No. 687,785. Patented Dec. 3, 1901.

J. RAILTON.

FILLING REPLENISHING LOOM.

(Application filed July 29, 1901.)

(No Model.) 3 Sheets—Sheet 1.

Fig. 1.

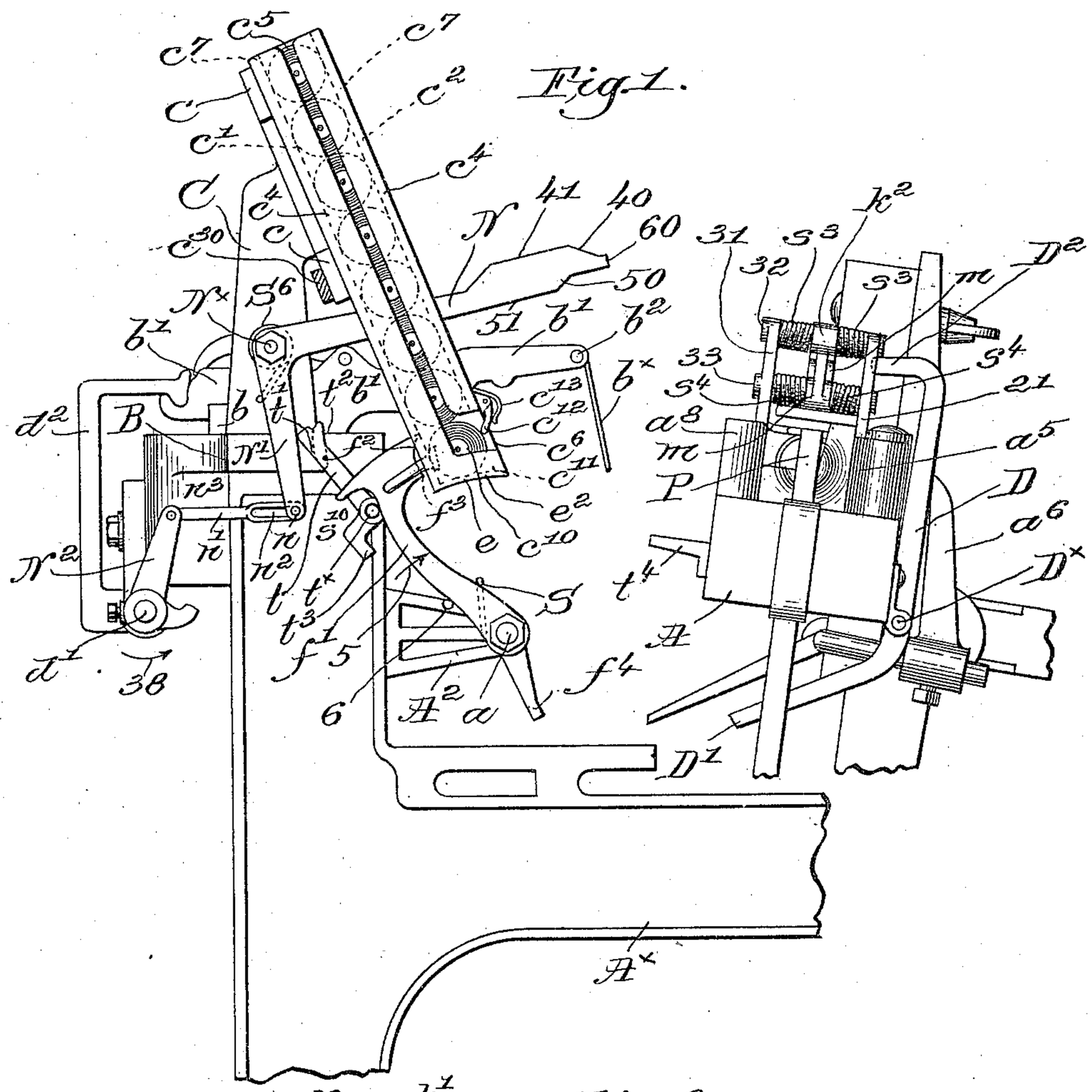
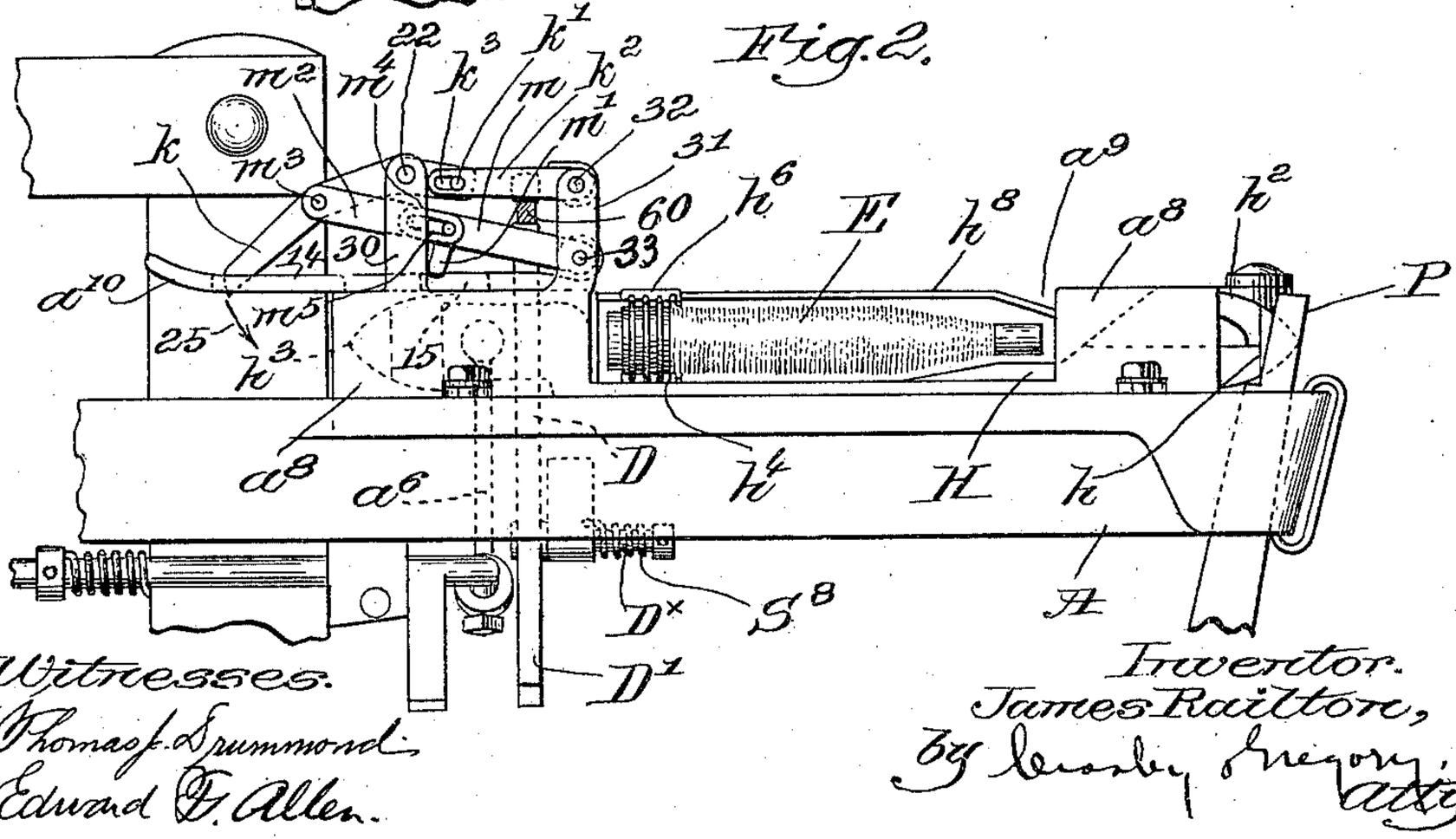


