June 3, 1930. R. CROMPTON ET AL 1,761,817

FEELER MECHANISM

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Fig. 1.

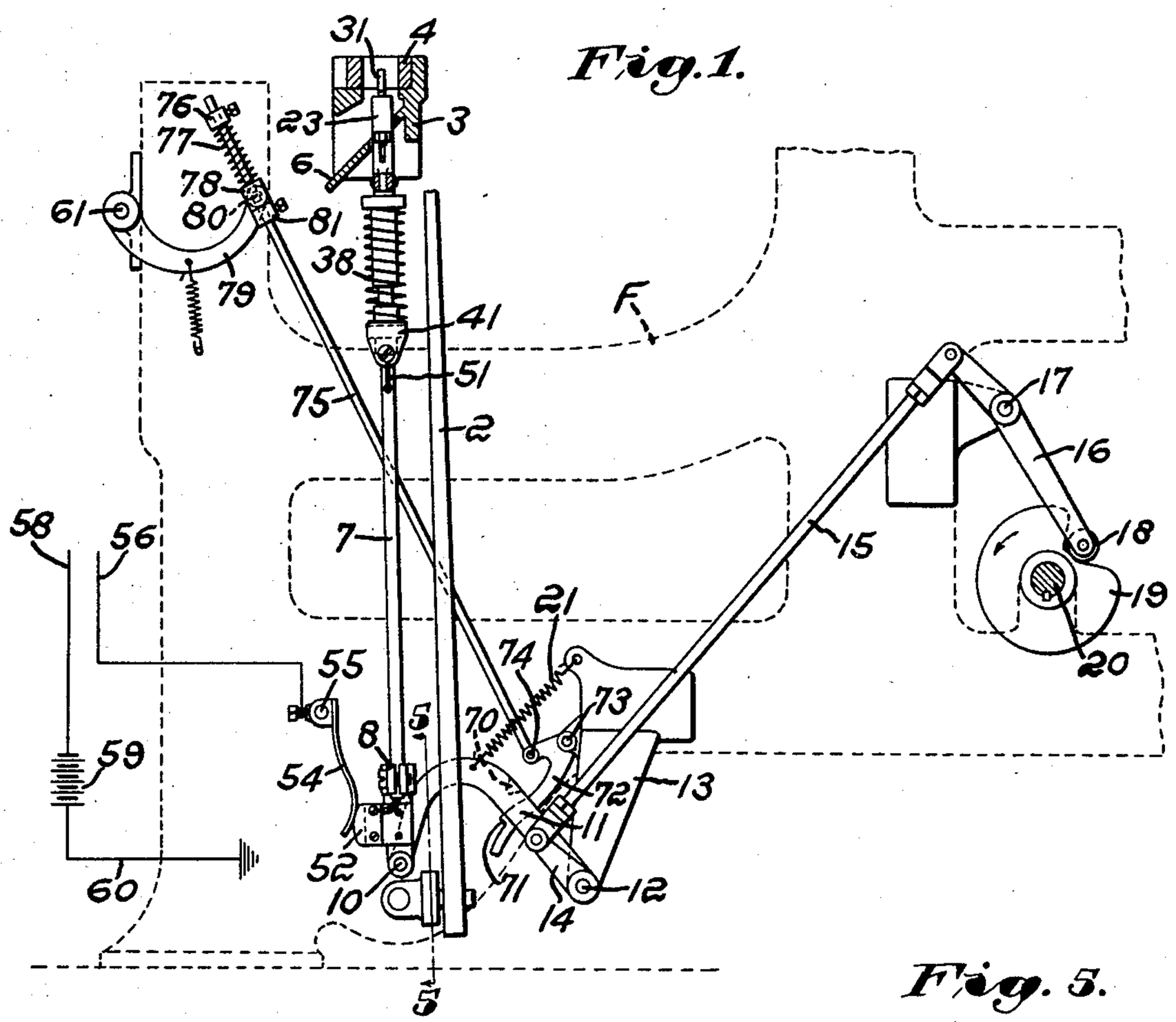


Fig. 6.

