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FILLING FEELER SLIDE MECHANISM

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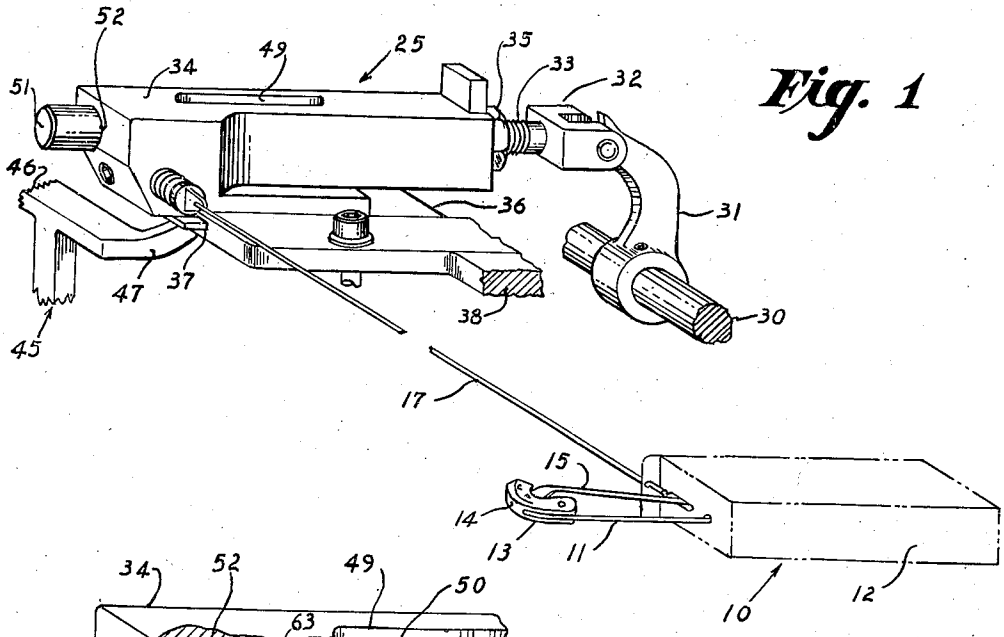


Fig. 1

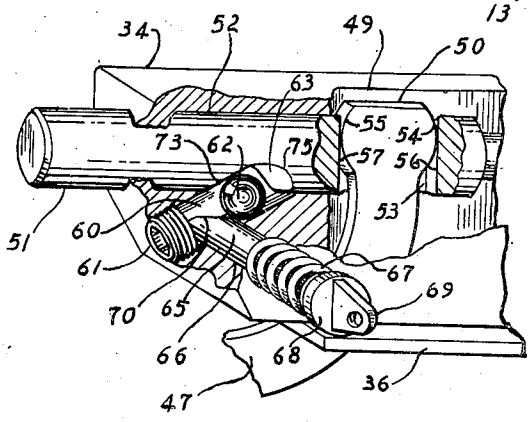


Fig. 2

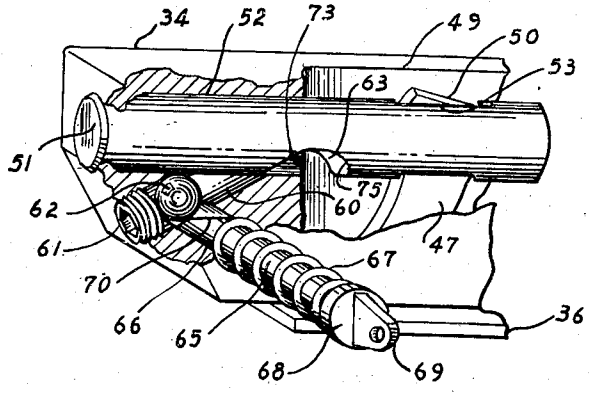


Fig. 3

INVENTOR.
JOHN RINNE
EVERETT H. ASHTON

BY Virgil F. Parris
ATTORNEY

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FILLING FEELER SLIDE MECHANISM

John Rinne, Brooklyn, N. Y., and Everett H. Ashton, Jersey City, N. J., assignors to The M. W. Kellogg Company, New York, N. Y., a corporation of Delaware

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14 Claims. (Cl. 139—269)

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The present invention relates to a feeler controlled slide mechanism for initiating in a loom a replenishment operation by which a nearly exhausted bobbin is automatically replaced by a full one.

