No. 686,904. Patented Nov. 19, 1901.

J. NORTHROP.

FILLING REPLENISHING MECHANISM FOR LOOMS.

(Application filed Apr. 29, 1901.)

(No Model.) 2 Sheets—Sheet 1.

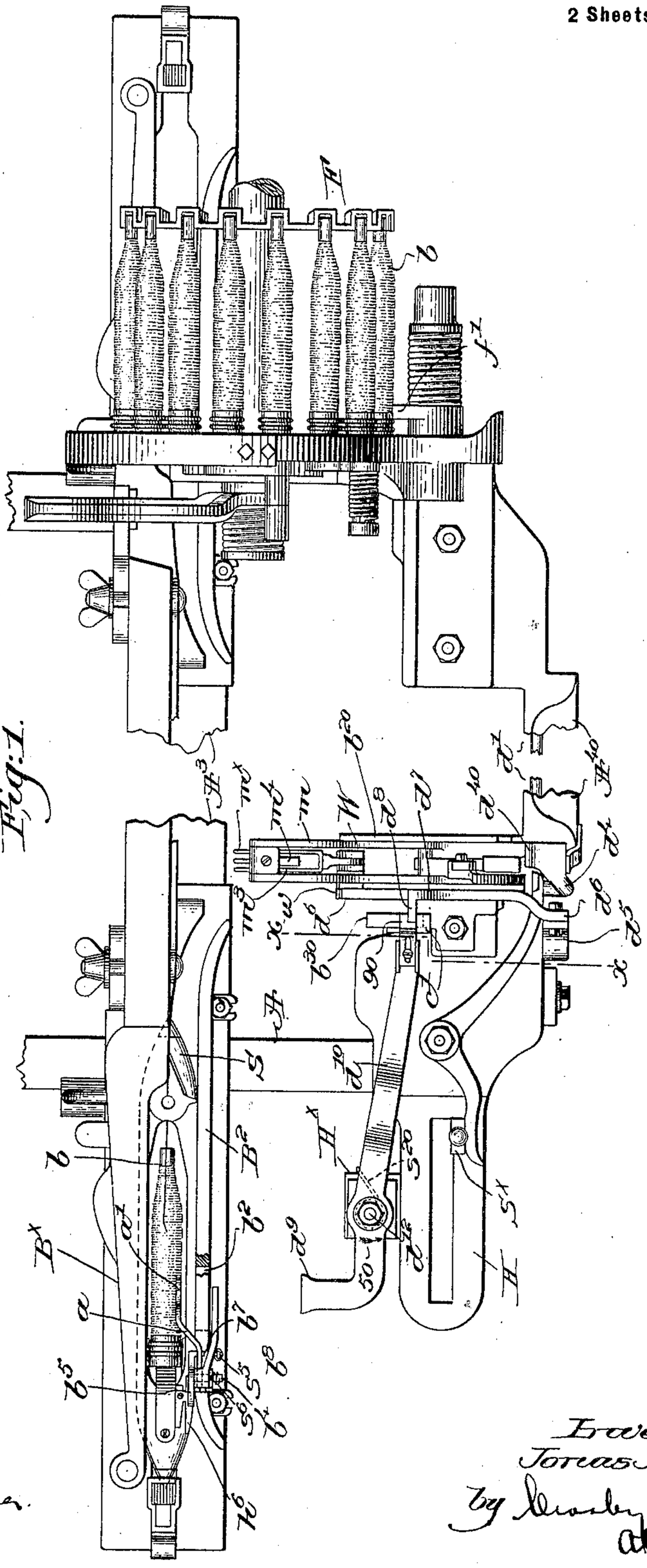

Fig. 1.

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Fig: 2.

