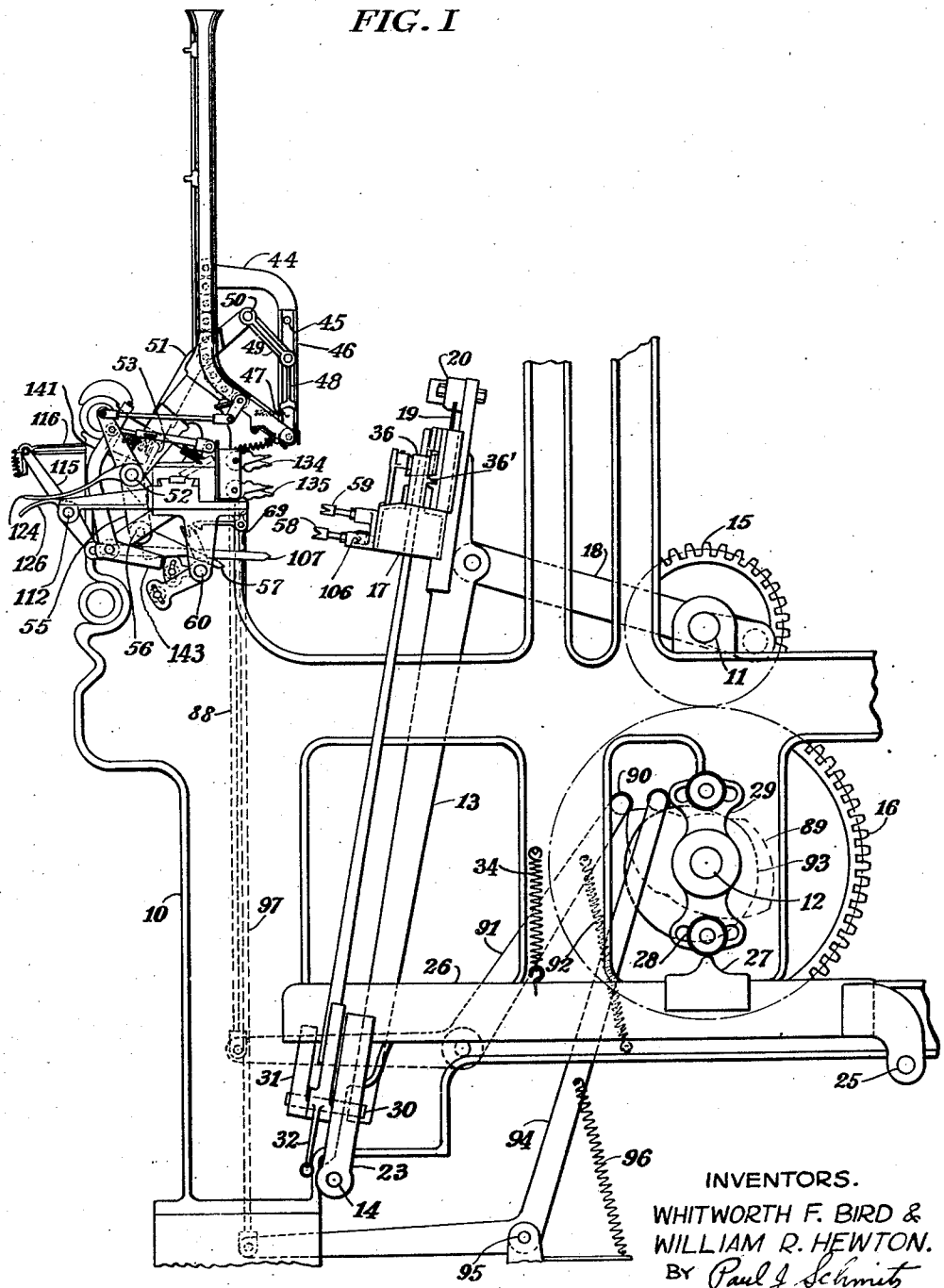
Nov. 8, 1938. W. F. BIRD ET AL 2,136,331

