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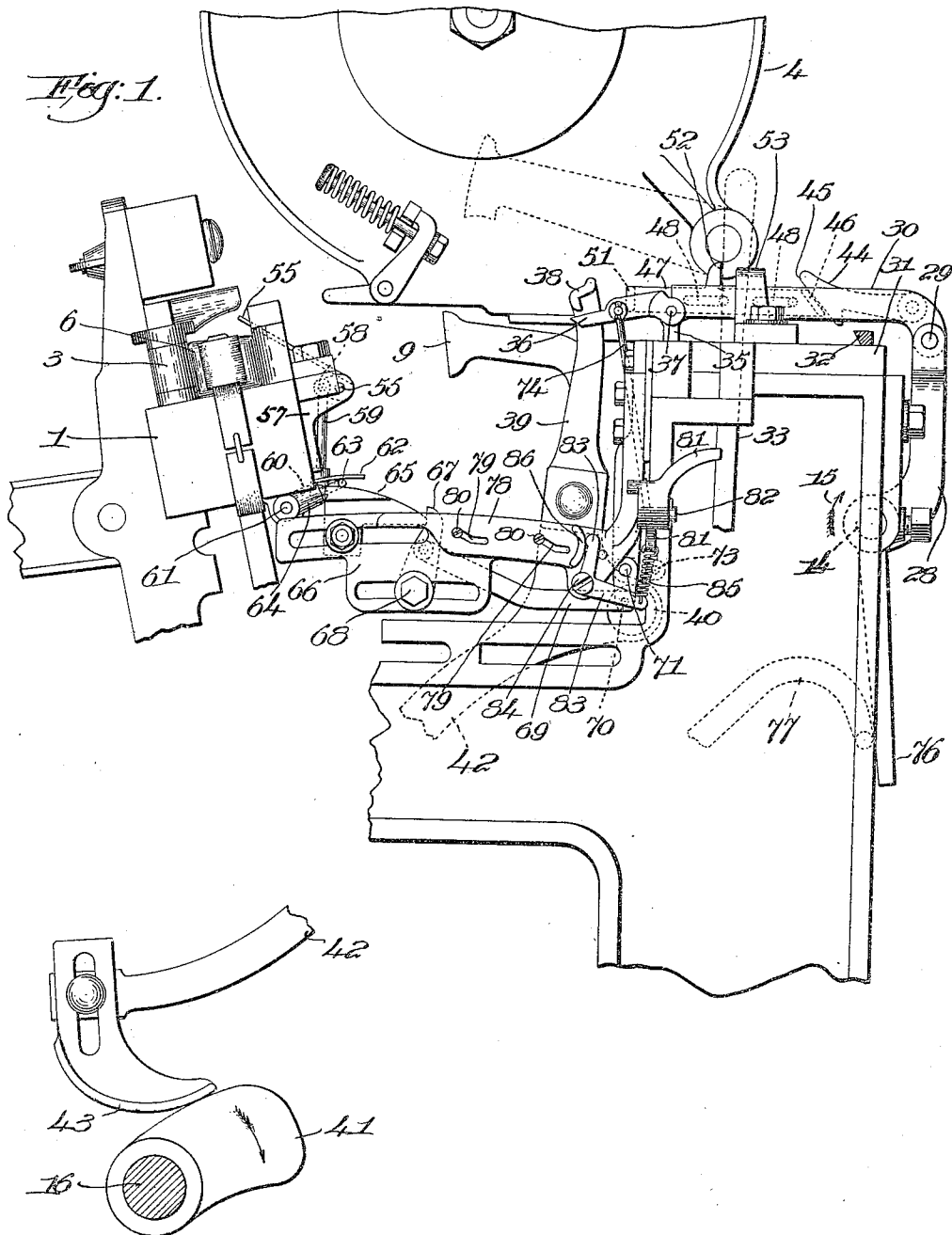
LOOM.

APPLICATION FILED OCT. 6, 1909.

952,637.

Patented Mar. 22, 1910.

3 SHEETS—SHEET 1.



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LOOM.