Fig. 2.



Witnesses.
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Edward F. Allen.

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(No Model.) 3 Sheets—Sheet 2.

Fig. 3.

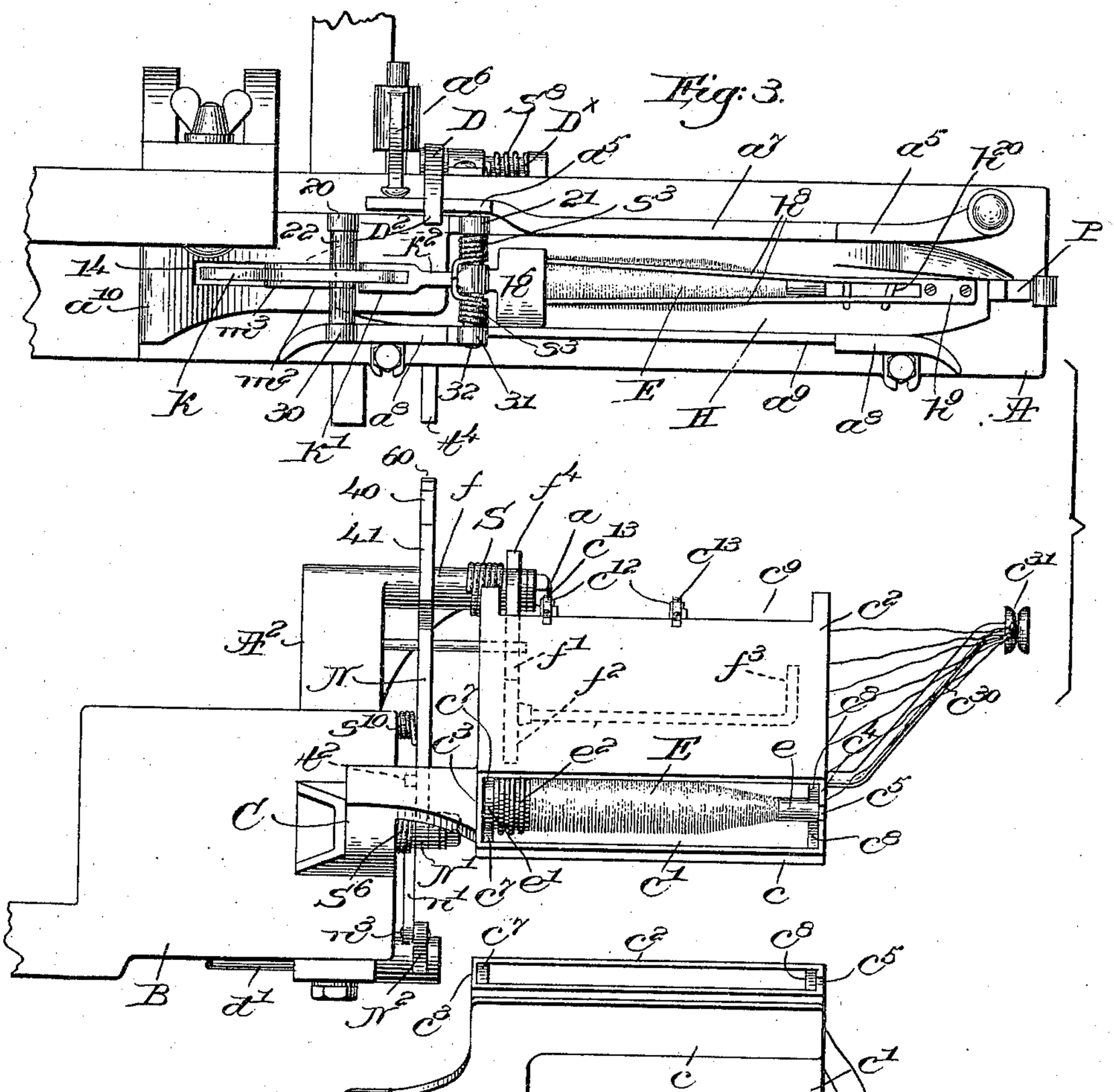

Fig. 4.

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Fig. 5.

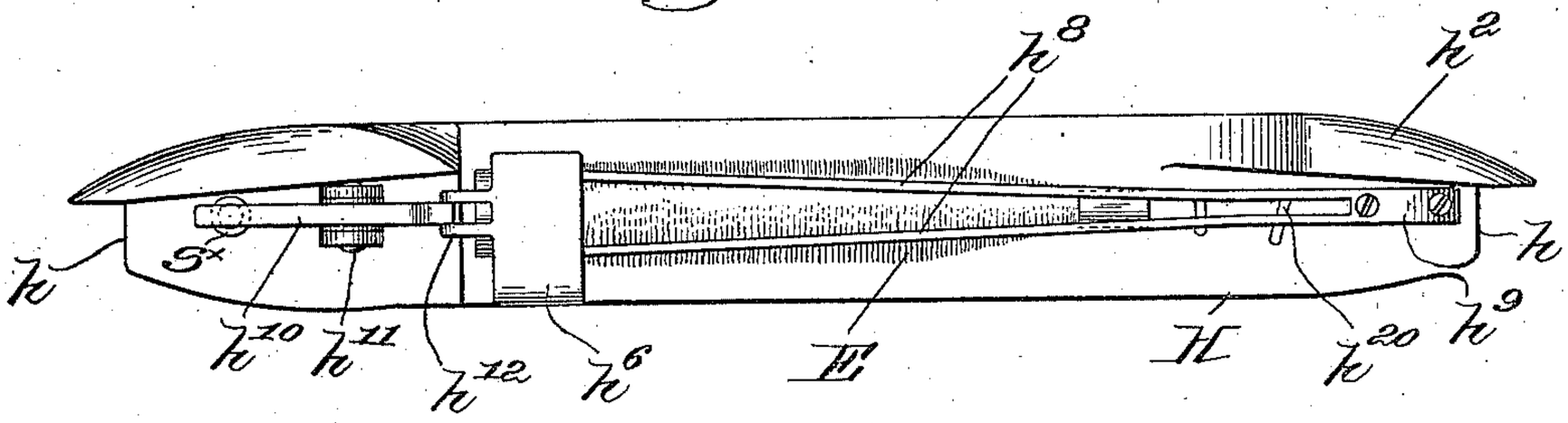


Fig. 6.