In a conventional loom, there is provided a transferring or replenishing mechanism, the operation of which is initiated by the rotation of a starting rod. A feeler controlled slide mechanism has a filling cam follower which is provided with a trip, and which by virtue of the filling-motion cam on the main cam shaft, is brought forward each time that the shuttle is checked in the left-hand side of the loom. A feeler slide located between the filling cam follower and the starting rod, and forming part of the feeler controlled slide mechanism, is ordinarily held in such a position that it does not engage the trip. A feeler mechanism operates to detect substantial exhausting of the filling supply on the bobbin, and when this condition is indicated, a connecting rod is put into action. The actuation of this connecting rod causes the feeler slide through a comparatively complicated train of mechanism to be moved in position to engage the filling cam follower trip as it comes forward on its next stroke, thereby operating the starting rod, and in turn, the replenishing mechanism.

One object of the present invention is to provide a new and improved feeler controlled slide mechanism, which is comparatively simple and inexpensive to manufacture, which is positive, certain, reliable and quick in operation, and which lends itself to accurate control, even at high speed.

Various other objects of the invention will be apparent from the following particular description, and from an inspection of the accompanying drawings, in which—

Fig. 1 is a perspective of a filling feeler slide mechanism embodying the present invention;

Fig. 2 is a fragmentary perspective of the filling feeler slide mechanism partly in section, and shown at the instant the slide bolt forming part thereof is latched to the feeler slide in response to a detection of a nearly exhausted bobbin by the feeler mechanism; and

Fig. 3 is a fragmentary sectional perspective similar to that shown in Fig. 2, but shown with the slide bolt released from latched engagement with the feeler slide for normal idle operation.

The loom to which the filling feeler slide mechanism of the present invention is applied may be of the general conventional type, and

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may comprise a conventional feeler mechanism in which a feeler tip is moved sidewise along the bare portion of a nearly exhausted bobbin to actuate a connecting rod, or may comprise the improved feeler mechanism 10, forming the subject-matter of a co-pending application, Serial No. 708,638, filed November 8, 1946. This improved feeler mechanism 10 comprises generally a spring-pressed feeler rod 11 mounted for endwise movement in a fixed case 12, and pivotally carrying a feeler tip 13 presenting a curved feeler surface 14. A spring-pressed indicator rod 15 pivotally secured to the feeler tip 13 is mounted for endwise and angular movement in the case 12. A connecting rod 17 mounted for endwise movement has one end in the angular path of movement of the indicator rod 15.

The feeler mechanism 10 is mounted on one side of the loom, as for example, on the left side, in front of the picking course of the shuttle. Upon each alternate forward beat-up movement of the lay, the checked bobbin engages the feeler tip 13. When the bobbin has an ample supply of filling yarn, this yarn engaging the tip 13 provides enough friction to prevent rotation of said tip about its pivotal mounting with the feeler rod 11. Under these conditions, the indicator rod 15 is moved endwise by the advancing bobbin without actuating the connecting rod 17.

When the supply of yarn on the bobbin is nearly exhausted, the bare portion of the bobbin engages the feeler tip 13 on the next beat-up stroke of the lay, causing said tip thereby to rotate about its pivotal mounting with the feeler rod 11. This causes the indicator rod 15 to be angularly tilted into engagement with one end of the connecting rod 17, so that said rod is moved endwise against the action of a spring at its other end. At this latter end, the connecting rod 17 operates a filling feeler slide mechanism 25 to initiate the operation of the replenishing mechanism.

The feeler controlled slide mechanism 25 of the present invention comprises the usual starting rod 30, which is ordinarily stationary, and which, upon rotation, initiates the operation of the replenishing mechanism in a manner well-known in the art. For rotating this starting rod 30, there is rigidly connected thereto a crank arm 31 having at its outer end a knuckle joint connection 32 to one end of a short rod 33, the other end being adjustably secured to the forward end of a filling feeler slide 34. The connection between the rod 33 and the slide 34 is rendered adjustable by threading said rod into said slide,

and providing a locking nut 35 on the threaded portion of said rod bearing against the forward end of said slide.