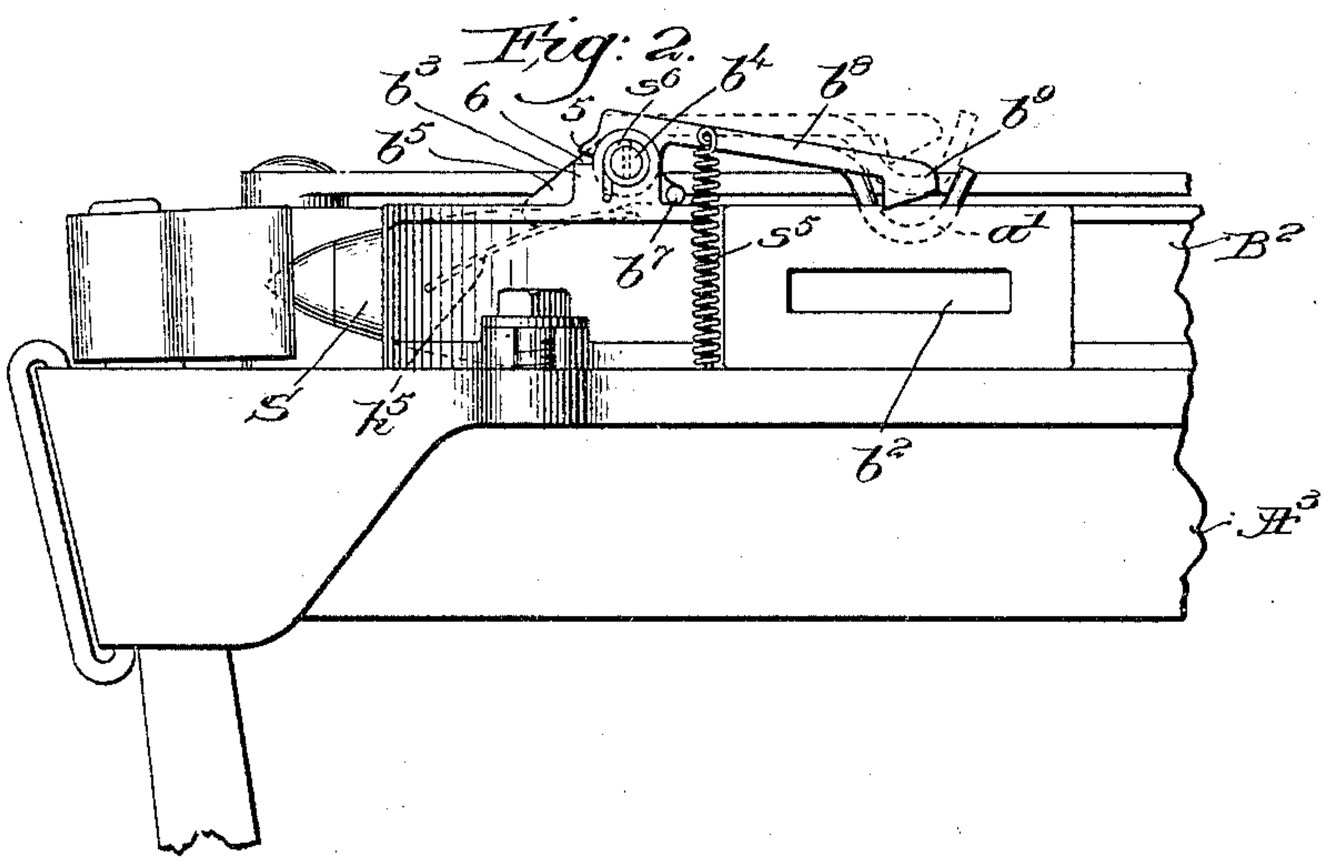


Fig: 4.

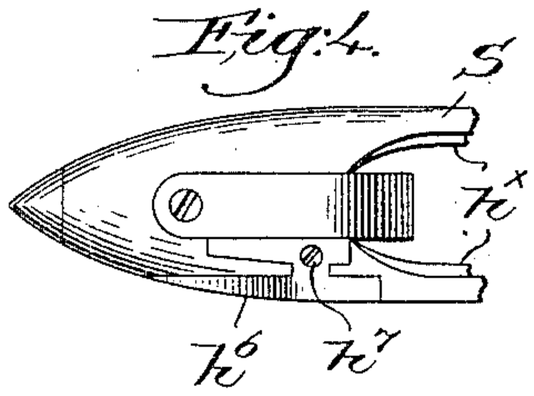


Fig: 5.