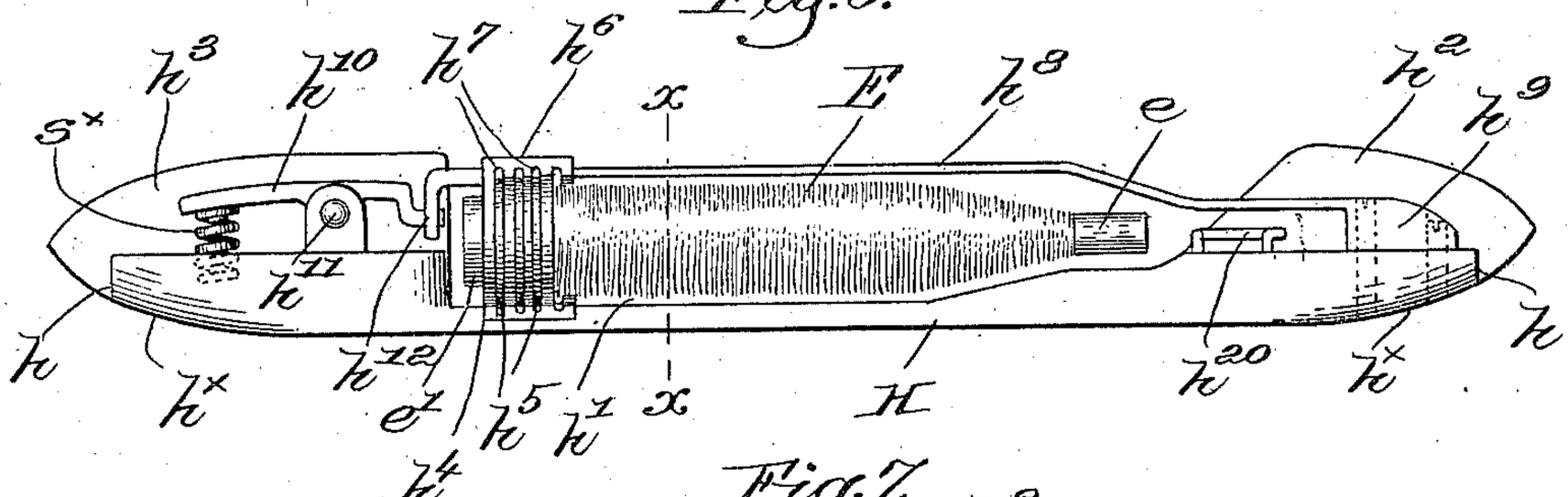
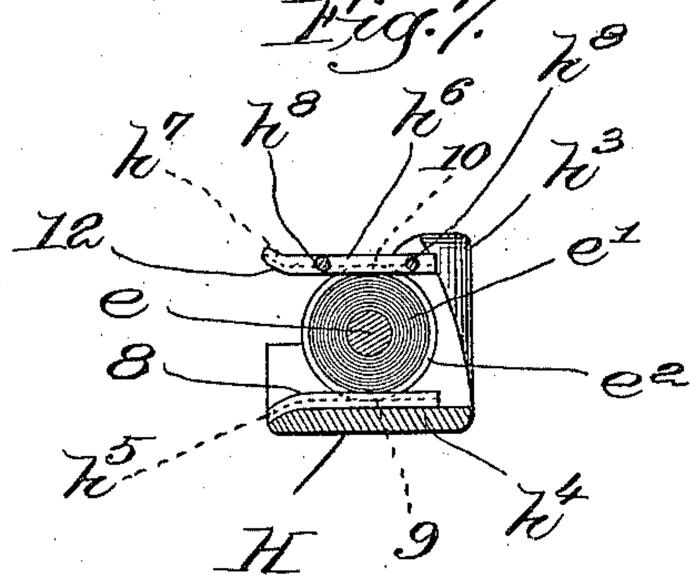


Fig. 7.



Witnesses.
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UNITED STATES PATENT OFFICE.

JAMES RAILTON, OF NEW BEDFORD, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF PORTLAND, MAINE, AND HOPEDALE, MASSACHUSETTS.

FILLING-REPLENISHING LOOM.

SPECIFICATION forming part of Letters Patent No. 687,785, dated December 3, 1901.

Application filed July 29, 1901. Serial No. 70,063. (No model.)

To all whom it may concern:

Be it known that I, JAMES RAILTON, a subject of the King of Great Britain, residing at New Bedford, in the county of Bristol and State of Massachusetts, have invented an Improvement in Automatic Filling-Replenishing Looms, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention has for its object the production of an automatic filling-replenishing loom, and embodies various novel features of construction, operation, and arrangement, as will more fully appear hereinafter.

In my present invention the running shuttle is provided at the proper time with a fresh supply of filling, a suitable hopper or feeder containing a supply of filling-carriers or bobbins to be transferred one by one to the shuttle, the fresh filling being inserted into the shuttle at the side thereof, the spent filling-carrier being automatically ejected from the opposite side of the shuttle. The change of filling is effected upon detection of absence of filling in the shed due to breakage or exhaustion of the filling, detection being accomplished by or through a filling fork or detector, which controls the operation of the means for effecting the actuation of the filling-replenishing mechanism. The structure of the shuttle includes novel features, which will be hereinafter fully described and appropriately claimed.

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, the lay being shown as ready to beat up and the filling-replenishing mechanism in normal condition. Fig. 2 is a front elevation of the lay and shuttle-box at the replenishing side of the loom with certain of the mechanism on the lay and in normal position, the shuttle being shown in the shuttle-box. Fig. 3 is a top or plan view of the mechanism shown in Fig. 1 at the right-hand side of the loom. Fig. 4 is a front elevation of the hopper or feeder as viewed from the front of the loom. Fig. 5 is a top or plan view, enlarged, of the shuttle detached, a filling-carrier being shown in position therein. Fig. 6 is a side elevation of the shuttle; and Fig. 7 is a transverse section on the line $x\,x$, Fig. 6, looking toward the left.