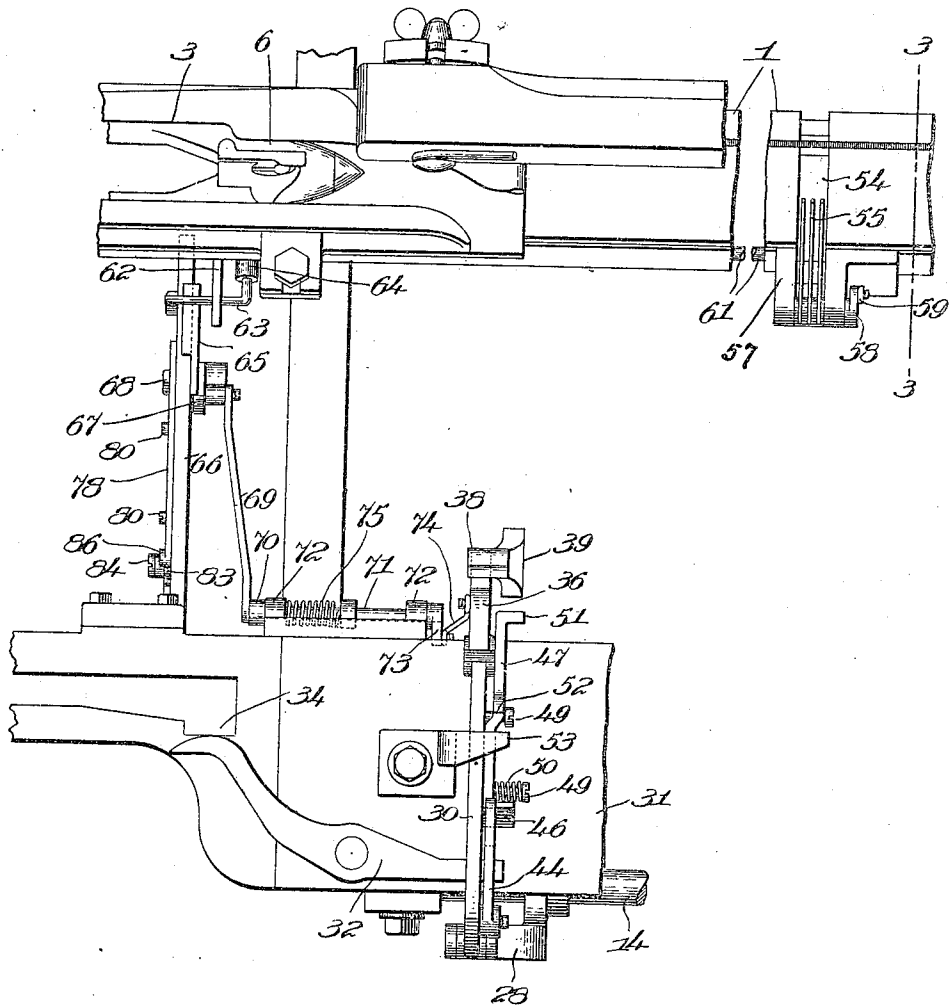
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3 SHEETS—SHEET 2.

Fig. 2.



