlled by the detector, to rock said shaft, and a shuttle-feeler yieldingly connected with the operating-shaft, the feeler being held by an improperly-positioned shuttle from completing its movement with said shaft, substantially as described.

9. In a loom, the lay, a rock-shaft mounted thereon, a normally inoperative actuating-cam, connections between it and the rock-shaft, a pawl-carrier mounted on and rocked by movement of the lay, a pawl on said carrier, a filling-detector, connections between it and the pawl to cause the latter to engage and operate the bunter-cam upon failure of the filling, and a spring-controlled shuttle-feeler mounted upon and adapted to be moved by the rock-shaft to feel for the shuttle, substantially as described.

10. In a loom, the lay, a center filling-detector and an operating-shaft thereon, means operated by movement of the lay and governed by the detector, to rock the shaft upon failure of the filling, and a shuttle-feeler arm yieldingly mounted on said operating-shaft, combined with filling-supplying mechanism, and a normally inoperative actuating-bunter therefor, mounted on the lay and provided with a finger in the path of and to be moved by the feeler-arm when the shuttle is properly positioned, substantially as described.

11. In a loom, the lay, a center filling-detector and an operating-shaft thereon, means operated by movement of the lay and governed by the detector, to rock the shaft upon failure of the filling, and a shuttle-feeler arm yieldingly mounted on said operating-shaft, combined with filling-supplying mechanism, and a spring-controlled and normally inoperative actuating-bunter therefor, provided with a finger in the path of the feeler-arm, engagement of the feeler by an improperly-positioned shuttle causing the feeler-arm to yield on the operating-shaft and thereby fail to move the bunter into operative position, substantially as described.

12. In a loom, the lay having a shuttle-box, a movable binder therefor provided with a feeler-stop, a shuttle-feeler and a filling-detector both mounted on the lay, an operating-shaft on the lay, to which said feeler is yieldingly connected, and means controlled by the detector to operate the shuttle-feeler upon failure of the filling, combined with filling-supplying mechanism, and a coöperating bunter having a finger to be engaged and moved by the feeler when the shuttle is properly positioned to move the bunter into operative position, the feeler-stop engaging the feeler and preventing movement thereof to actuate the bunter when the shuttle fails to enter the shuttle-box, substantially as described.

13. In a loom, the lay having a shuttle-box, a shuttle-feeler and a center filling-detector, both mounted on the lay, means, operated by movement of the lay and controlled by the detector, to actuate the shuttle-feeler upon failure of the filling, and a feeler-stop operative when the shuttle fails to enter the shuttle-box, combined with filling-supplying mechanism, and an actuator therefor moved by the shuttle-feeler into operative position when the shuttle is properly entered in the shuttle-box, substantially as described.

14. In a loom, filling-supplying mechanism, the lay having a slotted shuttle-box for the passage therethrough of a filling-carrier ejected from a shuttle, a rock-shaft on the lay, a chute on the rock-shaft below the shuttle-box, a filling-detector and connections between it

and the rock-shaft to rock the latter upon failure of the filling and thereby swing the chute into operative position, substantially as described.

15. In a loom, the lay having a shuttle-box slotted for the passage therethrough of a filling-carrier ejected from a shuttle, a rock-shaft on the lay, a chute mounted on the rock-shaft, a filling-detector, and connections between it and the rock-shaft, to rock the latter upon failure of the filling, and thereby move the chute into position beneath and to conduct an ejected filling-carrier from the shuttle-box, combined with filling-supplying mechanism, and an actuating-bunter therefor moved into operative position by said rock-shaft, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM F. DRAPER.
JAMES H. NORTHROP.

Witnesses:
HERBERT S. MANLEY,
GEO. OTIS DRAPER.