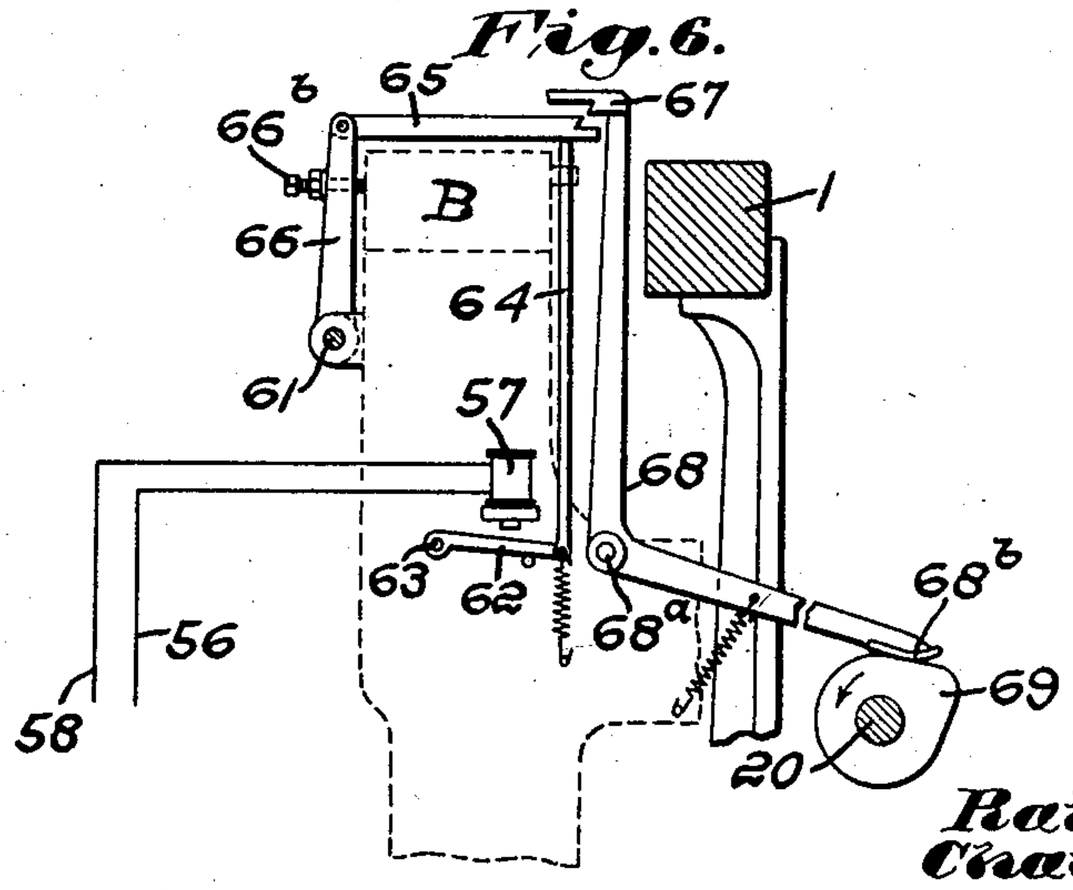
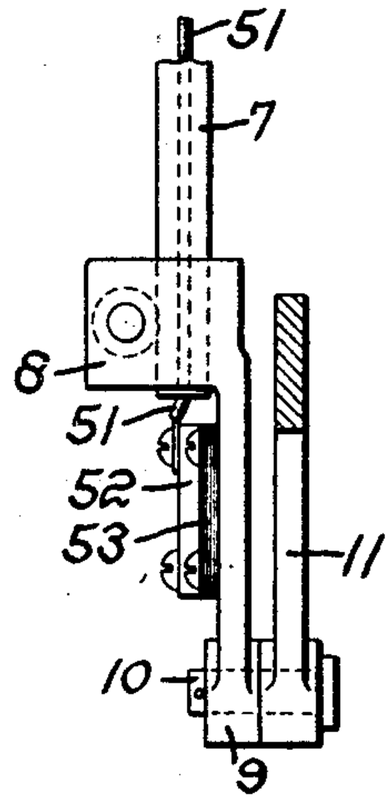


Fig. 5.



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Fig. 2.