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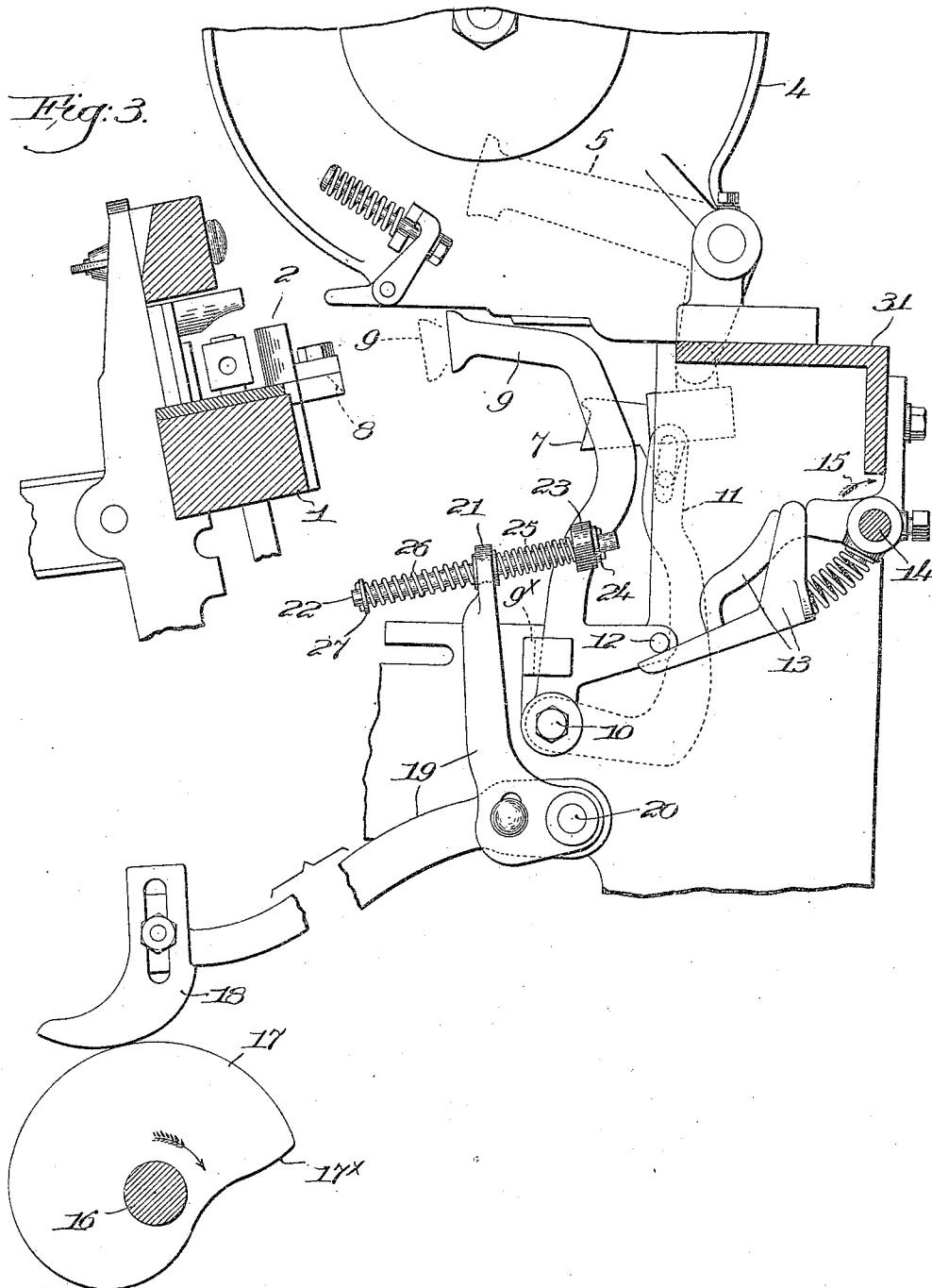
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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LOOM.

952,637.

Specification of Letters Patent.

Patented Mar. 22, 1910.

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To all whom it may concern:

Be it known that I, ALONZO E. RHOADES, a citizen of the United States, and resident of Hopedale, county of Worcester, State of Massachusetts, have invented an Improvement in Looms, of which the following description, in connection with the accompanying drawing, is a specification, like characters on the drawing representing like parts.

This invention relates more particularly to looms provided with mechanism to replenish automatically the running filling, and the invention herein is illustrated in connection with a loom of the Northrop type, one form of which is found in United States patent to Northrop No. 529,940, dated November 27, 1894.

It is desirable to effect filling replenishment promptly upon the detection of filling absence, and a structure has been devised whereby, through the instrumentality of a detector at the replenishing side of the loom, the replenishment of filling is effected on the pick of the shuttle toward the replenishing mechanism, immediately following detection of filling absence on that pick.

Owing to the speed at which modern looms are run the operation of the replenishing mechanism immediately following detection of filling absence must be effected in an exceedingly short period of time, which period is reduced when the detector is located at the replenishing side of the loom, demanding almost too much of the mechanism for the accomplishment of the desired object.

In the present invention means are provided to effect filling replenishment on the pick in which filling absence is detected, and in order to afford more time for the desired operation of the parts, and to relieve the mechanism to a considerable extent use is made of a center filling-detecting mechanism, whereby a considerable gain is made in the time in which the required operations can be performed.

While the absence of filling is detected on either pick, in this invention, such detection is effective only on the pick in which the shuttle is moving toward the replenishing side of the loom, as will appear hereinafter.

Provision is herein made whereby a plurality of successive operations of the replenishing mechanism causes stoppage of the loom automatically.