AUTOMATIC LOOM

Filed Feb. 3, 1938 7 Sheets-Sheet 1

FIG. I



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AUTOMATIC LOOM

Filed Feb. 3, 1938 7 Sheets-Sheet 2

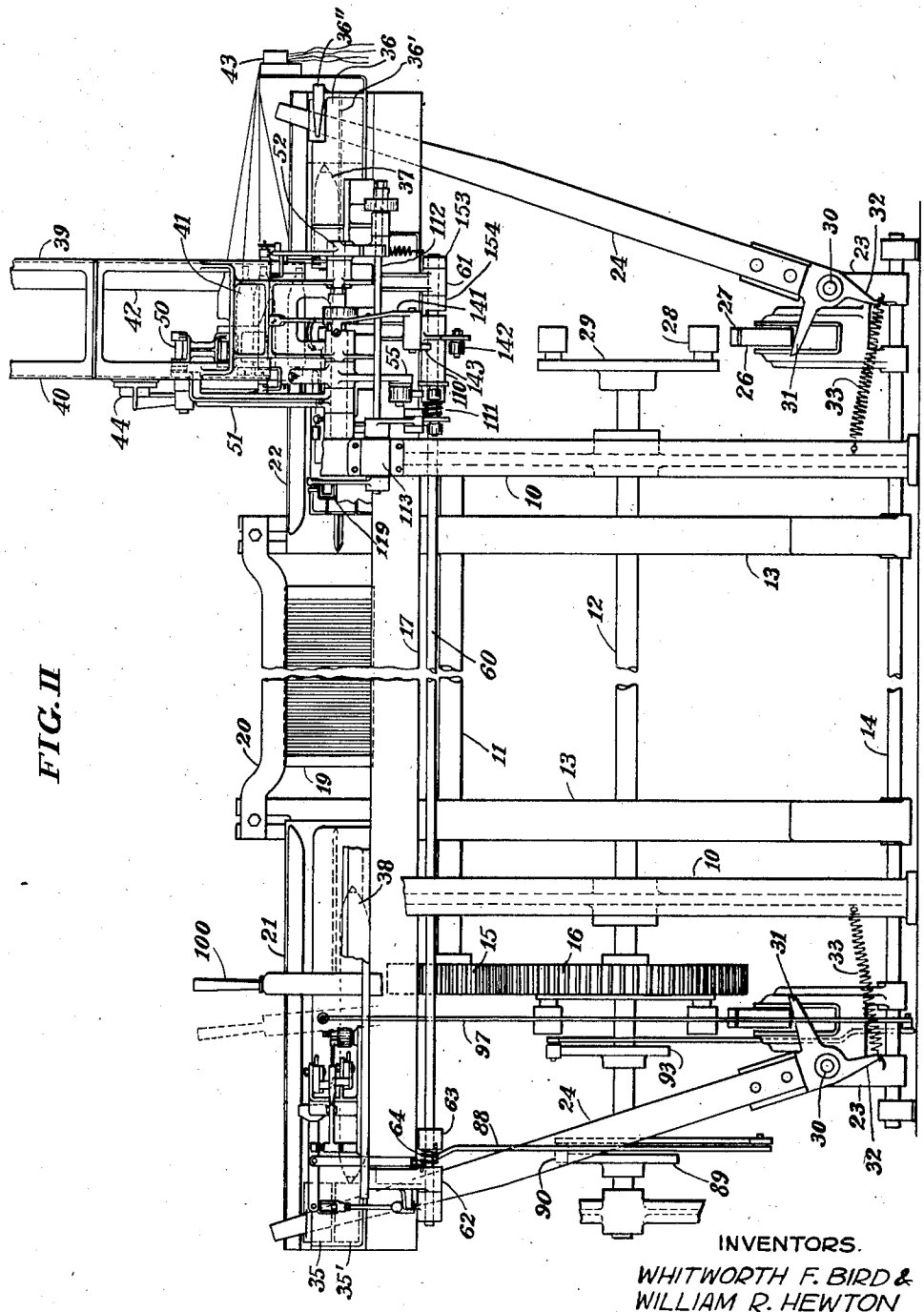

FIG. II