Referring to Figs. 1 and 3, the lay A, breast-beam B, the loom side $A^{\times}$, Fig. 1, and the stand b for the slide b', on the inner end of which the usual filling fork or detector $b^{\times}$ is fulcrumed at b^2, the slide being moved outward in usual manner by the weft-hammer (not shown) when the fork is not tilted, as when filling is absent as the lay beats up, may be and are all of well-known construction and operate in well-known manner.

The filling-replenishing mechanism comprises, essentially, a hopper or feeder, located at one side of the loom, to contain the reserve of filling-carriers, and a transferrer to effect the transfer of the latter one by one to the shuttle as occasion demands, and herein the said mechanism is located at the right-hand side of the loom. An upright casting C is rigidly secured to the breast-beam near its right-hand end and is provided with laterally-extended arms $c\,c$, Fig. 4, to which the hopper is suitably secured, said arms being located in a slightly-inclined plane. (See Fig. 1.) The hopper is made as an elongated box open at the top to receive the filling-carriers and comprises a front c', back c^2, closed inner end c^3, and an outer end c^4, having a slot c^5 running from the top of the hopper to an enlargement c^6 at the bottom. (See Fig. 1.) Each filling-carrier or bobbin comprises the usual barrel e and an enlarged base or head e', provided with annular ribs or rings e^2 to be engaged by the holding means in the shuttle, to be described, and the length of the hopper is such as to accommodate a plurality of the filling-carriers, one resting on top of another. Guide-ribs c^7 on the inner face of the hopper end c^3 embrace the heads of the filling-carriers and direct them down to the bottom of the hopper, and at the opposite end of the latter, inside the end-plate c^4, I have arranged two other parallel guide-ribs c^8, between which the tips of the barrels e of the bobbins gradually slide down to the bottom of the hopper. The back c^2 is cut away at its lower end, as at c^9, Fig. 3, to form a discharge-throat, and the tip of the lowest filling-carrier of the series rests on the bottom edge c^{10} of the slot

enlargement, while the head of such filling-carrier rests on a cross-rib c^{11} on the inner end c^3 of the hopper. (See dotted lines, Fig. 1.) It should be noted that the rear rib c^7 extends down only to the throat c^9, so as to permit discharge of the lowest filling-carrier. I have shown two pivoted detents c^{12} mounted above the throat and extending below it to prevent the lowest filling-carrier from being accidentally thrown or shaken out of the hopper, suitable springs c^{13} yieldingly holding the detents in position. Manifestly the lowermost filling-carrier will be supported in the hopper, as described, and the others superposed one upon another.

A bracket A^2 on the loom side has a laterally-extended stud a, on which is mounted to rock the hub f of a transferrer f', having a curved or segmental head f^2 and an offset tip-engaging portion f^3, (see Figs. 1, 3, and 4,) the front of the hopper being cut away at its lower end, as at c^{14}, Fig. 4, to permit the transferrer and tip portion to swing through the bottom of the hopper. Normally the transferrer is positioned as shown in the drawings; but when actuated to transfer a filling-carrier it is rocked in the direction of arrow 5, Fig. 1, engaging the head and tip of the lowest filling-carrier in the hopper and forcing it out of the throat c^9 into the shuttle, a spring S returning the transferrer to normal position against a stop 6 on the bracket A^2. The transferrer f' has a depending portion or dog f^4, which is struck at the proper time by a bunter on the lay, to be described, to operate the transferrer as the lay beats up. When the transferrer is operated, the curved top of its segmental head f^2 holds up the next filling-carrier above it and releases it to drop into lowermost position when the transferrer returns to normal position shown, the spring-detents c^{12} then moving into holding position.

It will be more convenient to at this time describe the construction of the shuttle, and, referring to Figs. 5, 6, and 7, the shuttle comprises an elongated body H, flat on its bottom to travel across the raceway of the lay and through the shed and slightly upcurved at its ends, as at $h^\times$, which are cut straight across part way, as at h, Fig. 5, giving the body a scow shape in general. The body is cut away from side to side at its top, as at h', to receive the filling-carrier, (designated as a whole by E,) and at each end of the body on its top beyond the recess h' enlarged portions h^2 h^3 are left extended beyond the blunt ends h of the body at one side of the longitudinal axis thereof and being curved downwardly on their upper faces. (See Fig. 5.) These enlargements assist in giving to the shuttle ends the requisite shape to pass readily through the shed, the pickers P for throwing the shuttle in usual manner engaging the blunt ends h h of the shuttle-body.

In order to firmly hold the filling-carrier in the recess h' while the loom is running properly, I have devised a simple structure, which will also permit ejection of a spent filling-carrier by the automatic introduction of a fresh one from the hopper. To this end the bottom of the recess h' has secured thereto near one end a fixed jaw h^4, grooved at h^5 to receive the rings e^2 of the head of the filling-carrier, the inlet side of the jaw being flared (see Fig. 7) at 8, and in the center the grooves h^5 are depressed, as at 9, to form a seat when the filling-carrier is properly positioned. A coöperating movable jaw h^6, located above the fixed jaw, is also provided with transverse grooves h^7, having a seat portion 10 at the center and flared at the inlet side, as at 12, Fig. 7, said jaw being mounted on a strong yielding support h^8, shown as spring-bars branching from a block h^9, secured to the shuttle-body near its opposite end, the bars being bent up to extend above the filling-carrier without interfering therewith and at the same time protecting it during the movement of the shuttle through the shed. The support h^8 normally maintains the jaw h^6 pressed toward the fixed jaw, but yielding when a filling-carrier is inserted between the flaring ends of the jaws. In order, however, to give additional holding power to the movable jaw, I have provided a detent h^{10}, fulcrumed at h^{11} on the shuttle-body adjacent the enlargement h^3, the inner end of the detent being so located as to press down upon a loop h^{12}, extended from the jaw h^6, a strong spring $s^\times$ being interposed between the under side of the outer end of the detent and the top of the shuttle-body. This spring $s^\times$ is powerful enough to normally act through the detent upon the jaw h^6 and hold it locked in operative position to prevent displacement of the filling-carrier.