Should the shuttle be improperly boxed when replenishment of filling is called for the operation of the replenishing mechanism is prevented by simple and effective means, and the take-up of the cloth is arrested temporarily when filling replenishment is called for.

The various novel features of the invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a left-hand side elevation of part of a loom embodying one form of the present invention, showing filling-replenishing mechanism of the Northrop type at the right-hand side of the loom. Fig. 2 is a top plan view of the left-hand side of the loom, with the lay broken out and showing the center filling-detecting mechanism and parts controlled thereby. Fig. 3 is a transverse section of the loom, taken at the right of the line 3—3, Fig. 2.

In the drawings, 1 is the lay, having shuttle-boxes 2 and 3, the former at the right-hand end thereof, adjacent the filling-replenishing mechanism, which comprises a magazine or hopper 4 for the spare filling-carriers or bobbins, a transferer 5 to transfer the bobbins singly to the running shuttle 6, Fig. 1, a dog 7 operatively connected with the transferer, and a bunter 8 on the lay, all substantially of usual construction and operating in well-known manner.

A shuttle-feeler 9, partly shown in Fig. 1, is fulcrumed at 10 Fig. 3, to swing rearward and feel for the shuttle in the box 2 when filling replenishment is called for, said feeler having an attached arm 11 which coöperates with and governs the position of the dog 7, moving the latter into and out of the path of the bunter 8 on each pick of the shuttle to the replenishing box 2, by means to be described. A lug 12 on the feeler is engaged by a compound, spring-controlled arm 13 carried by the rock-shaft 14, common to the Northrop type of automatic loom, rotation of said rock-shaft in the direction of arrow 15 acting through arm 13 and lug 12 to swing the shuttle-feeler rearward to feel for the shuttle and if the latter is properly boxed to permit the replenishing mechanism to operate.

In this invention the shuttle-feeler is arranged to oscillate during the normal operation of the loom, the cam-shaft 16 of

the loom having fast upon it a cam 17, Fig. 3, cooperating with a follower 18 on a bell-crank 19 fulcrumed at 20, the upturned arm of said bell-crank having an eye 21 through which is loosely extended a rod 22. Said rod at its forward end is loosely held in a lateral ear 23 on the shuttle-feeler, a collar 24 on the rod preventing withdrawal from the ear, and light centering springs 25, 26 are coiled around said rod, one between the ear and the eye 21 and the other between said eye and a collar 27 on the rear end of the rod, to constitute a yielding connection between the feeler and the bell-crank.

As the cam-shaft revolves once for each two picks the shuttle-feeler will be correspondingly oscillated. It is retracted or swung forward on the pick of the shuttle to the left, and on the pick to the right, or toward the box 2, the feeler is swung rearward against the stop 9*, the throw of the cam 17 being such that the rearward swing of the feeler acts through the arm 11 to move the dog 7 directly into the path of the bunter 8 as the lay beats up. There is very little clearance between the dog and the bunter when said dog is inoperative, so that a relatively slight rearward movement of the feeler 9 into dotted line position, Fig. 3, will operatively position the dog, the end of the feeler crossing the mouth of the box 2 as the lay moves forward and as such forward movement continues the sudden rise 17* of the cam 17 operates to quickly retract the feeler, and thereby the dog 7 is returned to inoperative position before the bunter 8 reaches it, provided filling replenishment is not called for. In other words, if the filling remains intact the above described operations are performed on every pick on which the shuttle moves to the box 2, and after the feeler is retracted as described it will be given an additional forward movement as the tip thereof meets the back-plate of the shuttle-box, the spring 26 at such time being somewhat compressed, but the high part of the cam 17 acts as the lay swings back and retains the feeler in its normal, full line position, Fig. 3, preventing any interference of the feeler with the shuttle when it is picked from right to left. If filling replenishment is called for, however, the turning of rock-shaft 14 acts through arm 13 and lug 12 to maintain the feeler in its rearward position to feel for the shuttle and to retain in operative position the dog 7 if the shuttle is properly boxed, and at such time the spring 25 will be compressed, for it will be remembered that the rise 17* of the cam 17 has just acted to retract the feeler. The dog being thus held in its operative position will be engaged by the bunter 8 and filling re-

plenishment will be effected in well-known manner.