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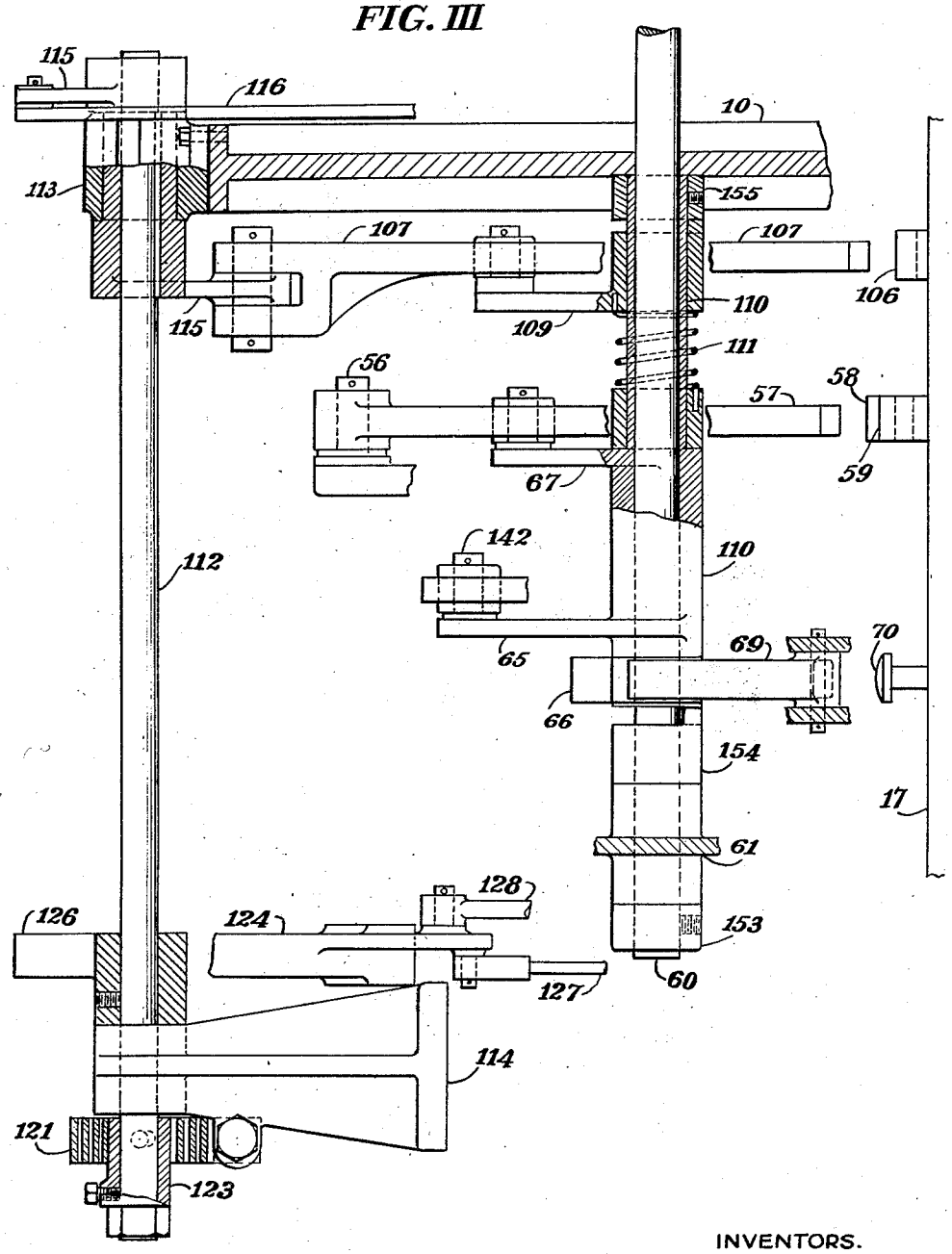
AUTOMATIC LOOM

Filed Feb. 3, 1938 7 Sheets-Sheet 3

FIG. III



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AUTOMATIC LOOM

Filed Feb. 3, 1938 7 Sheets-Sheet 4

FIG. IV.