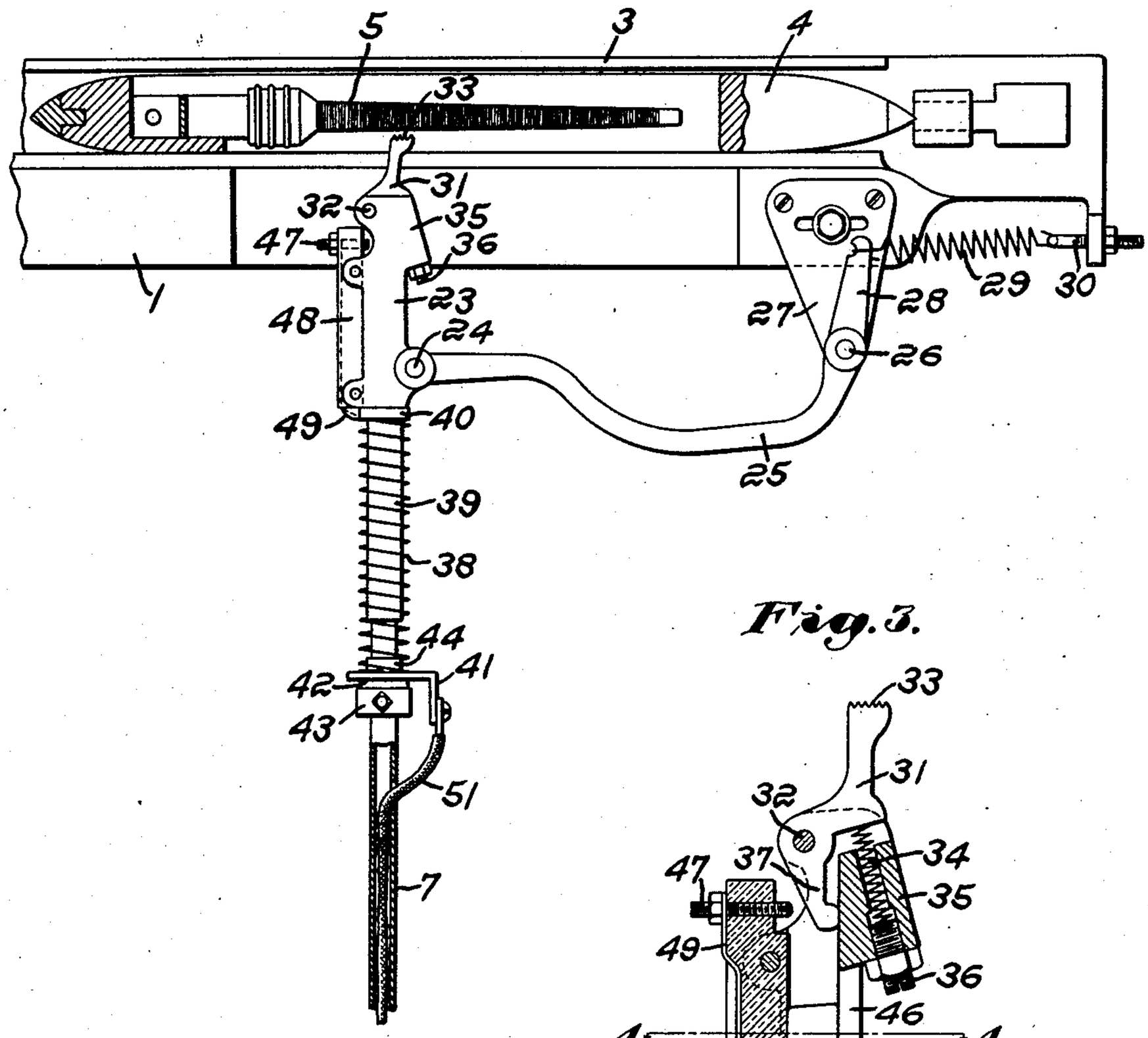


Fig. 3.