The shuttle-box at the hopper end of the lay comprises a back wall a^5, which is shown as the binder, and acted upon by the spring-controlled finger a^6 of the usual protector mechanism, said binder being cut away longitudinally at a^7 to permit ejection of a spent filling-carrier, and the front wall a^8, rigidly secured to the lay, is also cut away at a^9 to permit entrance of a fresh filling-carrier from the hopper to the shuttle at the proper time. At its inner end an overhanging top plate or guard a^{10} is secured to the lay, and longitudinally slotted at 14 and 15 (see dotted lines, Fig. 2) for a purpose to be described, and the guard has two upturned lugs 20 21 thereon opposite two similar lugs 30 31 on the front wall a^8.

On a transverse pin 22, connecting the lugs 20 30, I have mounted a shuttle-positioner, shown as an arm k, its downturned free inner end entering the slot 14 and its outer end being jointed by a pin k' with the bifurcated end of a lever k^2, fulcrumed on a transverse pin 32, connecting the upper ends of the lugs 21 31, the pin k' entering longitudinal slots k^3 in lever k^2. (See Fig. 2.) Springs s^3, fixed at one end and at their other ends secured to lever k^2, act normally to depress it, and there-

by to elevate the shuttle-positioner in position shown out of the path of the shuttle, the lever k^2 and outer arm of the bent lever k constituting a toggle. A second cross-pin 33 connects the lugs 21 31 below the pin 32 and forms a fulcrum for a detent-releaser m, having a depending finger m', Fig. 2, and normally held up by springs s^4 s^4, (see Fig. 1,) attached to the releaser and to the lugs 21 31, respectively, the finger at times descending through the slot 15 in the guard a^{10}. A link m^2 is jointed at one end at m^3 to the shuttle-positioner k, beyond its fulcrum, the opposite end of the link being slotted at m^4 to receive a lateral pin m^5 on the releaser m, the latter and the link constituting a toggle connection between the fixed fulcrum 33 and the shuttle-positioner, and as the springs s^3 s^4 work oppositely they keep the parts normally in the position shown clearly in Fig. 2. Now if the shuttle-positioner is swung down in direction of arrow 25, Fig. 2, the shuttle being in the box, it will engage the tip of the extension h^3, and if the shuttle is not fully boxed the movement of the positioner will operate to push it into the box into proper position for transfer of filling. So, too, if the shuttle is properly boxed the spring-actuated end of the detent h^{10} will be in position to be engaged and depressed if the releaser m is rocked to depress the finger m' into engagement with the detent, compression of the spring $s^\times$ thereby ensuing, and the movable jaw h^6 will be released from the locking action of the detent ready for filling transfer. The means for effecting such operations will now be described, as well as the means for operating the transferrer.