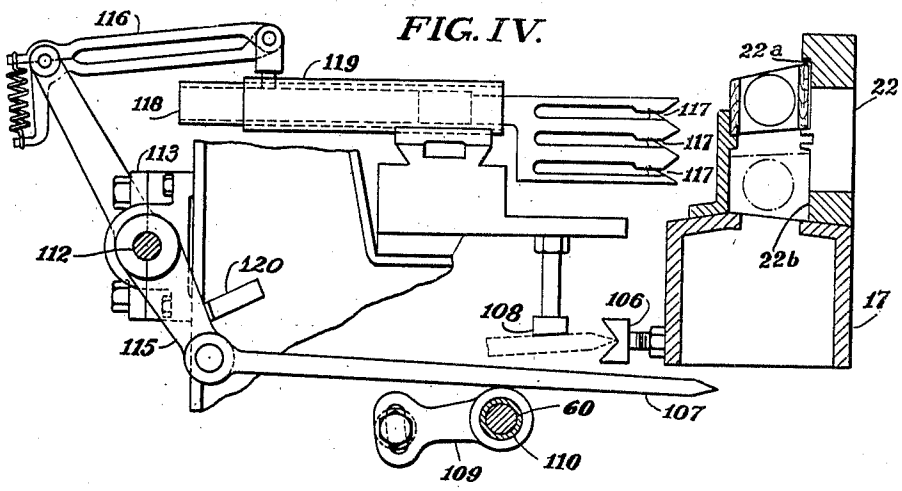
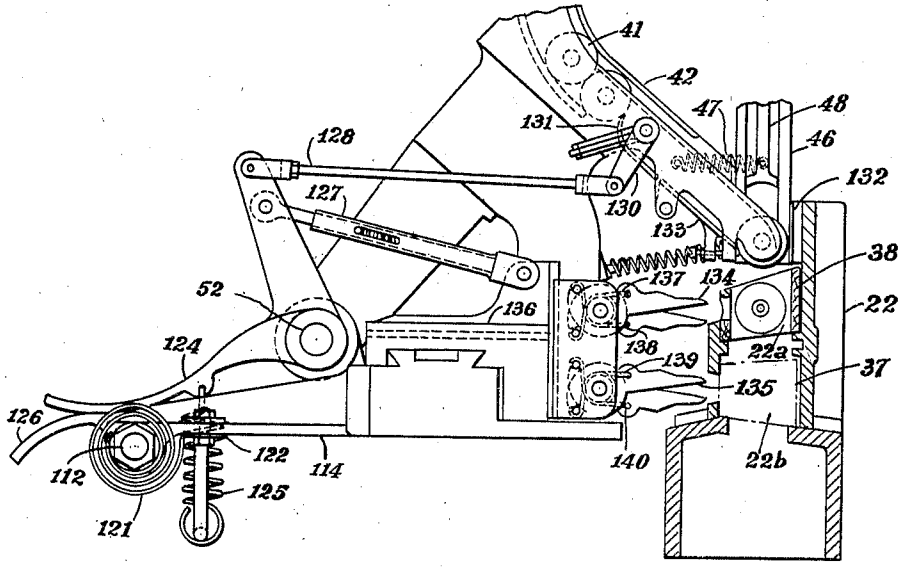


FIG. V.



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AUTOMATIC LOOM

Filed Feb. 3, 1938 7 Sheets-Sheet 5

FIG. VI.