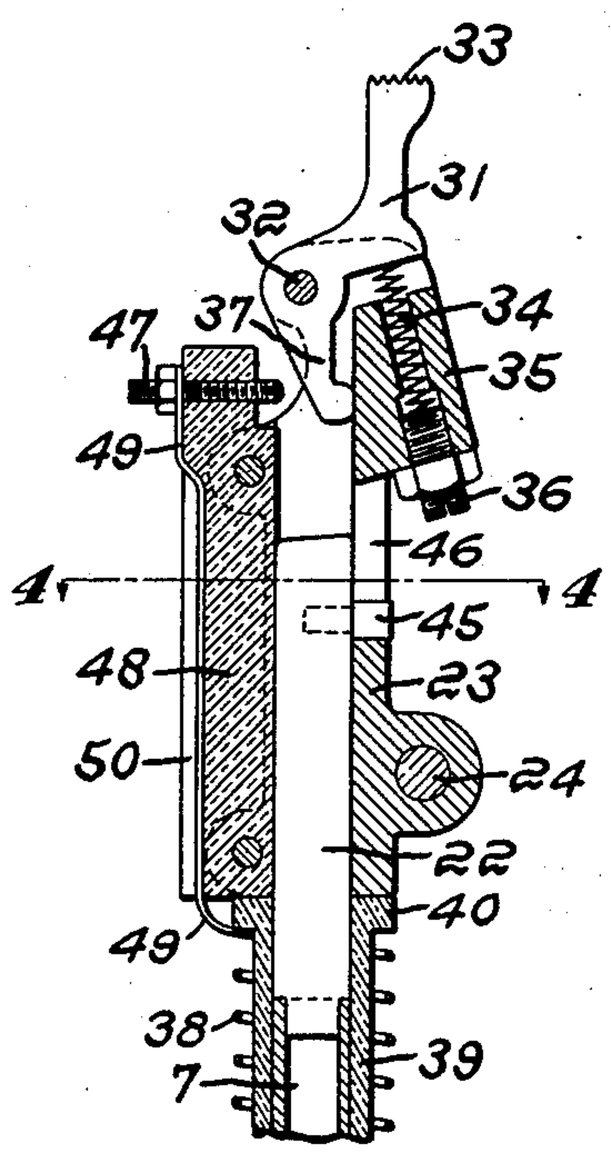
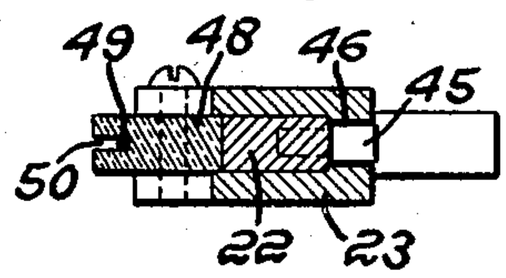


Fig. 4.



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Patented June 3, 1930 1,761,817

UNITED STATES PATENT OFFICE

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FEELER MECHANISM

Application filed April 21, 1927. Serial No. 185,432.

The present invention relates to automatic weft replenishing looms, and more particularly aims to provide improved means for bringing into operation the replenishing mechanism upon depletion or substantial exhaustion of the weft or filling in an active shuttle.

In the accompanying drawings illustrating by way of example one embodiment of our invention,

Fig. 1 shows a filling feeler mechanism and associated parts embodying one form of our invention as seen from one side of the loom, the right side as illustrated, adjacent portions of the loom frame being indicated in dotted line, and the shuttle box and shuttle being in vertical section;

Fig. 2 is a front elevation, upon a larger scale, of the shuttle box and feeler mechanism, the front plate of the shuttle box and the bobbin chute being omitted for the sake of clearness;

Fig. 3 is a detail view upon a still larger scale of the feeler mechanism proper, taken in vertical section through the upper portion thereof;

Fig. 4 is a horizontal section on the line 4—4 of Fig. 3;

Fig. 5 is a section upon a larger scale on the line 5—5 of Fig. 1; and

Fig. 6 is a vertical section looking toward the left side of the loom and illustrating certain means controlled by the feeler mechanism.

The filling feeler mechanism of our invention is adapted for use with various types of filling replenishing looms, and may be employed in association with a shuttle box at either side of the loom. It is particularly useful, however, in connection with drop box or color looms having a single shuttle box at one side and a plurality of shifting shuttle boxes or cells at the other side. For the purpose of illustration we have herein shown the feeler as associated with a single shuttle box at the right hand side of the loom, herein assumed to be the battery or replenishing side.

Referring more particularly to the drawings, a portion of the loom frame herein the right side frame, is indicated in dotted line at F. The lay is seen at 1 and the picker stick, which may be of any desired type, is shown at 2; see Fig. 1. The shuttle box 3 appears in vertical transverse section in Fig. 1 and in side elevation in Fig. 2, the front plate of the box having been removed in said latter figure. In the position of the parts illustrated a shuttle 4 containing a bobbin 5 has been received in the shuttle box. The latter is equipped with the usual bobbin chute 6, seen in Fig. 1, but omitted in Fig. 2 for the sake of clearness.