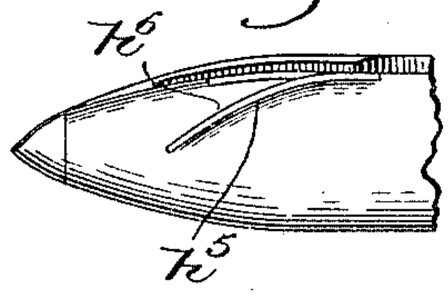


Fig: 3.

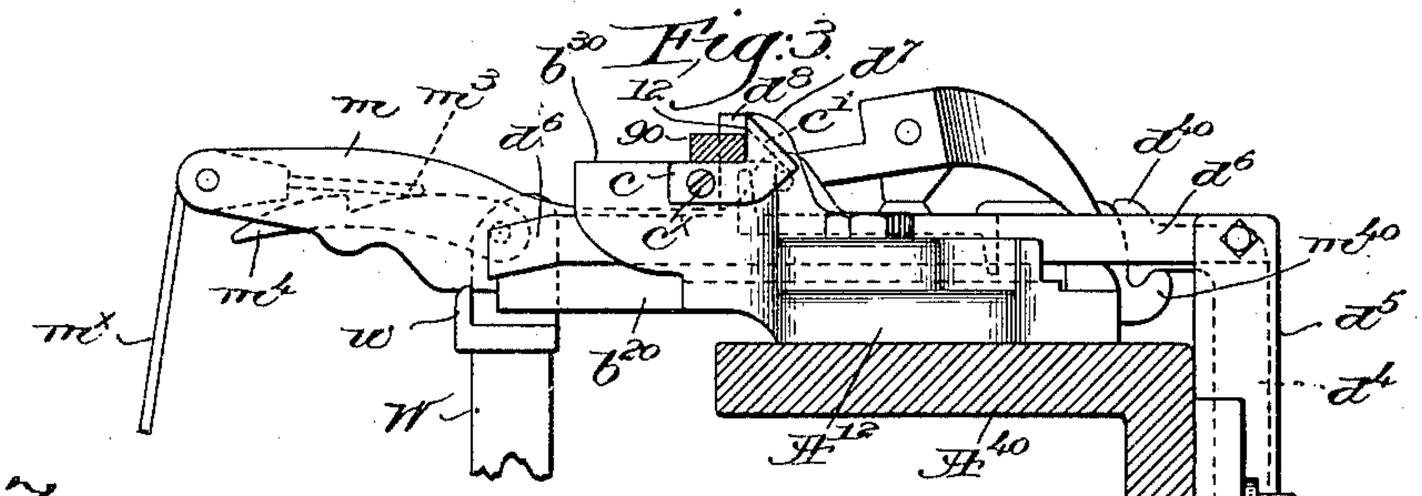


Fig. 7.