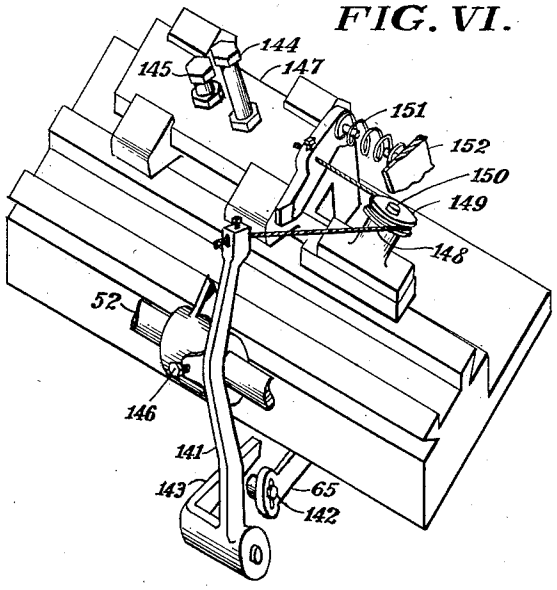
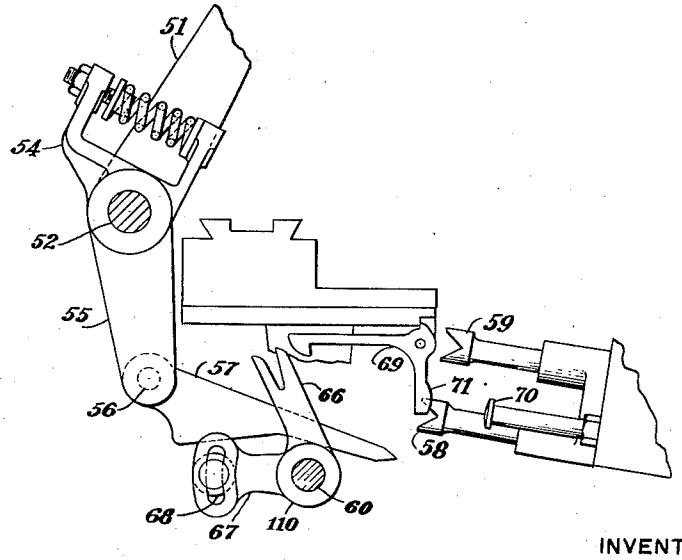


FIG. VII.



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AUTOMATIC LOOM

Filed Feb. 3, 1938 7 Sheets-Sheet 6

FIG. VIII.

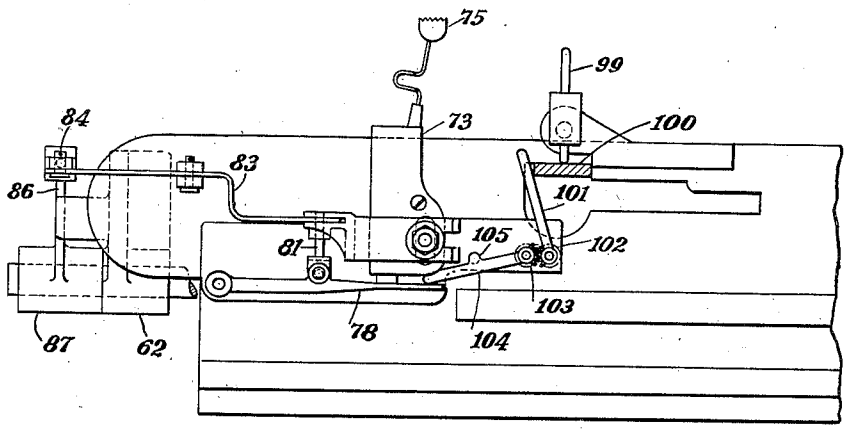
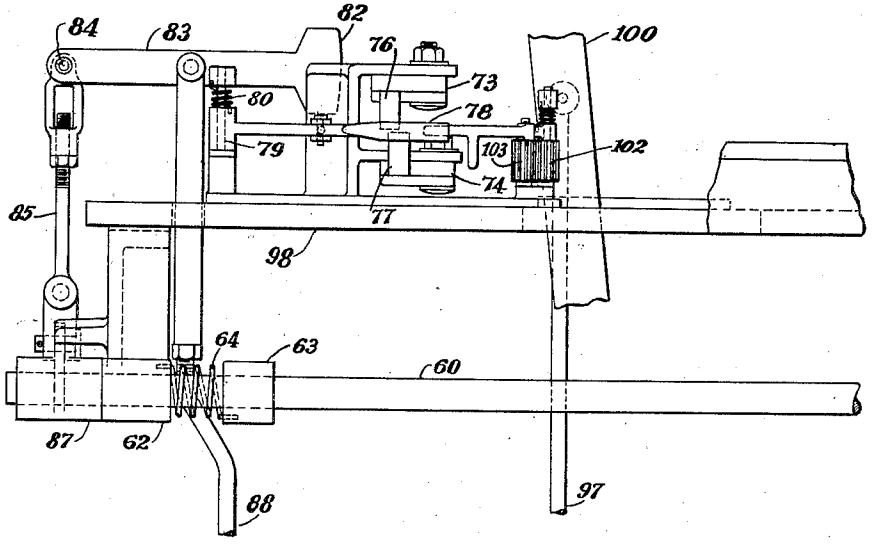


FIG. IX.