The feeler mechanism is mounted upon a feeler post or upright 7, preferably of tubular construction, having secured to its lower end a foot-piece 8 provided with a boss 9 loose upon a pin 10, whereby the feeler post can move with the lay. Said foot-piece is pivotally connected by said pin 10 to one end of a curved lever 11, the other end of which is secured to a stud shaft 12 journalled in a bracket 13 on the loom frame. Also fast upon said stud shaft is a finger 14 having pivotally connected to its outer end a link 15, the opposite or upper end of which is pivotally attached to one end of a two-arm lever 16, itself pivoted upon the loom framing as at 17.

At the other end of said two-arm lever 16 is a cam roll 18 co-operating with a cam 19 fast upon the cam shaft 20, which may be the usual cam shaft of the loom. Said cam is formed with a single depressed portion of relatively short extent as compared with its dwell portion, whereby the two-arm lever 16 will receive one relatively quick and clearly defined actuation for each revolution of the cam shaft. A spring 21, one end of which is connected to the curved lever 11 and the other end anchored upon the loom frame, tends constantly to move said curved lever 11 and the feeler post 7 upwardly, and also functions to keep the cam roll 18 in contact with the cam. As the depressed portion of the latter comes opposite the cam roll said spring 21 is permitted to move said lever 11 sharply upward, thus moving upwardly the feeler post 7.

At the upper extremity of the feeler post

7 is secured a short rod or solid portion 22 upon which the carrier for the feeler proper is movable. Said carrier comprises an elongated sleeve-like body 23, see particularly Figs. 2 and 3, which is pivotally connected as at 24 to an arm 25, Fig. 2, itself supported for pivotal movement as at 26 upon a plate 27 adjustably secured to the shuttle box. Said arm 25 has an extension or finger 28 to the outer end of which is attached one end of a spring 29, the other end of which is secured, preferably adjustably, to a depending portion of the shuttle box, as at 30. The feeler post is maintained in proper upright position and guided in its movement by said arm 25.

The feeler proper or feeler tip 31 is pivotally mounted, as at 32, at the upper end of the carrier body 23, the extremity of the feeler tip being roughened or serrated as indicated at 33 for engagement with the filling in the shuttle. The upper portion of said feeler tip 31 is offset from its point of pivotal support, and is normally maintained in substantially the position illustrated in Figs. 2 and 3 by means of a spring 34 in a housing 35 formed on the carrier 23, means such as the screw 36 preferably being provided to afford adjustment of the spring tension. A depending finger 37 is secured to the feeler tip and, in the normal position of the latter, abuts the adjacent inner face of the carrier body, as illustrated in Fig. 3, thus limiting movement of the feeler in a counter-clockwise direction as viewed in said figure.

It will be understood that the feeler tip is constructed and arranged to be passed up through the bottom of a boxed shuttle, and to engage the filling carrier or bobbin therein. If at such time sufficient filling remains upon the carrier so that replenishment is not required, the serrated portion of the feeler tip will engage said filling and be prevented from moving or slipping lengthwise of the shuttle. If, however, the filling is substantially exhausted the feeler tip will be caused to slip lengthwise the shuttle, moving in a clockwise direction about its pivot 32, and compressing the spring 36.

A lost-motion or spring connection is preferably provided intermediate the feeler post 7 and the feeler carrier 23, whereby, when the feeler tip engages the filling and is prevented from slipping, the feeler post may move upwardly relative to the feeler carrier. Said means as illustrated includes a coil-spring 38 surrounding a sleeve 39 of insulating material through which the upper portion of the post extends. Said spring bears at its upper end against a flange 40 on said sleeve, said flange engaging at its upper face the bottom portion of the feeler carrier 23. At its lower end said spring 38 rests upon a metal washer 41, see Fig. 2, insulated from the feeler post as by the insulating washer 42 supported on the collar 43 adjustably secured to the feeler post. An insulating bushing 44 preferably is provided at the upper face of said metal washer 41, centering the lower end of the spring and preventing contact thereof with the feeler post.

A pin 45, secured in the upper portion 22 of the feeler post and projecting into a slot 46 in the feeler carrier 23 serves as a stop to limit the motion of said feeler carrier relative to the feeler post under the influence of the spring 38.