If the shuttle is improperly boxed it will engage the feeler and move it forward as the lay advances, the spring 26 being compressed and the spring-controlled arm 13 yielding, and the arm 11 moves the dog out of operative position, thereby preventing the complete operation of the replenishing mechanism. Should the shuttle protrude from the box 2 when the filling is intact it will engage the feeler and press it forward as the lay advances, but the compression of spring 26 allows such feeler movement without any damage, as will be manifest, and the spring-controlled arm 13 will also yield as the lug 12 depresses it. The prevention of filling replenishment by the feeler when the shuttle is improperly boxed is present in looms of the Northrop type, and hence is not novel *per se*, but the regular oscillating or swinging movement of the feeler due to the feeler-cam 17 is novel, and its utility is manifest. That is, inasmuch as the dog is operatively positioned at every pick of the shuttle toward the replenishing side of the loom, the maintaining of said dog in such position by or through the turning of the rock-shaft 14 when filling replenishment is called for is accomplished quickly and readily, with a very vital saving in time and giving the parts of the mechanism an opportunity to operate more easily.

The means for turning rock-shaft 14 to effect the operation of the replenishing mechanism, and the center filling-detecting instrumentality which governs the same, will now be described in order.

An upturned arm 28 fast on said rock-shaft is pivotally connected at 29 to a latch-carrier 30 extended rearward across the breast-beam 31 and over the adjacent end of the knock-off lever 32 which is arranged to release the shipper 33, Fig. 1, from its holding notch 34, Fig. 2, the rear end of the latch-carrier being supported by a depending lug 35. A latch 36 is pivotally mounted on the latch-carrier at 37 and extends rearwardly therefrom, to be at times engaged by the shouldered head 38 of a vibrating member or actuator 39, fulcrumed at 40 and vibrated by a cam 41, Fig. 1, on the cam-shaft 16, the long leg 42 of the actuator carrying the cam-follower or shoe 43. The latch 36 is normally positioned out of the path of the head 38, as shown in Fig. 1, but when the latch is operatively positioned to be engaged by the head on the forward stroke of the actuator 39 the latch-carrier 30 will be moved forward and thereby the rock-shaft 14 will be turned to effect a change of filling if the shuttle is properly boxed. The latch-carrier has pivotally mounted upon it a

hooked dog 44 with a beveled face 45 adapted to rest upon an inclined shelf 46 on a slide 47 longitudinally slotted at 48 to receive lateral studs 49 on the latch-carrier. One of the studs has a spring 50 coiled around it, Fig. 2, which bears against the slide and presses it against the adjacent face of the latch-carrier, and the rear end of the slide is bent laterally at 51 into the path of the actuator 39.

The first outward movement of the latch-carrier 30 moves the slide with it until a shoulder 52 thereon abuts against a fixed stop 53, arresting the slide and letting the dog 44 drop onto the top of the knock-off lever 32 as the carrier 30 completes its forward movement. On the return of the carrier as the rock-shaft 14 resumes its normal position, as usual, the slide 47 returns, but the dog now drops back of the knock-off lever in operative position, and if for any reason there is a second outward movement of the latch-carrier, as for instance because of a shuttle-misthread, the dog 44 turns the lever 32 and releases the shipper, to stop the loom. When the loom is thereafter started, or if such a second outward movement of the latch-carrier does not occur, the actuator 39 on its forward stroke hits the end 51 of the slide and resets it on the carrier, the shelf 46 engaging the face 45 of the dog and restoring the latter to normal position. This arrangement, broadly speaking, to effect shipper release upon a plurality of successive operations of the replenishing mechanism, is similar to devices heretofore employed to perform corresponding functions in looms of the Northrop type, but the arrangement herein shown, in connection with the parts of the apparatus, is believed to be novel.