A bell-crank N N′ is fulcrumed at $N^\times$ on the casting C, near the inner end of the hopper, the depending arm N′ being connected by a pin n with a link n', slotted at n^2 to receive the pin, the outer end of the link being jointed at n^3 to an upturned rocker-arm N^2, fast on a rock-shaft d', mounted in suitable bearings below the breast-beam, said rock-shaft having thereon a second upturned arm d^2, which is bent over to engage the fork-slide b'. (See Fig. 1.) A spring $d^\times$, Fig. 4, acts to rock shaft d' opposite arrow 38, Fig. 1, and a spring S^6 also tends to maintain the bell-crank in the position shown, this member constituting an actuator, as will appear later, to effect the operation of the shuttle-positioner, detent-releaser, and transferrer. The rear end of the arm N of the actuator extends toward the lay, and it has on its upper edge a cam-surface 40 41 and on its lower edge, but nearer its fulcrum, a second cam-surface 50 51. On the lay in the vertical plane of the actuator a bent lever D D′ is fulcrumed at $D^\times$, the depending part D′ constituting a bunter for the transferrer-dog f^4, while the part D extends upward back of the lay and at its upper end is bent forward, as at D^2, above the shuttle-box, a spring S^8, Figs. 2 and 3, acting to retain the bent lever normally in the position shown. Whenever the filling is absent as the lay beats up, the fork $b^\times$ will not be tilted, and if it is the detecting-beat then the usual outward movement of the slide b' will be effected in well-known manner. Through arm d^2 shaft d' is rocked in direction of arrow 38, and through rocker-arm N^2 and link n' the actuator will be rocked so that the free end of arm N will be lowered into such position that at the next forward beat of the lay the tip 60 will enter between the lever k^2 and releaser m, this being shown sectionally in Fig. 2. As the forward movement of the lay continues the cam-surface 40 41 acts to lift lever k^2 and depress the shuttle-positioner k, as has been described, to insure correct boxing of the shuttle in the filling-replenishing box, and acting an instant later the cam-surface 50 51 depresses the detent-releaser m to release the holding-jaw h^6 from control of the spring-detent h^{10}, thus putting the shuttle in readiness to receive a fresh filling-carrier. While these operations have been effected the tip 60 of the actuator has been acting on the bent end D^2 of the lever D to bring the bunter D′ into position to engage the dog f^4, and thereby the transferrer, already described, will be operated to transfer the lowest filling-carrier from the hopper to the shuttle, the spent filling-carrier being ejected automatically by the incoming fresh one. As the lay then moves back the withdrawal of the actuator N permits quick return of the detent-releaser and the shuttle-positioner to normal inoperative position, and at the same time the bunter D′ returns automatically to inoperative position. An arm c^{30}, secured to the hopper, has a holding device c^{31} for the ends of filling, (see Figs. 3 and 4,) the filling ends being led from the carriers in the hopper through the slot c^5. When the shuttle is thrown across the lay, the end of the fresh filling is held at c^{31}, and it draws under the jaw-holder h^8 and over and under a bent hook h^{20}, located in front of the tip of the filling-carrier, the hook thereafter taking the place of the usual shuttle-eye, the thread running off the filling-carrier around the base of the hook and beneath its overhang. Now when the actuator N has been moved into operative position it must be positively held in such position till after it has effected the various operations described, and consequently I have provided a locking-dog t, fulcrumed on the loom-frame at $t^\times$ and having a notch t' (see Fig. 1) and a cam-lug t^2. A spring s^{10}, fixed at one end and secured at its other end to the dog, normally maintains the latter pressed against the inner edge of the depending arm N′ of the actuator, and when the latter is swung forward the spring s^{10} causes the dog to follow until the lower end of the arm N′ enters the notch or socket t'. The actuator N at such instant is in operative position, and the dog t holds it so until released. The locking position of the dog brings its cam-lug t^2 opposite the rear end of

the link n', and a depending tail t^3, forming a part of the dog, is also moved into the path of a releasing-lug t^4, fast on the lay. Now when the beat up of the lay brings the lug t^4 against the tail t^3 the dog is disengaged or unlocked from the arm N' and partly rocked against its spring s^{10}, and at the same time the return of the rocker-arm N^2 to normal position causes the rear end of link a' to push against the cam-lug t^2 to still further move the dog t back to normal position. The slot n^2 in the link permits longitudinal movement of the latter before the actuator-lever N N' is free to return to its normal position by the action of its controlling-spring S^6.

The mechanism herein described is in actual practice comparatively simple and the filling-replenishing is under the control of the fork or detector, which detects the absence of filling as the lay beats up, the fork being located at the side of the loom farthest from the hopper.

It is to be understood that various mechanisms herein omitted—such as the take-up and let-back devices, stopping means, and other usual appurtenances of a loom—will be in practice employed in well-known manner.

My invention is not restricted to the precise construction and arrangement shown, as the same may be varied or modified in various particulars without departing from the spirit and scope of my invention.

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

1. In a loom, the lay, a shuttle, holding means mounted thereon for a filling-carrier, a hopper to contain a reserve of filling-carriers, a transferrer to transfer a filling-carrier to the shuttle, means to operate the transferrer, a device to act upon the holding means and render the same operative to receive a filling-carrier, and a common actuator for said device and for the transferrer-operating means, governed by or through absence of filling, to first render the holding means receptive and thereafter to operate the transferrer to transfer a fresh filling-carrier from the hopper to the shuttle and into the said holding means.

2. In a loom provided with filling-replenishing mechanism, operating means therefor, the lay, a shuttle to contain a supply of filling, holding means therefor on the shuttle, a shuttle-positioner mounted on the lay, and a device on the latter to render the holding means receptive to the insertion of a fresh filling-carrier, combined with an actuator, movable into operative position by or through absence of filling, to successively actuate the shuttle-positioner and insure proper boxing of the shuttle, and to operate the device to act upon the holding means, rendering the latter receptive to the entrance of a fresh filling-carrier.

3. In a loom, a hopper to contain a plurality of filling-carriers superposed one upon another, said hopper having a discharge-throat, detents to hold the lowermost filling-carrier in position, a transferrer to engage said filling-carrier and move it from the hopper to the shuttle; the lay, a shuttle open at its front and back, means to hold a filling-carrier, and means to automatically release the grasp of said holding means upon the filling-carrier prior to transfer of a fresh filling-carrier to the shuttle.

4. In a loom, the lay, a shuttle, fixed and movable jaws thereon to engage and hold a filling-carrier, a detent to normally hold the movable jaw in operative position, filling-replenishing mechanism at one side of the loom, a shuttle-box on the lay adjacent thereto, a detent-releaser to act upon the detent and thereby release the movable jaw, and means to automatically actuate the detent-releaser prior to the operation of the filling-replenishing mechanism.