Through the described mechanism and connections the feeler post and feeler at the upper end thereof will be moved upwardly once for each time that a shuttle enters the shuttle box at that side of the loom, this upward movement of the feeler post being herein effected by the spring 21, previously mentioned, each time the depressed portion of the cam 19 comes opposite the cam roll 18. The spring 38 and associated parts above described permit upward movement of the feeler post relatively to the parts at its upper end at times when replenishment is not called.

In the form illustrated the cam 19 will withdraw the feeler from the shuttle positively. Such withdrawal should bring the feeler below the plane of the race-plate at the time of the pick-out. We prefer that the withdrawal of the feeler be continued until the feeler is below the surface of the bobbin chute, into what may be called its normal position. As clearly shown in Fig. 1 the feeler works through a suitable opening in the bobbin chute or guide 6.

The slipping movement of the feeler tip 31 which occurs upon detection thereby of the need for replenishment of the filling of the active shuttle then boxed is utilized in any suitable manner to initiate the operation of the replenishing mechanism. As herein illustrated said detecting or indicating movement of the feeler controls an electrically operated device for the purpose mentioned.

Referring again to Figs. 2 and 3, the finger 37 of the feeler, upon detecting movement of the latter, is moved toward the left, viewing said Fig. 3, and into engagement with a contact element or screw 47 adjustably positioned in a block 48 of suitable insulating material on the feeler carrier 23. An electrical conductor 49 attached to said contact element 47 extends downwardly along said insulating block, preferably in a groove 50 therein, see Fig. 4, and is secured to the upper end of the spring 38. Said spring is insulated from the feeler post in the manner previously described, and in addition to its feeler carrier supporting function forms a portion of the electrical circuit,

being in contact at its lower end with the metal washer 41. The latter has connected to it an insulated conductor 51 which is led down along and preferably interiorly of the feeler post, as illustrated in Figs. 2 and 5, and is connected at its lower end to a contact plate 52 attached to the feeler post foot-piece 8 through an intermediate insulating member 53.

Said contact plate 52 thus is adapted to move with the feeler post and, when the latter is raised, is brought into contact with a brush or spring contact strip 54 supported on a stud 55 upon, but suitably insulated from, the loom framing. Said brush 54 has connected to it a conductor 56 which extends to the electrical device above mentioned, in this instance a magnet 57 herein positioned at the opposite side of the loom; see Fig. 6. A conductor 58 returning from said magnet is connected with any suitable source of electro-motive supply, illustrated diagrammatically in Fig. 1 at 59, the other side of said supply being in circuit with the feeler tip, through the conductor 60 grounded on the loom framing and thus electrically connected through the working mechanism to the feeler tip 31.

Said magnet controls any suitable means for turning the usual starting rod 61 which serves to bring the replenishing mechanism into operation in the well-known manner. Herein for the purpose the armature 62 of the magnet, pivoted at one end upon the loom frame, as at 63, has attached to its other end a lifter 64 contacting at its upper end a latch 65 overlying the breast beam B with its free end resting upon said lifter. Said latch is pivotally connected to a lever 66 extending from the starting rod.

Normally, when there is no call for replenishment, the lifter occupies the position substantially as shown. In response to an indicating or slipping movement of the feeler tip 31 the circuit is closed at the contact element 47, the contact plate 52 and the spring finger 54 being then also in engagement, and the magnet 57 is engaged, lifting the latch 65 to bring its free end into the path of a dog 67 at the upper end of a lever 68 pivotally supported as at 68^a. The other end of said lever is provided with a follower 68^b cooperating with a cam 69 on a suitable cam shaft, herein the usual cam shaft 20. By said means the dog 67 receives a forward movement for each pick and, when the latch 65 has been lifted in response to a call for replenishment, will pick up said latch and impart a counter-clockwise turning movement to the starting rod 61, bringing the replenishing mechanism into operation. Said movement of the latch and starting rod by the lever 68 preferably occurs as the lay 1 starts back from front center. An adjustable stop 66^b desirably is provided on the lever 66 and taking against the breast beam, properly to position the latch and for timing purposes.

As previously stated the feeler is preferably withdrawn below the bobbin chute, being then clear of the path of the spent or substantially exhausted bobbin when the latter is discharged. In case a change or replenishment of filling is indicated it is desirable positively to retain the feeler in its said position below the bobbin chute during the replenishing or transfer operation. Accordingly we desirably provide suitable means to hold or lock the feeler mechanism in said depressed position.