The center filling-detecting mechanism.—Referring to Fig. 2 the lay 1 has a transverse slot or recess 54 substantially midway between the shuttle-boxes, to receive the tines of the center filling-detector or fork 55, fixedly attached to a horizontal rock-shaft 56 having bearings in a bracket 57 attached to the front of the lay, said shaft having a rocker-arm 58 connected by a short link 59 with a short arm 60, Fig. 1, fast on a rock-shaft 61 mounted at the underside of the lay and extended toward its left-hand end. As the shuttle is picked and lays the filling, the shaft 61 is turned to depress the tines of the detector 55 into position to engage the filling, if present, extending across the recess 54, as is usual in center-fork structures, a light spring 62 effecting the detecting movement of the detector 55. This spring bears against a follower 63 extended laterally from an arm 64 on the outer end of rock-shaft 61, the follower traveling upon a cam 65 held in adjustable position on a bracket 66 fixedly

attached to a suitable part of the loom-frame. 65 When the lay moves forward from the position shown in Fig. 1 the follower 63 travels along the forwardly and downwardly inclined cam 65 until the detector engages and is held up by the filling, and as the lay beats 70 up said follower leaves the cam before it reaches its forward end, and the operation of the loom is unchanged, the cam lifting the follower and elevating the detector 55 on the back stroke of the lay, as shown in Fig. 1, 75 and out of the shuttle-path. If the filling breaks or runs out, however, the detector will not be upheld on the forward beat of the lay, and the follower will travel the length of the cam 65 and engage the up- 80 turned end of a finger 67 fulcrumed at 68 on the bracket 66, swinging the finger forward. Said finger is connected by a link 69 with a depending arm 70 fast on a short rock-shaft 71, Fig. 2, mounted in suitable 85 bearings 72 on the loom-frame, said shaft having a second arm 73 connected by a link 74 with the latch 36, the connecting arms 70 and 73 forming a bell-crank.

When the finger 67 is swung forward as 90 described, the shaft 71 is turned against the action of a spring 75, Fig. 2, and the latch 36 is operatively positioned in the path of the head 38, so that when the actuator 39 moves forward on its operating stroke the 95 latch-carrier 30 will turn the controlling rock-shaft 14 to cause replenishment of filling. At such time an arm 76 depending from the shaft 14 coöperates with the end of a lever 77, shown in dotted lines, Fig. 1, 100 to arrest take-up, the lever being in practice a part of the pawl-carrier of take-up mechanism substantially such as is shown in United States Patent No. 643,284, granted to Clement February 13, 1900. If the filling 105 is present the follower 63 will be held above and out of engagement with the finger 67 at a fixed point in the forward beat of the lay, at every pick, and the finger or parts controlled by it will remain quiescent, but when 110 filling absence is detected the follower and finger will engage at the fixed or critical point in the forward stroke of the lay, and the latch 36 will be operatively positioned, on either pick. Filling replenishment must 115 take place only when the shuttle is in the box 2, however, and herein the replenishing mechanism cannot operate at any other time, for when filling absence is detected on the pick of the shuttle to the left, Fig. 2, away 120 from the shuttle-box 2, the shuttle-feeler 9 is held in its forward position by the action of the high part of cam 17 on the follower 18, maintaining the dog 7 in its inoperative position, Fig. 3, and the actuator 39 is on its 125 backward stroke, as in Fig. 1. The forward stroke of said actuator will not be made until after the next pick of the shuttle, from

box 3 toward the replenishing side of the loom, consequently, there is nothing to move the latch-carrier 30 forward after detection of filling absence on the pick from right to left. The timing of the cam 41 is such that when the detector 55 has its detecting movement on either pick the head 38 of the actuator will be back beyond the latch 36, so that the latter can be lifted if filling absence is detected. The shuttle is picked from the box as, or immediately after, the lay crankshaft passes top center, the center filling-detector being raised out of the way before the shuttle reaches it.

The active or forward movement of latch 36 and the consequent feeling movement of the shuttle-feeler 9, operatively positioning the dog 7, take place only when filling absence is detected on the active detecting pick; viz., that one on which the shuttle moves toward the replenishing shuttle-box 2, and after the shuttle has passed the detector 55. Inasmuch as the latter is at the center of the lay, however, the time for the above-named operations is increased, making it easier for the parts of the mechanism involved to perform their required functions, and as the operative stroke of the actuator 39 is rapid, due to the shape of the cam 41, and the movement of the dog 7 to operative position is very slight, the increased period of time gained by the described arrangement and operation is ample for the purpose. Thus when filling replenishment is called for it is accomplished with comparative ease on the pick on which filling-absence is detected, provided the shuttle is properly positioned in the replenishing box.