The slide 34 is guided for horizontal movement, and for that purpose, has a bed plate 36 extending on its opposite sides with slide fits into respective guide recesses 37 in a filling motion bracket 38 secured to the breast beam of the loom. The slide 34 is maintained in inoperative forward position shown in Fig. 1 by a spring (not shown) acting on the starting rod 30, and by a stop (not shown) for said rod operating against the force of said spring to limit said slide in said position in a manner well-known in the art.

A filling cam follower 45 is provided, which may be oscillated by virtue of the filling motion cam on the main cam shaft in the usual manner, or by virtue of a cam on the take-up drive shaft, in accordance with an improved arrangement shown in copending application, Serial No. 739,044, filed April 2, 1947, and which is brought forwardly each time that the shuttle is checked in the left-hand shuttle box of the loom. This cam follower 45 may have an arm 46, which operates the filling stop motion serving to automatically stop the machine when the filling breaks, in a manner well-known in the art, and has a curved arm 47 extending in an elongated slot 49 in the slide 34 and terminating at its outer end in a dog 50.

Between the cam follower dog 50 and the slide 34 is a latch, which is ordinarily released to permit said dog to operate idly in the slide 34, and which is automatically tripped by the connecting rod 17, to lock said slide to said dog, and thereby cause the forward movement of the slide to the right, to rotate the starting rod 30 upon the next forward movement of said cam follower dog. This latch comprises a plunger or slide bolt 51, shown of cylindrical shape, and having a slide fit in a horizontal bore 52 in the slide 34. The cam follower dog 50 extends in a slot 53 in the bolt 51, and is formed with opposite convexly curved edges 54 and 55 adapted to engage the corresponding edges 56 and 57 respectively of said slot 53, to afford between said dog and said bolt a connection which will permit limited rotation of said dog in said slot as said bolt 51 is reciprocated in the slide 34.

As the cam follower 45 is oscillated, the bolt 51 is horizontally moved idly thereby in the slide 34, while said slide is maintained in the inoperative position shown in Fig. 1. To latch the bolt 51 to the slide 34 upon actuation of the connecting rod 17, said slide has a bore 60 extending from its rear end obliquely upwardly towards the bore 52, and closed at its outer rear end by a screw plug 61. Housed in this oblique bore 60 is a movable catch piece 62, which is shown in the form of a spherical steel ball, and which is adapted to enter a notch 63 on the underside of the bolt 51. This notch 63 is just deep enough to receive part of the ball 62 in latched position thereof shown in Fig. 2, while the rest of the ball projects into the bore 60, to interlock the bolt 51 and the slide 34 for movement in unison.

The ball 62 is normally in released position out of the bolt notch 63 as shown in Fig. 3. To move this ball 62 into the bolt notch 63 and into position shown in Fig. 2, upon actuation of the connecting rod 17, said rod is connected at one end to a trip plunger or trigger 65, having a slide fit in a horizontal bore 66 of the slide 34, and spring-pressed outwardly away from said slide by means of a coil spring 67 bearing at one end against the outside of the slide, and bearing at the other end against a head 68 at the outer end of said plunger. The head 68 is formed with an apertured lug 69, to which one end of the connecting rod 17 is anchored. With this spring-pressed trip plunger arrangement as described, the connecting rod 17 is normally biased towards the feeler mechanism 10.

To move the latch ball 62 from the normally released position shown in Fig. 3 into the bolt notch 63 upon actuation of the connecting rod 17, the inner end of the trip plunger 65 is bevelled to define a cam surface 70. Upon movement of the trip plunger 65 inwardly towards the slide 34 against the action of the spring 67, this cam surface 70 engaging the ball 62 moves said ball upwardly in the bore 60 and into the bolt notch 63.