Referring particularly to Fig. 1, we have illustrated for this purpose a lug 70 projecting laterally from the curved lever 11 and adapted to be engaged by a projection 71 on a locking lever or dog 72 pivotally supported as at 73 upon a fixed part, herein the bracket 13 previously mentioned. Said dog has pivotally connected to it at 74 a link 75 which is yieldingly attached at its upper end,—by means of a block 76, the spring 77, and the collar 78,—to an arm 79 projecting from the starting rod 61. Said collar 78 carries a pin 80, pivotally engaged with said arm 79, the downward movement of said collar, which is slidable upon the link 75, being limited by an adjustable stop 81 upon said link.

Upon a call for transfer or replenishment by the feeler the starting rod is actuated in the manner previously described, turning in a counter-clockwise direction as viewed in Fig. 1. Said turning of the starting rod raises the arm 79 and with it the link 75, bringing the dog 72, which normally lies below and out of the path of the lug 70 on the curved lever 11, up against said lug. As the curved lever 11 and lug 70 thereon move down during the withdrawal of the feeler said lug will ride under the projection 71, which latter snaps over into holding position above the lug, by reason of the provision of the spring 77. Said dog thus serves to lock the feeler mechanism in depressed position until subsequently released by an opposite turning movement of the starting rod after replenishment or transfer has been completed.

From the foregoing it will be understood that the feeler mechanism described operates through the usual bottom opening of the shuttle. No special opening in the side of the shuttle is necessitated, so that the shuttle is in nowise weakened, as it would be by such side opening. Moreover, no special construction of the shuttle or bobbin, such as the provision of electric contact elements or other special parts, is required, thus permitting standard or usual shuttles and bobbins to be employed. It will also be noted that the described feeler mechanism will co-

operate successively with any plurality of shuttles used in a given weaving operation.

Our invention is not limited to the particular embodiment thereof herein shown and described, its scope being set forth in the following claims.

Claims:

1. In an automatic weft-replenishing loom having at one end thereof a magazine or battery of fresh weft supplies, in combination with a shuttle box at said end of the loom, a feeler adapted to enter through the bottom of the active shuttle when in said box to detect substantial exhaustion of its filling, spring means to effect the feeling movement of said feeler, cam operated mechanism to withdraw said feeler prior to the next pickout of the shuttle, and means effective upon detection by said feeler to lock the latter against a further feeling movement until replenishment has occurred.

2. In an automatic weft-replenishing loom having at one end thereof a magazine or battery of fresh weft supplies, in combination with a shuttle box at said end of the loom, means adapted to feel through the bottom of the active shuttle when in said box to detect substantial exhaustion of its filling, mechanism apart from the lay to insert and to withdraw said feeler means, and means to prevent reinsertion of said feeler means during replenishment.

3. In a weft-replenishing loom, in combination with a shuttle having a bottom opening, feeler means operable through the shuttle bottom to detect existence of that condition of the weft supply upon which replenishment is predicated, and means brought into action thereby to institute transfer of fresh weft into the shuttle, said feeler means comprising a lifter rod pivoted to swing with the lay, a feeler carrier at the upper end of said rod and having a feeler proper pivoted thereon, spring means tending to elevate said rod and feeler carrier, cam means positively to withdraw and hold down said rod but permitting said spring elevating means to function periodically, and a lost-motion connection between said feeler carrier and said lifter rod allowing the latter to move upwardly relatively to the carrier at the upper limit of the carrier movement.

4. In a weft-replenishing loom, in combination with a shuttle, a mechanical feeler adapted to enter the shuttle bottom and to move longitudinally of the shuttle upon detection of substantial exhaustion of the weft therein, a starting rod movable to institute weft transfer, means to move the starting rod, a magnetic device means governed thereby to cause operation of said starting-rod-moving means, means independent of the shuttle and/or the bobbin whereby said detecting movement of the feeler operates said magnetic device and means actuated by the starting rod in instituting a transfer to render said feeler inoperative during said transfer but thereafter permitting it to resume operation.