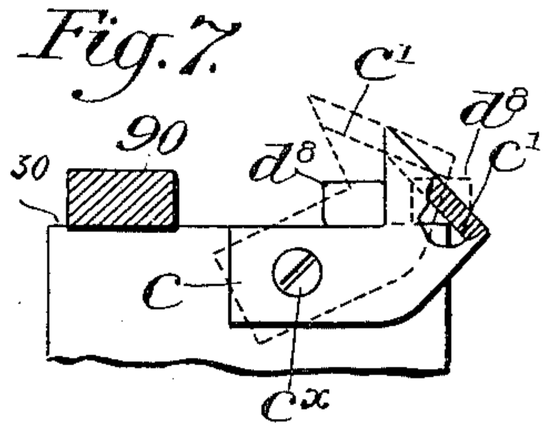
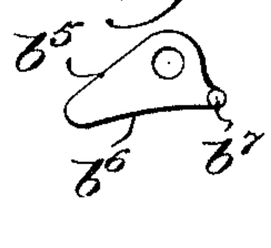
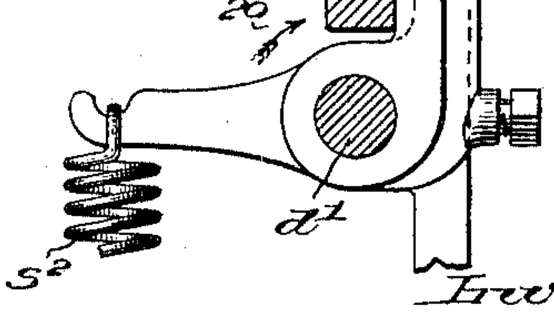


Fig: 6.





Witnesses,
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Attys

UNITED STATES PATENT OFFICE.

JONAS NORTHROP, OF HOPEDALE, MASSACHUSETTS, ASSIGNOR TO DRAPER COMPANY, OF HOPEDALE, MASSACHUSETTS, A CORPORATION OF MAINE.

FILLING-REPLENISHING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 686,904, dated November 19, 1901.

Application filed April 29, 1901. Serial No. 57,890. (No model.)

To all whom it may concern:

Be it known that I, JONAS NORTHROP, a subject of the King of Great Britain, and a resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Automatic Filling-Replenishing Mechanisms for 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 relates to looms provided with automatic filling-replenishing mechanism of the type wherein the change of filling is effected when a feeler detects the exhaustion of the filling in the shuttle to a predetermined extent.

In a former United States Patent, No. 646,866, granted to me April 3, 1900, the operative movement of the feeler is effected by or through the shuttle as it enters the shuttle-box, and the feeler is so constructed that the volume of the filling in the shuttle is determined by measuring its diameter. In my present invention I have also made the feeling movement of the feeler dependent upon the entrance of the shuttle in the shuttle-box, but in a novel manner, an actuating-spring being permitted to effect feeling movement by or through the entrance of the shuttle in the shuttle-box. The volume of filling in the shuttle-box is determined by measuring its diameter in my present invention; but instead of having the feeler straddle the filling mass and engage the same at two points on opposite sides of its longitudinal axis, as in my said patent, I have provided for the engagement with the filling at only one side of its longitudinal axis. Such construction obviates certain practical objections which sometimes occur with the mechanism described in my patent.

Various other features of my invention will be hereinafter described, and particularly pointed out in the following claims.

Figure 1 is a top or plan view centrally broken out of a loom having one embodiment of my present invention applied thereto. Fig. 2 is an enlarged front elevation of the left-hand end of the lay with a portion of the shuttle-box and the feeler and adjacent mechanism. Fig. 3 is an enlarged transverse sectional detail on the line $x\,x$, Fig. 1, looking to the right and showing a portion of the means for determining the time of operation of the filling-replenishing mechanism. Fig. 4 is a top or plan view of one end of the shuttle, showing a cam thereon, to be referred to. Fig. 5 is a side elevation of the end of the shuttle shown in Fig. 4. Fig. 6 is a detail in side elevation of the shoe which coöperates with the shuttle to effect feeling movement of the feeler. Fig. 7 is an enlarged detail of the resetting device, showing normal and abnormal positions thereof by full and dotted lines, respectively.

Referring to Fig. 1, the loom-frame A, breast-beam A^{40}, the lay A^3, the shipper-lever $S^\times$ and its notched holding-plate H, attached to the breast-beam, the filling-feeder F to receive the filling-carriers b, the transferrer f', and the operating or controlling rock-shaft d', adapted to be rotated in the direction of the arrow 20, Fig. 3, to effect a change of filling and normally held in the position shown in said figure by the spring s^2, are and may be all as shown in said Patent No. 646,866, referred to, the parts operating substantially as set forth in said patent.