5. In a loom, the lay, a shuttle, fixed and movable jaws thereon to engage and hold a filling-carrier, a detent to normally hold the movable jaw in operative position, filling-replenishing mechanism at one side of the loom, a shuttle-box on the lay adjacent thereto, a detent-releaser to act upon the detent and thereby release the movable jaw, a shuttle-positioner overhanging the inner end of the shuttle-box, and means to successively operate the shuttle-positioner and detent-releaser prior to operation of the filling-replenishing mechanism.

6. In a loom, the lay, a shuttle, fixed and movable jaws thereon to engage and hold a filling-carrier, a detent to normally hold the movable jaw in operative position, filling-replenishing mechanism at one side of the loom, a shuttle-box on the lay adjacent thereto, a detent-releaser to act upon the detent and thereby release the movable jaw, a shuttle-positioner overhanging the inner end of the shuttle-box, spring-actuated devices to normally maintain said positioner and releaser in inoperative position, and means operative upon failure of filling in the shed to successively operate the positioner and releaser, the operation of the latter permitting separation of the holding-jaws for the reception of a fresh filling-carrier.

7. In a loom, the lay, a shuttle, fixed and movable jaws thereon to engage and hold a filling-carrier, a detent to normally hold the movable jaw in operative position, filling-replenishing mechanism at one side of the loom, a shuttle-box on the lay adjacent thereto, a detent-releaser to act upon the detent and thereby release the movable jaw, a shuttle-positioner overhangiug the inner end of the shuttle-box, an actuator provided with two cam-surfaces, to respectively effect the operation of the positioner and releaser, and means to move the actuator into operative position prior to the actuation of the filling-replenishing mechanism.

8. In a loom, the lay, a shuttle, fixed and

movable jaws thereon to engage and hold a filling-carrier, a detent to normally hold the movable jaw in operative position, filling-replenishing mechanism, a shuttle-positioner and a device to release the movable jaw from the detent, an actuator to operate said positioner and the releasing device, means to operatively position the actuator upon failure of the filling in the shed, and a locking device to hold said actuator in operative position until after the actuation of the filling-replenishing mechanism.

9. In a loom, the lay, a shuttle, fixed and movable jaws thereon to engage and hold a filling-carrier, a detent to normally hold the movable jaw in operative position, filling-replenishing mechanism, including a transferrer, an operating-bunter therefor, on the lay, an actuator to move the bunter into operative position as the lay beats up, means operative upon failure of the filling in the shed to move the actuator into operating position, and a locking device to hold the actuator in position until after the operation of the transferrer.

10. In a loom, the lay, a shuttle, fixed and movable jaws thereon to engage and hold a filling-carrier, a detent to normally hold the movable jaw in operative position, filling-replenishing mechanism, including a transferrer, an operating-bunter therefor, on the lay, an actuator to move the bunter into operative position as the lay beats up, means operative upon failure of the filling in the shed to move the actuator into operating position, a locking device to hold the actuator in such position until after the transferrer has been operated, and means to release the locking device as the lay completes its forward beat.

11. A shuttle for automatic filling-replenishing looms, having a transverse recess for the filling-carrier, a fixed holding-jaw in the bottom of the shuttle, a coöperating, movable jaw above it, a yielding support therefor, and means to maintain the movable jaw in position to grasp a filling-carrier and retain it in operative position.

12. A shuttle for automatic filling-replenishing looms, having a transverse recess for the filling-carrier, a fixed holding-jaw in the bottom of the shuttle, a coöperating, movable jaw above it, a yielding support therefor, and a spring-controlled detent to normally engage and hold the movable jaw in operative position.

13. A shuttle for automatic filling-replenishing looms, comprising an elongated, scow-like body, fixed and movable holding-jaws extended transversely of the shuttle-body, and having seats in their opposed faces, a yielding support for and upon which the movable jaw is mounted, and a normally operative detent to engage and hold the movable jaw in position to grasp a filling-carrier and maintain it in the seats of the jaws.

14. A shuttle for automatic filling-replenishing looms, comprising an elongated, scow-like body, fixed and movable holding-jaws extended transversely of the shuttle-body, and having seats in their opposed faces, a yielding support for the movable jaw, and means coöperating with said support to normally hold said jaw in position to grip a filling-carrier between it and the fixed jaw.

15. A shuttle for automatic filling-replenishing looms, comprising an elongated, scow-like body, fixed and movable holding-jaws located at one end of and extended transversely of the shuttle-body, and having seats in their opposed faces, a resilient support for the movable jaw, fixed at the opposite end of the shuttle-body and adapted to extend rearwardly above the filling-carrier, and a spring-actuated detent to coöperate with and normally maintain the movable jaw in position to grip a filling-carrier.

16. A shuttle for automatic filling-replenishing looms, comprising a body having blunt ends and adapted to receive a filling-carrier, holding means on the body for the filling-carrier, and overhanging extensions at the ends of the body, at one side of the longitudinal axis of the shuttle.

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

JAMES RAILTON.

Witnesses:
GEORGE N. GARDINER,
JOHN J. BILSBORROW.