The notch 63 is desirably designed to permit easy entry of the ball 62 therein, and to retain said ball therein until it is proper time to release it. For that purpose, the notch 63 has a rear edge 73, which is inclined in a general direction substantially parallel to the longitudinal axis of the bore 60, so that said edge aligns with the rear longitudinal side of said bore in latched position of the ball 62 shown in Fig. 2. This alignment of the rear notch edge 73 with the rear longitudinal side of the bore 60 permits not only easy entry of the ball 62 into the notch 63, but also affords a design in which said notch edge bearing against said ball during forward movement of the slide bolt 51 to the right, presses said ball against the opposite wall of said bore and thereby retains said ball in latched position, even though the trip plunger 65 has been withdrawn from the bore 60. At the same time, the latched ball 62 pressing against the wall of the bore 60 pushes said slide 34 forwardly with the bolt 51.

Normally, in the idle operation of the filling feeler slide mechanism 25, the trip plunger 65 is in withdrawn position from the bore 60, and the ball 62 is in released position at the bottom of said bore, as shown in Fig. 3. In this normal condition of the mechanism 25, the cam follower dog 50 as it oscillates moves the slide bolt 51 idly in the bore 52, while the slide 34 is held in stationary position by the spring-pressed starting rod 30.

When the yarn supply on the bobbin becomes sufficiently exhausted to operate the feeler mechanism 10, and thereby to actuate the connecting rod 17, said rod moves the trip plunger 65 into the bore 60 against the action of the spring 67. The tripping movement of the plunger 65 is so timed with respect to the operation of the filling cam follower 45, that the slide bolt 51 is slightly past the beginning of its forward stroke to the right, with the notch 63 in registry with the bore 60, as shown in Fig. 2, when said plunger 67 is so operated. This inward tripping movement of the plunger 65 cams the ball 62 upwardly into the notch 63 of the slide bolt 51.

During the forward stroke of the cam follower dog 50 to the right (Fig. 2), the forward curved edge 54 of said dog engages the edge 56 of the bolt slot 53, and pushes the bolt 51 forwardly towards the right (Fig. 2), thereby causing the inclined edge 73 of the notch 63 to press the ball 62 against the opposite wall of the bore 60. This action serves to hold the ball 62 in latched position, and serves to move the slide 34 rearwardly towards the right against the action of the spring on the starting rod 30, so that said starting rod is rotated, and the replenishing operation initiated.

During this forward movement of the slide 34 towards the right, the feeler 13 is restored into inoperative position, so that the trip plunger 65 is withdrawn out of blocking position with respect to the ball 62. However, the ball 62 is retained in latched position described during the forward stroke of the dog 50 by the pressure between the notch edge 73 and the opposite wall of the bore 62 created by the pushing action of the cam follower dog 50 on the bolt 51 as described.

Upon completion of the forward stroke of the dog 50 towards the right, and during rearward return stroke of said dog towards the left, the slide 34 is pushed rearwardly by the spring acting on the starting rod 30. This presses the ball 62 against the notch edge 73 and causes thereby the edge 56 of slot 53 in the bolt 51 to be pushed against the edge 54 of the dog 50, so that the return of the slide 34 is effected simultaneously with the return of the cam follower 45, even though the trip plunger 65 has been withdrawn from the bore 60. This is advantageous, since the slide 34 would otherwise be snapped back by spring pressure and unimpeded into the position shown in Fig. 1, and this may, as a result, have an unfavorable vibratory or shocking effect on the loom.

Just before the dog 50 reaches the end of its rearward stroke towards the left, the slide 34 will stop, as a result of a stop arrangement provided in connection with the starting rod 30. There is enough clearance between the ball 62 and the edge 75 of the bolt notch 63 to permit the bolt 51 to move rearwardly to the left with respect to the stopped slide 34 as the dog 50 completes its rearward stroke to the left. This movement of the bolt 51 to the left relative to the stopped slide 34 releases the holding pressure on the ball 62 and permits said ball to drop down into the bore 60. The bolt 51 will then resume its normal idle operation under the action of the cam follower dog 50, until the next detecting impulse from the feeler mechanism 10 is received.