The filling-replenishing mechanism is located at one side of the loom and is adapted to transfer a fresh supply of filling to the shuttle S when the latter is in the adjacent shuttle-box, while the feeler itself is mounted in my present invention upon the front wall B^2 of the shuttle-box $B^\times$.

The front wall of the shuttle-box $B^\times$ is shown as provided with a longitudinal aperture or slot b^2, for a purpose to be described, and said wall has secured to or forming a part of it, at or near its outer end, an upturned stand or bracket b^3, in which is mounted a short rock-shaft b^4, transverse to the length of the shuttle-box and extended outwardly in front of the stand b^3. At its inner end the rock-shaft has fast upon it a shoe b^5, having its lower longitudinal edge slightly convexed in the direction of its length, as at b^6, (see Fig. 6,) and the shoe is provided with a lateral outwardly-extended lug or projection b^7, for a purpose to be described. The rock-shaft

has pivotally mounted upon it an arm b^8, provided at its extremity with an enlargement b^9, which I shall hereinafter term a "bunter," the same being adapted to swing in a substantially vertical plane in front of the front wall of the shuttle-box and to at times extend in front of and act as a closure for the aperture b^2.

The feeler is shown as an arm a, secured to the arm b^8 and bent inwardly and then extended in the direction of the longitudinal axis of the shuttle-box, the free end of the arm being shown best in Fig. 2 as bent into a substantially U-shaped form at a' to contact intermittingly with the filling in the shuttle, the latter being open at its top and bottom, as in the patent referred to.

The swinging movement of the feeler and bunter will be effected in unison by virtue of their connection; but the feeler by virtue of its position will move into and out of the shuttle when the latter is in the shuttle-box $B^\times$, while the bunter moves up and down inside of the front wall of the shuttle-box.

A spring s^5, secured at one end to the lay and at its other end to the bunter-arm b^8, as herein shown, effects the feeling movement of the feeler, it being understood that on such movement the feeler will move toward and engage the filling at one side of the longitudinal axis of the filling-carrier to determine the volume of the filling mass by measuring its radius, and on such feeling movement the feeler will be arrested by the filling until the latter is exhausted to a predetermined extent, and until such time the downward movement of the bunter will be insufficient to move it in front of the aperture b^2; but when the filling has been sufficiently exhausted to fail to arrest the movement of the feeler at such time the bunter will move down in front of the aperture into operative position for a purpose to be described.

A spring s^6, stronger than the spring s^5, is secured at one end to the rock-shaft b^4 and at its other end to the stand b^3, the winding of the spring being such as to normally maintain the feeler and bunter in dotted-line position, Fig. 2, with a shoulder 5 on the feeler-arm in engagement with a stop 6 on the stand, and at such time the shoe b^5 will be depressed so that the stud or projection b^7, which projects beneath the feeler-arm a, will lift it and hold it in dotted-line position, Fig. 2, with the spring s^5 stretched.

Referring to Figs. 4 and 5, the end of the shuttle, which is provided with the holding-jaws $h^\times$ for the head of the filling-carrier, is herein shown as cut away on its side to leave a cam-shaped shoulder h^5, which preferably is protected by a metal plate h^6, secured to the shuttle in any suitable manner, as by a screw h^7, Fig. 4. Now when the shuttle enters the shuttle-box $B^\times$ the cam will engage the lower edge of the shoe b^5 and will rock the said shoe in opposition to the action of the spring s^6 into the position shown in full lines, Fig. 2, and the stud b^7 will be withdrawn from engagement with the feeler-arm, so that the action of the spring s^6, which I shall term the "retractile" spring, is neutralized and the spring s^5 is free to act to move the feeler into the shuttle to feel the filling therein. As the shuttle is thrown out of the shuttle-box $B^\times$ the retractile spring s^6 immediately acts to return the shoe to normal position and through the stud b^7 to lift the feeler into normal position.