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AUTOMATIC LOOM

Filed Feb. 3, 1938 7 Sheets-Sheet 7

FIG. X.

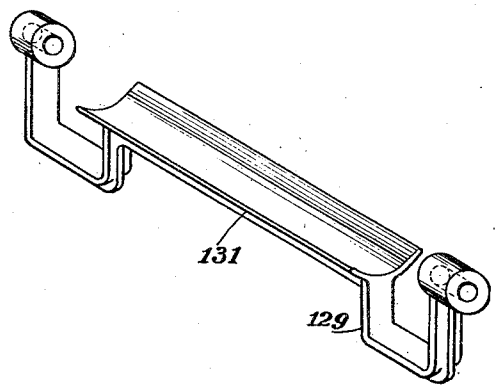
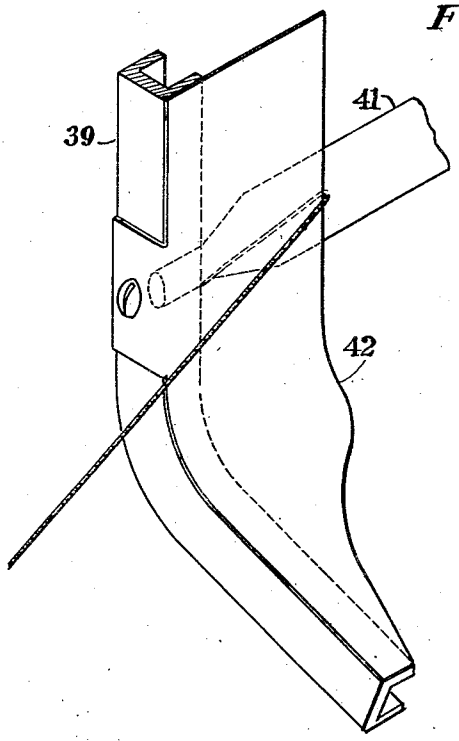


FIG. XI.



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Patented Nov. 8, 1938

2,136,331

UNITED STATES PATENT OFFICE

2,136,331

AUTOMATIC LOOM

Whitworth F. Bird, Wallingford, and William R. Hewton, Philadelphia, Pa., assignors to Collins & Aikman Corporation, Philadelphia, Pa., a corporation of Delaware

Application February 3, 1938, Serial No. 188,448

21 Claims. (Cl. 139—241)

This invention relates to looms wherein two shuttles are employed and wherein the warps are so manipulated as to form superposed weaving sheds through which the respective shuttles are passed in opposite directions simultaneously, with resultant production at one time, of a double fabric, two separate superposed fabrics, or a double pile fabric which may be cut apart on the loom or after removal from the loom, to produce two separate pile fabrics. This application is a continuation in part of co-pending applications Serial No. 94,726 and Serial No. 750,626, and includes changes and improvements in the structure of the replenishing mechanism and its initiating means. These co-pending applications have matured into United States Letters Patents Nos. 2,111,526 and 2,111,525, respectively.

More particularly, this invention has reference to multi-shed looms, with automatic weft replenishing mechanism at one side of the loom, and feeler initiating means on the opposite side, whereby replenishment is effected downwardly from above while the lay is substantially in its forward or beat-up position. Each side of the lay is provided with a shuttle box composed of two superposed shuttle compartments. The shuttles may be made to conform to the shape of the shed which they traverse and the compartments are shaped in a similar manner.