When the shipper is released to stop the loom the latter must frequently be turned over by hand, and in order to prevent the operative positioning of the latch 36 a shield 78 is provided, having cam-slots 79, Fig. 1, which loosely receive studs 80 projecting from the side of the bracket 66. Normally the shield is in the position shown, but when the shipper 33 is released it hits one arm of a bell-crank 81, pivoted on the loom-frame at 82, and rocks the bell-crank, the lower arm thereof then rocking a second bell-crank 83 fulcrumed at 84 on the bracket 66, a spring 85 connecting the two bell-cranks. The shield is provided with a curved abutment 86, Fig. 1, against which bears an arm of bell-crank 83, and when it is rocked as described by release of the shipper the shield 78 will be moved upward and rearward, with its upper edge above the tripping device or finger 67. When the lay swings forward the follower 63 passes from the cam 65 onto the top of the shield and above the finger, so that the latter and the parts controlled thereby, remain quiescent, and the loom can be turned over by hand as

often as is necessary. Upon return of the shipper to running position the bell-cranks 81, 83, return to normal position and the shield drops back into inoperative position, shown in Fig. 1.

Changes or modifications in various details of construction, operation and arrangement may be made by those skilled in the art without departing from the spirit and scope of the present invention as set forth in the annexed claims.

Having fully described the invention what I claim as new and desire to secure by Letters Patent is:

1. An automatic filling-replenishing loom having, in combination, filling-replenishing mechanism at one side only of the loom; a center filling-detecting instrumentality to detect filling-absence on either pick; means to cause the operation of the replenishing mechanism when the shuttle is boxed properly at the replenishing side of the loom; and mechanism, controlled by or through said detecting instrumentality, to place in action said means only on the pick of the shuttle toward the replenishing side of the loom when filling-absence is detected on the same pick.

2. An automatic filling-replenishing loom having, in combination, filling replenishing mechanism at one side only of the loom; a center filling-detecting instrumentality to detect filling-absence on either pick; means to cause the operation of the replenishing mechanism when the shuttle is boxed properly at the replenishing side of the loom; a device to restrain from operation said mechanism when the shuttle is improperly boxed for replenishment; and mechanism, controlled by or through said detecting instrumentality, to place in action said means only on the pick of the shuttle toward the replenishing side of the loom when filling-absence is detected on the same pick.

3. An automatic filling-replenishing loom having at one side thereof mechanism to replenish the running filling, and means, including a latch and an actuator, to bring said mechanism into operation only on the pick of the shuttle toward the replenishing side, combined with a center filling-detecting instrumentality to detect filling-absence on either pick, and means, controlled by the detecting instrumentality, to cause coöperation of the actuator and latch only when filling-absence is detected on the pick toward the replenishing side of the loom.

4. An automatic filling-replenishing loom having, in combination, mechanism at one side thereof to replenish the running filling; a shuttle-feeler operating on the pick of the shuttle toward the replenishing side of the loom; a center filling-detecting instrumentality, and means controlled conjointly by the feeler and the detecting instrumentality

to effect the operation of the replenishing mechanism when the shuttle is boxed properly for replenishment of filling and only when filling-absence has been detected on the same pick to the replenishing side of the loom.

5. In a loom provided with mechanism to replenish automatically the running filling, in combination, a center filling-detecting instrumentality, and means controlled as to its operation by or through such instrumentality to cause filling replenishment only on the pick toward the replenishing side of the loom when absence of filling is detected by said instrumentality on the same pick.

6. In a loom provided with mechanism to provide automatically the running shuttle with fresh filling, in combination, a center filling-detecting instrumentality, and means controlled as to its operation by or through such instrumentality to place said mechanism in readiness to operate only on the pick of the shuttle toward it when filling-absence is detected by the detecting instrumentality on the same pick.

7. An automatic loom having at one side thereof mechanism to replenish the running filling, and means, including a movable dog, to effect the operation of said mechanism, in combination with a shuttle-feeler controlling the position of the dog and moved, at each pick of the shuttle toward the replenishing side of the loom, to place the dog in and then out of its operative position; and mechanism, actuated by or through detection of filling-absence on the same pick toward the replenishing side, to act through the shuttle-feeler and place the dog in its operative position, whereby replenishment of filling occurs on the pick toward the replenishing side when filling-absence is detected on the same pick.