The rock-shaft d' is provided with an upturned arm d^5, Fig. 3, on the upper end of which is pivotally mounted a latch d^6, which is rearwardly extended across the breast-beam, said latch when in its operative position being adapted to be engaged by a shoulder w on the weft-hammer W. An upturned ear d^7 on the latch is provided with a transverse projection d^8, which normally rests upon a wear-plate 90, secured to one end of a substantially L-shaped detent d^9 d^{10}, fulcrumed on a vertical pivot d^{12}, mounted on a bracket $H^\times$, secured to the holding-plate H, as shown in Fig. 1. The arm d^9 of the detent is extended rearwardly and is adapted to enter the aperture b^2 in the front wall B^2 of the shuttle-box at each forward beat of the lay until a change of filling is to be effected, and so long as the arm d^9 can enter said aperture the detent will not be moved from operative position (shown in Fig. 1) and the latch d^6 will be maintained inoperative or out of the path of the shoulder w on the weft-hammer. The usual filling-fork $m^\times$ is pivotally mounted on a slide m, supported in a guide b^{20}, and the filling-fork is provided with a loop-like tail m^3 to coöperate with the usual hook m^4, carried by the weft-hammer, when upon failure of the filling the fork is not tilted, as will be understood by those skilled in the art, the outer end of the slide having a hooked portion m^{40} to engage the correspondingly-shaped end d^{40} of an upturned arm d^4, fast on the rock-shaft d', substantially as in United States Patent No. 662,320, dated November 20, 1900. The guide b^{20} forms part of a stand A^{12}, bolted to the breast-beam and having an upturned portion provided with a horizontal face b^{30}, (see Fig. 3,) on which the plate 90 of the detent slides. So long as the detent retains the latch d^6 inoperative there will be no change of filling, unless effected by or through the filling-fork $m^\times$, if the filling breaks; but when the filling in the shuttle has been sufficiently exhausted to permit the feeler a' to move down past the filling-carrier far enough to position the bunter b^9 in front of the aperture b^2 the said bunter will engage the rearwardly-extended arm d^9 of the detent and the latter will be rocked on its pivot in the direction of the arrow 50, Fig. 1, withdrawing the plate 90 from beneath the projection d^8, and the latch will drop so that it will be in the path of the shoulder w on the outward stroke of the

weft-hammer, and thereby the arm d^5 will be swung outward, rocking the shaft d' in the direction of the arrow 20, and a change of filling will be effected in well-known manner when the shuttle enters the shuttle-box at the right-hand side of the loom. A spring s^{20}, Fig. 1, normally acts to retain the detent in its operative position beneath the projection d^8 and against the upturned face 12 of a resetting member pivotally mounted on a part of the guide b^{20}, the resetting device being shown as a substantially ⌊-shaped casting c, pivotally mounted at $c^\times$ and having an inclined and laterally-extended head c', the under face of which normally rests on the outer edge of the shelf b^{30}. (See Figs. 3 and 7.) When the plate 90 is withdrawn from beneath the projection d^8, the latter drops onto the horizontal shelf b^{30}, and so below the upper end of the inclined head c' of the resetting device, and when the latch d^6 is moved outwardly or to the right (viewing Fig. 3) by or through the action of the weft-hammer the projection d^8 will pass underneath and engage the under inclined surface of the head c' and will act to tilt the resetting device c upwardly on its fulcrum $c^\times$ (see dotted line, Fig. 7) until the projection passes out from beneath the lower edge of the head, whereupon the device c immediately resumes its normal position. (Shown in full lines, Fig. 7.) When the rock-shaft d' is returned to its normal position after change of filling is effected, the latch d^6 is moved to the left, (viewing Fig. 3,) and then the projection d^8 engages and rides up over the outer inclined face of the head c' and drops off the upper edge of the same onto the plate 90 of the detent, the latter by that time having returned to the position shown in Fig. 3, the resetting device c also returning to its normal position as soon as the projection d^8 has passed from beneath the lower edge of the head c', as above stated, and the parts are thus reset ready for the next operation of the filling-replenishing mechanism.