5. In a loom equipped with replenishing mechanism to supply a fresh weft carrier to the active shuttle through the top thereof and to discharge the spent weft carrier through the shuttle bottom, in combination with a shuttle box at one end of the lay and a starting rod for instituting operation of the replenishing mechanism, a weft feeler, mechanism operable each time a shuttle is received in said box to cause said feeler to enter said shuttle through the bottom thereof and to withdraw it prior to the next picking of said shuttle, said feeler having a portion actuated as the result of detection thereby of the need for replenishment, mechanim to move the starting rod to call replenishment, means whereby said detecting actuation of said feeler portion causes said starting-rod-moving mechanism to function, and means actuated by said replenishment-calling movement of the starting rod to lock the feeler in withdrawn position during replenishment.

6. In a loom equipped with replenishing mechanism to supply a fresh weft carrier to the active shuttle through the top thereof and to discharge the spent weft carrier through the shuttle bottom, in combination with a shuttle box at one end of the lay, a starting rod for instituting operation of the replenishing mechanism and means to move said starting rod, a weft feeler movable into and out of a boxed shuttle through the bottom thereof, mechanism so to move said feeler each time a shuttle is received in said box, said feeler having a portion actuated as the result of detection thereby of the need for replenishment, and mechanism controlled by said detecting actuation of the feeler to render said means for moving the starting rod operative or inoperative, including a latch positionable operatively to connect the starting rod and its moving means but normally inoperative, a magnet or the like to position said latch and connections between said magnet and said feeler portion.

7. In a loom equipped with replenishing mechanism to supply a fresh weft carrier to the active shuttle through the top thereof and to discharge the spent weft carrier through the shuttle bottom, in combination with a shuttle box at one end of the lay, and a starting rod for effecting action of the replenishing mechanism, a weft feeler supported for movement through the shuttle bottom into and out of a shuttle in said box, mechanism to cause the feeler so to enter each shuttle upon its reception in said box and to withdraw it prior to the

next picking of the shuttle, said feeler having a portion actuated as the result of detection thereby of the need for replenishment, mechanism to move the starting rod to call replenishment in response to said detecting actuation of said feeler portion, and means operatively connected with said starting rod to hold said feeler out of the path of the discharging weft carrier when replenishment is called.

8. In a loom equipped with replenishing mechanism to supply a fresh weft carrier to the active shuttle through the top thereof and to discharge the spent weft carrier through the shuttle bottom, in combination with a shuttle box at one end of the lay, and a starting rod for instituting operation of the replenishing mechanism, a weft feeler, mechanism operable each time a shuttle is received in said box to cause said feeler to enter said shuttle through the bottom thereof and to withdraw it prior to the next picking of said shuttle, said feeler having a portion actuated as the result of detection thereby of the need for replenishment, cam controlled means to operate said starting rod and having a normally inoperative position, means whereby said detecting actuation of said feeler portion renders said cam controlled means operative, and means controlled by the starting rod in a replenishment-instituting operation thereof to render said feeler operating mechanism inoperative during replenishment.

9. In a weft-replenishing loom, in combination with a shuttle adapted to receive a bobbin through its top and to discharge the same through its bottom, a shuttle-box adapted to receive said shuttle, and means to feel through the bottom of the shuttle when in said box to indicate requirement of weft replenishment, said means comprising a lifter pivotally supported for swinging movement with the lay and having a feeler at its upper end, spring means adapted to raise said lifter to enter its feeler through the shuttle bottom, and cam means acting positively to depress said lifter but periodically permitting said spring means to function.

10. In a weft-replenishing loom, in combination with a shuttle adapted to receive a bobbin through its top and to discharge the same through its bottom, a shuttle-box adapted to receive said shuttle, means to feel through the bottom of the shuttle when in said box to indicate a requirement of weft replenishment, said means comprising a lifter pivotally supported for swinging movement with the lay and having a feeler at its upper end, spring means adapted to raise said lifter to enter its feeler through the shuttle bottom, cam means acting positively to depress said lifter but periodically permitting said spring means to function, and other means actuated as a result of an indication for replenishment to lock down said lifter during the subsequent transfer operation.

11. In a weft-replenishing loom, in combination with a shuttle, a device acting through the shuttle bottom to feel for the condition of the filling supply therein, operating means for said device including a spring lifter and a cam depresser, normally inactive transfer mechanism, connections whereby said feeler device renders said transfer mechanism operative upon detection of filling depletion, and means cooperating with said operating means of the feeler device to render the latter inoperative during the transfer operation.

In testimony whereof, we have signed our names to this specification.

RANDOLPH CROMPTON.
CHARLES E. KNOWLTON.