As many changes can be made in the above mechanism, and many apparently widely different embodiments of this invention can be made without departing from the scope of the claims, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A filling feeler slide mechanism for a loom, comprising a starting member for initiating a replenishing operation, a slide, a connection between said slide and said starting member for actuating said starting member upon movement of said slide, a latch bolt mounted in said slide for slide movement with respect thereto, an operating member connected to said latch bolt and adapted normally to oscillate said latch bolt idly in said slide in time sequence with an operating part of the loom, and means for latching said bolt to said slide upon reception of a feeler detecting impulse, to move said slide with said operating member and thereby actuate said starting member.

2. A filling feeler slide mechanism for a loom, comprising a starting member for initiating a replenishing operation, a slide, a connection between said slide and said starting member for actuating said starting member upon movement of said slide, a latch bolt mounted in said slide for slide movement with respect thereto, an operating member connected to said latch bolt and adapted normally to oscillate said latch bolt idly in said slide in time sequence with an operating part of the loom, and a ball movable into position to latch said bolt to said slide upon reception of a feeler detecting impulse, whereby said slide is moved with said operating member, and said starting member thereby actuated.

3. A filling feeler slide mechanism for a loom, comprising a starting member for initiating a replenishing operation, a slide, a connection between said slide and said starting member for actuating said starting member upon movement of said slide, a latch bolt mounted in said slide for slide movement with respect thereto, an operating member connected to said latch bolt and adapted normally to oscillate said latch bolt idly in said slide in time sequence with an operating part of the loom, a ball mounted in said slide and normally disengaged from said bolt, and a feeler controlled plunger mounted in said slide for moving said ball into position to latch said bolt to said slide, and thereby cause said slide to move.

4. A filling feeler slide mechanism for a loom, comprising a starting member for initiating a replenishing operation, a slide, a connection between said slide and said starting member for actuating said starting member upon movement of said slide, a latch bolt mounted in said slide for slide movement with respect thereto and having a notch, a filling motion cam follower connected to said latch bolt and adapted normally to oscillate said latch bolt idly in said slide, a catch piece movably supported in said slide, and feeler controlled means for moving said catch piece into said notch and into latched engagement with said slide to move said slide with said cam follower and thereby actuate said starting member.

5. A filling feeler slide mechanism for a loom, comprising a starting member for initiating a replenishing operation, a slide, a connection between said slide and said starting member for actuating said starting member upon movement of said slide, a latch bolt mounted in said slide for slide movement with respect thereto and having a notch, a filling motion cam follower connected to said latch bolt and adapted normally to oscillate said latch bolt idly in said slide, a ball movably supported in said slide, and feeler controlled means for camming said ball into said notch and into latched engagement with said slide to move said slide with said cam follower and thereby actuate said starting member.

6. A filling feeler slide mechanism for a loom, comprising a starting member for initiating a replenishing operation, a slide, a connection between said slide and said starting member for actuating said starting member upon movement of said slide, a latch bolt mounted in said slide for slide movement with respect thereto and having a notch on its bottom side, a cam follower connected to said latch bolt and adapted normally to oscillate said latch bolt idly in said slide, said slide having a bore leading downwardly from the underside of said latch bolt, a movable catch piece in said bore, and a feeler controlled plunger mounted in said slide and adapted to extend into said bore upon reception of a feeler detecting impulse, to raise said catch piece into said notch and into latched engagement with said slide, whereby said slide is moved with said cam follower and said starting member is actuated.

7. A filling feeler slide mechanism for a loom, comprising a rotatable starting rod for initiating

a replenishing operation, a slide, a crank arm connected to said rod and having a hinge connection with said slide, a latch bolt mounted in said slide for slide movement with respect thereto and having a notch on its bottom side, a cam follower connected to said latch bolt and adapted normally to oscillate said latch bolt idly in said slide, said slide having a bore leading downwardly from the underside of said latch bolt, a movable ball in said bore, and a feeler controlled plunger mounted in said slide and adapted to extend into said bore upon reception of a feeler detecting impulse to raise said ball upwardly into said notch and into latched engagement with said slide, whereby said slide is moved with said cam follower, and said starting member is actuated.