By the construction herein shown I obviate the use of a shuttle having a side aperture in its side wall, and the detent is only moved when the actuation of the filling-replenishing mechanism is to be effected. Furthermore, the feeler in my present invention is not called upon to perform any function other than that of feeling the filling in the shuttle, the bunter, which is controlled as to its position by or through the feeler, coöperating with the detent to release the latch at the proper time.

In my prior patent, which I have hereinbefore referred to, the calipering of the diameter of the filling mass by the feeler is effected by causing the feeler to intermittingly engage the feeling at two points on opposite sides of its longitudinal axis; but this sometimes proves objectionable in practice, as there is a tendency to jam the feeler and the filling-carrier.

By measuring the radius as in the present structure I entirely obviate any possibility of jamming or catching of the feeler on the filling mass in the shuttle, because the feeler contacts with the filling at only one side of the longitudinal axis of the filling-carrier.

The shuttle is in my present invention made to directly control the feeling movement of the feeler rather than by the operation of an intermediate device, such as the picker in my patent referred to, and a somewhat more accurate operation of the feeler is thus effected with a closer timing of the feeler movement with the boxing of the shuttle.

The construction of the various parts hereinbefore described is simple, strong, and durable, and not likely to get out of order.

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-box thereon having an aperture in its front wall, automatic filling-replenishing mechanism, controlling means therefor including a normally-operative detent adapted to intermittingly enter the aperture, combined with a feeler to intermittingly determine the volume of filling in the shuttle, and a bunter governed by the feeler and adapted to move across the aperture in the shuttle-box wall to engage and move the detent into inoperative position when the filling in the shuttle is exhausted to a predetermined extent.

2. In a loom, the lay, a shuttle-box thereon having an aperture in its front wall, a feeler and a bunter, operatively connected and pivotally mounted on the shuttle-box, and means to intermittingly effect movement of the feeler into the shuttle when in the shuttle-box to determine the volume of the filling in the shuttle, the bunter moving outside of the front wall of the shuttle-box and across the aperture therein when the filling in the shuttle is exhausted to a predetermined extent, combined with automatic filling-replenishing mechanism and controlling means therefor, including a latch and a detent normally maintaining the latch inoperative and adapted to intermittingly enter the aperture in the shuttle-box wall until the latter is crossed by the bunter.

3. In a loom, the lay, a shuttle-box thereon having an aperture in its side wall, and a shuttle having an open top, filling-replenishing mechanism and means to determine the time of its operation, including a pivotally-mounted L-shaped detent, one end of which is adapted to intermittingly enter the aperture in the shuttle-box wall, combined with a feeler mounted on the shuttle-box and movable by the entrance of the shuttle into the box to engage and feel the filling in the shuttle, and means controlled by the feeler to close

the aperture in the shuttle-box wall and cooperate with the detent, to render the same inoperative, when the filling in the shuttle is exhausted to a predetermined extent.

4. In a loom, the lay having a shuttle-box, a normally-inoperative feeler and a connected bunter, both mounted on the shuttle-box, and movable on opposite sides of the front wall thereof, the latter having an aperture therein, a shuttle, and means governed by the entrance of the shuttle into the shuttle-box to effect movement of the feeler to engage and be arrested by the filling in the shuttle until it is exhausted to a predetermined extent, combined with filling-replenishing mechanism, and means to determine the time of its operation, said means including a member to coöperate with the bunter when the filling has been exhausted to the predetermined extent, and said bunter is interposed between the aperture in the shuttle-box wall and said member.

5. In a loom, the lay, a shuttle having an open top, and a shuttle-box having an aperture in its front wall, a filling-feeler mounted on the shuttle-box, means actuated by or through the shuttle to move the feeler through the open top of the shuttle and feel the filling therein, and a closure for the said aperture governed by the feeler, combined with filling-replenishing mechanism controlled as to its operation upon movement of the closure across the said aperture.