8. In an automatic loom having at one side mechanism to replenish the running filling, and means including a dog movable into and out of operative position, to effect the operation of said mechanism, in combination, means to move the dog into and then out of operative position at each pick of the shuttle toward the replenishing side of the loom; and separate means operated by or through detection of filling-absence on the specified pick of the shuttle to place the dog in its operative position, to thereby cause filling replenishment on the pick toward the replenishing side when filling-absence is detected on such pick.

9. In an automatic loom having at one side mechanism to replenish the running filling, and means, including a dog movable into and out of operative position, to effect the operation of said mechanism, in combination, means to move the dog into and then out of operative position at each pick of the shuttle toward the replenishing side of the

loom; and separate means, including a center filling-detecting instrumentality, to place the dog on its operative position if filling-absence is detected on the specified pick of the shuttle, to cause filling replenishment on the pick toward the replenishing side when filling-absence is detected on such pick.

10. In an automatic loom having at one side mechanism to replenish the running filling, and means, including a dog movable into and out of operative position, to effect the operation of said mechanism, in combination, a vibratable shuttle-feeler; connections between it and the dog; means to vibrate the shuttle-feeler and thereby move the dog into and out of operative position on each pick of the shuttle toward the replenishing side of the loom, engagement of the feeler by the shuttle when boxed improperly for filling replenishment maintaining the dog inoperative; a center filling-detecting instrumentality; and means controlled thereby upon detection of filling-absence on the specified pick of the shuttle to operatively position the dog if the shuttle is properly boxed and thereby cause filling replenishment on the pick toward the replenishing side when filling-absence is detected on such pick.

11. In an automatic loom having at one side mechanism to replenish the running filling, and means, including a dog movable into and out of operative position, to effect the operation of said mechanism, in combination, a vibratable shuttle-feeler; connections between it and the dog; means yieldingly connected with the feeler to vibrate it and move the dog into and out of operative position on each pick of the shuttle toward the replenishing side of the loom; and separate means operated by or through detection of filling-absence on the specified pick of the shuttle to operatively position the dog and cause the replenishing mechanism to operate on the pick toward the replenishing side when filling-absence is detected on such pick.

12. In a loom having at one side thereof mechanism to replenish automatically the running shuttle with filling and a lay having a bunter, in combination, a dog close to the path of the bunter and movable therein to effect the operation of the replenishing mechanism; means to move the dog into and out of the bunter path on the pick of the shuttle toward the replenishing mechanism while the filling remains intact; and separate means, including a filling-absence detecting device, carried by the lay, to position the dog in the bunter path when said device detects filling-absence on the specified pick of the shuttle.

13. In a loom having at one side thereof mechanism to provide the running shuttle automatically with a fresh supply of filling,

in combination, the lay, a center filling-detecting instrumentality operative on every pick to detect filling-absence, and means, mounted independently of the lay and effectively controlled by said instrumentality only on the pick of the shuttle toward the replenishing side of the loom, to enable said instrumentality, upon detection of filling-absence on that pick, to cause the actuation of the replenishing mechanism.

14. In a loom having mechanism at one side thereof to replenish automatically the running filling, a shipper, and releasing means therefor, in combination, a center filling-detecting instrumentality operative on every pick to detect filling-absence, means effective only on the pick of the shuttle toward the replenishing side of the loom to enable said instrumentality, upon detection of filling-absence on that pick, to cause the actuation of the replenishing mechanism, and a device to operate the shipper releasing means upon two successive actuations of the replenishing mechanism.

15. In a loom having automatic filling-replenishing mechanism, in combination, a center filling-detecting instrumentality operative on every pick to detect filling-ab-

sence, and means controlled by the filling-detecting instrumentality but effective only on the pick of the shuttle toward the replenishing mechanism to enable said instrumentality, upon detection of filling-absence on that pick, to cause the actuation of the replenishing mechanism.

16. In a loom having automatic filling-replenishing mechanism, in combination, a center filling-detecting instrumentality operative on every pick to detect filling-absence, means effective only on the pick of the shuttle toward the replenishing mechanism to enable said instrumentality, upon detection of filling-absence on that pick, to cause the actuation of the replenishing mechanism, and means to prevent such actuation of the replenishing mechanism if the shuttle is positioned improperly for replenishment of the running filling.

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

ALONZO E. RHOADES.

Witnesses:

E. D. OSGOOD,
ROBERT JAMISON.