It has been proposed heretofore, among other ways, to effect weft replenishment in multi-shed looms by inserting the new weft supply substantially from one side of the shuttle. This method of replenishment has been found to have many disadvantages, including difficulties encountered in attempting to effectively control the checking of the shuttles in their respective boxes during weaving and in adjusting the shuttle boxes as well as in manipulating the new and spent bobbin weft ends.

An object of this invention is to overcome the drawbacks heretofore present in connection with weft replenishment in multi-shed looms, which desideratum is realized in practice through provision of a relatively simple and reliable automatic mechanism whereby the two shuttles are caused to pass simultaneously through the sheds from opposite sides of the loom. The replenishing mechanism may be mounted on a fixed portion of the loom in such a manner that a full bobbin is held in position substantially over the upper compartment of the before-mentioned shuttle box when the lay is in forward position. Said bobbin may be controlled so as to replenish a shuttle in either the upper or the lower compartment by feeler mechanism as hereinafter more fully described.

Another object of this invention is to provide in a multi-shed loom, feeler and related mechanism of simple and rugged construction for indicating substantial weft exhaustion and for initiating weft replenishment of the shuttle in either a close or more remote shuttle box compartment on the replenishing side of the loom by a single replenishing mechanism.

Another object of this invention is to provide in a device of the kind referred to, automatic means operable incident to the transfer of a bobbin to its position in a shuttle to place another bobbin in a position preparatory to transfer.

Further objects and advantages of this invention will be manifest from the detailed description of a preferred embodiment, illustrated in the attached drawings, wherein

Fig. I is a fragmentary view in side elevation of a portion of a loom conveniently embodying the present improvement.

Fig. II is a front elevation of a loom with the central portion broken out and with certain parts omitted to more clearly show the location and arrangement of the present improvements.

Fig. III is a fragmentary detail assembly view, partly in section, showing the lower portion of the transfer mechanism which is mounted on a fixed portion of the loom.

Fig. IV is a side elevational detail assembly of the weft hook mechanism and its relation to the shuttle boxes.

Fig. V is a view similar to Fig. IV of the weft cutting mechanism, a portion of the supply magazine, and shuttle boxes.

Fig. VI is a view of the transfer arm stop mechanism.

Fig. VII is a view of a portion of the transfer arm and the dagger, together with the dagger setting and actuating bunters.

Fig. VIII is a top plan view of the feeler mechanism and control parts.

Fig. IX is a side elevation of the mechanism set forth in Fig. VIII.

Fig. X is a detail view of the magazine cradle.

Fig. XI is a detail view of a magazine attachment which provides slack in the weft yarn.

Referring first more particularly to Fig. I of the drawings, a frame 10 has appropriately journalled thereon crankshaft 11 and a lower or main shaft 12, which latter may be driven from any suitable source of power in a known manner. The lay swords 13 are mounted on a sword shaft 14 and oscillate therewith. Sword shaft 14 is

journalled in the frame and serves to support a part of the picking mechanism. Intermeshing gears 15 and 16 fixed on the shafts 11 and 12 respectively, actuate the oscillating lay beam 17 through pitmans 18, which are pivotally connected to the swords. Carried on the lay beam 17 is a reed 19 which is supported at its top by a reed cap 20, and the two shuttle boxes generally indicated at 21 and 22, (Fig. II). Each shuttle box comprises two compartments, 21*a*, 21*b* and 22*a*, 22*b*, respectively, (Figs. IV and V), the construction of which will be more fully set forth hereinafter.

In general, the picking mechanism is the same on both sides of the loom; and fixed on the sword shaft 14 are supporting members 23 for the picker sticks 24 (Fig. II). Pivoted at 25 is a treadle arm 26 carrying a shoe 27 adapted to be engaged with picker rollers 28, which are adjustably mounted (Fig. I) on the double-armed supporting member 29. The picker sticks are pivoted on short shafts 30 which are fixed on supporting members 23, and comprise a foot 31 for engagement with threadle 26 and an extension 32 whereto is attached one end of a spring 33 which is fixed at its other end to the loom frame 10 and tends to keep the picker stick in its outward position. Any conventional picker stick check means may be used, but since this forms no part of this invention, it is omitted for the sake of clarity. Spring 34 (Fig. I) fixed to the loom at one end tends to counter-balance the weight of the treadle.