6. In a loom, the lay, a shuttle, a shuttle-box having an aperture in its front wall, automatic filling-replenishing mechanism, and means to determine the time of its operation including a latch, and a detent to normally maintain the latch inoperative, said detent entering normally said aperture at each forward beat of the lay, combined with a feeler, a bunter normally maintained by the feeler in inoperative position, and means to effect movement of the feeler to intermittingly determine the volume of the filling in the shuttle by measuring the radius of the filling mass, detection of predetermined exhaustion of filling by the feeler moving the bunter across the said aperture and into the path of and to move the detent on the forward beat of the lay, to thereby effect actuation of the filling-replenishing mechanism.

7. In a loom provided with automatic filling-replenishing mechanism, a shuttle, a feeler to intermittingly engage and feel the filling in the shuttle, a spring to move the feeler toward the filling, a stronger retractile spring to maintain the feeler inoperative, and means actuated by or through the shuttle to neutralize the action of the retractile spring and permit the feeler to be yieldingly moved toward the filling.

8. In a loom, the lay, a shuttle-box having an aperture in its front wall, a shuttle, automatic filling-replenishing mechanism, a pivotally-mounted feeler and a connected bunter, a spring to effect feeling movement of the feeler into engagement with the filling in the shuttle, a stronger retractile spring to withdraw the feeler, means actuated by engagement with the shuttle to neutralize the effect of the retractile spring, and thereby permit yielding movement of the feeler until arrested by the filling, and a detent to be engaged and moved by said bunter when the latter is positioned in front of the aperture upon exhaustion of the filling to a predetermined extent.

9. In a loom, the lay, a shuttle-box, a shuttle having an open top, a transverse rock-shaft mounted on the shuttle-box, a connected feeler and bunter pivotally mounted and extending on opposite sides of the front wall of the shuttle-box, a spring to effect movement of and to bring the feeler into contact with the filling in the shuttle, a shoe fastened on the rock-shaft, and having a lug to engage and move the feeler out of the shuttle, a spring to rock the rock-shaft and cause the feeler to be retracted and the shuttle to engage the shoe and move it against its controlling-spring, and thereby permit the feeler-spring to operate.

10. In a loom, the lay, a shuttle-box thereon having an aperture in its front wall, a rock-shaft mounted on the shuttle-box transversely thereto, and having a rigidly-attached shoe, a spring to rock the shaft in one direction, a feeler and a bunter, connected and loosely mounted on the rock-shaft, a spring to move the feeler into engagement with the filling in the shuttle, the shuttle having a cam on its exterior to engage the shoe and turn the rock-shaft against its controlling-spring when the shuttle enters the box, to thereby permit the feeler-spring to operate, and a lug on the shoe to retract the feeler when the shoe is released by exit of the shuttle from the shuttle-box.

11. In a loom provided with automatic filling-replenishing mechanism, means to control the operation thereof including a rock-shaft, an arm fast thereon, a latch pivotally mounted on said arm, a detent to normally maintain the latch inoperative, and the weft-hammer to engage the latch when released by the detent, combined with means operated by or through the shuttle to intermittingly determine by measuring its radius, the volume of the filling in the shuttle, a shuttle, and a bunter movable into position to engage the detent when the filling in the shuttle has been exhausted to a predetermined extent.

12. In a loom, the lay, a shuttle-box thereon, a feeler and a connected bunter pivotally mounted on the shuttle-box, a shuttle having an open top, a spring to move the feeler into the shuttle-box to feel the mass of filling therein at a point on one side of its longitudinal axis, and to be arrested by the filling

until exhausted to a predetermined extent, a stronger retractile spring to withdraw the feeler, and means operated by direct engagement with the shuttle to neutralize the action of the retractile spring combined with filling-replenishing mechanism, and means to determine the time of its operation, said means including a member adapted to be engaged and moved by the bunter when the filling in the shuttle has been exhausted to a predetermined extent.

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

JONAS NORTHROP.

Witnesses:

GEORGE OTIS DRAPER,

ERNEST W. WOOD.