8. A filling feeler slide mechanism for a loom, comprising a starting member for initiating a replenishing operation, a slide, a connection between said slide and said starting member for actuating said starting member upon movement of said slide, a latch bolt mounted in said slide for slide movement with respect thereto and having a notch on its bottom side, a cam follower connected to said latch bolt and adapted normally to oscillate said latch bolt idly in said slide, said slide having a bore leading downwardly from the underside of said latch bolt, a movable catch piece in said bore, and a feeler controlled plunger mounted in said slide for slide movement transverse to the longitudinal axis of the bore and adapted to extend into said bore upon reception of a feeler detecting impulse, said plunger having a cam surface adapted to engage and raise said catch piece into said notch and into latched engagement with said slide, upon movement of said plunger towards said bore, whereby said slide is moved with said cam follower and said starting member is actuated.

9. A filling feeler slide mechanism for a loom, comprising a rotatable starting rod for initiating a replenishing operation, a slide, a crank arm connected to said rod and having a hinge connection with said slide, a latch bolt mounted in said slide for slide movement with respect thereto and having a notch on its bottom side, a cam follower connected to said latch bolt and adapted normally to oscillate said latch bolt idly in said slide, said slide having a bore leading downwardly from the underside of said latch bolt, a movable ball in said bore, and a feeler controlled plunger mounted in said slide for slide movement transverse to the longitudinal axis of the bore and adapted to have its inner end extend into said bore upon reception of a feeler detecting impulse, said inner plunger end being bevelled to present an upwardly facing cam surface adapted to engage and raise said ball into said notch and into latched engagement with said slide upon movement of said plunger towards said bore, whereby said slide is moved with said cam follower and said starting member is actuated.

10. A filling feeler slide mechanism for a loom, comprising a starting member for initiating a replenishing operation, a cam follower, a normally disengaged connection between said cam follower and said starting member, said connection including a latch ball normally in disengaged position, and movable therefrom into position to engage said connection, and means operable upon reception of a feeler detecting impulse for moving said ball into position to engage said connection, and thereby actuate said starting member.

11. In a filling feeler slide mechanism for a loom, the combination comprising a slide normally held against movement, and adapted to initiate replenishing operations upon movement thereof, a slide bolt in said slide having a slot, a cam follower having an arm extending into said slot and engaging said bolt to oscillate said bolt idly with respect to said slide as said cam follower is oscillated, and feeler controlled releasable latch means between said slide and said bolt.

12. In a filling feeler slide mechanism for a loom as described in claim 11, in which said cam follower arm terminates at its outer end in a dog, and said bolt has a slot into which said dog extends with a fit loose enough to permit limited rotation of said dog relative to said bolt as said dog is oscillated.

13. A filling feeler slide mechanism for a loom, comprising a slide normally held against movement and adapted to initiate replenishing operations upon movement thereof, a slide bolt mounted in said slide, a cam follower adapted to be oscillated in time sequence with an operating part of the loom and connected to said slide bolt to normally oscillate said bolt idly with respect to said slide, a normally disengaged latch connection between said bolt and said slide, and feeler controlled means for effecting engagement of said latch connection near the beginning of one of the strokes of said cam follower upon reception of a feeler detecting impulse, said latch connection being operable to sustain automatically its engagement when once effected, until the cam follower reaches almost the end of its next return stroke, even though said feeler controlled means is returned into inoperative position before the end of said first-mentioned stroke.

14. A filling feeler slide mechanism for a loom, comprising a slide normally held against movement and adapted to initiate replenishing operations upon movement thereof, a slide bolt mounted in said slide, a cam follower adapted to be oscillated in time sequence with an operating part of the loom and connected to said slide bolt to normally oscillate said bolt idly with respect to said slide, the underside of said bolt having a notch, said slide having a bore extending to the underside of said bolt and inclined with respect to the longitudinal axis of said bolt, one of the edges of said notch being substantially parallel to said bore axis, a ball in said bore, and feeler controlled means for latching said ball into said notch, said ball in notched position engaging said notch edge and the opposite wall of said bore.

JOHN RINNE.
EVERETT H. ASHTON.

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