Numerals 35, 35', designate pickers which are built to conform to the shape of a cross-section of the compartments of the shuttle box 21, and the picker stick extends upwardly through registering slots in the lay beam 17, both of the shuttle compartments and the pickers.

A double picker 36, having a central lateral extension 36' extending into a rear portion of shuttle box 22, may be used on the replenishing side of the loom. This construction provides a wide bobbin passage (Fig. V) and the use of a relatively wide shuttle as the relatively wide shuttle is all that need be supported by the floor of the upper compartment 22*a*. Leaf spring picker check 36'' aids in the checking of both shuttles and prevents the picker from rebounding.

Each shuttle box is mounted on the movable lay, and, as heretofore set forth, includes two shuttle compartments, one above the other, in which the shuttles 37 and 38 are boxed and held after passing through the sheds formed by the warp threads.

Viewed from a position forwardly of the loom (Fig. II) the transfer mechanism per se is illustrated as being fixed on the right-hand side of the loom frame. The magazine proper comprises channel-shaped guides 39 and 40 for the descending bobbins 41 of the supply. On the channel guide 39 is secured a weft slack producing plate 42 (Fig. XI) which deflects the path of the weft from the tips of the supply bobbins to free end holder 43. The slack obtained, as the bobbin drops below the cradle to the end of the magazine, is sufficient to avoid the danger of the bobbin becoming tilted with the result that the bobbin-engaging transfer member will not properly contact the bobbin for the transfer.

To channel guide 40 is secured bracket 44 to which is pivoted at 45 transfer head guide 46. Spring 47 (Fig. V) maintains this guide 46 in vertical position against the end of the magazine so that the pivoted transfer head 48 is in alignment with a full bobbin preparatory to the transfer into a substantially exhausted shuttle. The spring 47 permits rearward movement of the guide 46 in the event of jamming during transfer. The member 49 on which transfer head 48 is pivoted is in turn pivoted as at 50 to transfer arm 51, loosely mounted on shaft 52, and is yieldingly pressed against the lower arm 53 of bifurcated member 54 fixed on shaft 52, as set forth in copending application Serial No. 94,756, above mentioned. An arm 55, integral with the bifurcated member 54, supports a stud 56 on which dagger 57 is pivoted. Latch mechanism controlled as hereinafter more fully set forth elevates and positions the dagger for engagement with either bunter 58 or 59. The bunters are adjustable in length and in the illustrated embodiment (Fig. VII) bunter 58, closer to the sword shaft 14, gives transfer arm 51 through dagger 57 its short stroke and bunter 49 its longer stroke.

Shaft 60, (Figs. II, III and IV) is journalled in brackets 61 and 62 on opposite sides of the loom and carries adjustable collar 63. Spring 64, one end of which is fixed, returns the shaft to its normal position after it is actuated. Loosely mounted on said shaft 60 is a step sleeve 110 comprising the arm 65 (Fig. III), latch arm 66 having a bifurcated end and dagger lifter arm 67 to which is adjustably secured roller 68 by which dagger 57 is raised. A short clockwise movement (Fig. VIII) of shaft 60 will cause the clutch collar 154, fixed to the shaft 60 (Fig. III), to engage the step sleeve 110 and to rotate it sufficiently so the one tooth of the bifurcated arm 66 will engage pivoted member 69 and a longer movement will result in the other tooth engaging 69 to set the dagger in alignment with the selected bunter. After the step sleeve 110 is positioned by the latch, the shaft 60 returns to its original position because of the influence of spring 64 (Fig. IX). Stud 70 on the forward beat of the lay strikes the extension 71 of member 69 and permits step sleeve 110 to rotate counter-clockwise to its original position.

The movements of shaft 60 and the positioning of the dagger 57 are initiated by side slip feelers 73, 74 (Figs. II, VIII and IX), secured to the loom frame. As hereinbefore stated, the shuttles are picked simultaneously from opposite sides of the loom. One or the other of the feeler tips 75 contacts a shuttle after each throw and forces one of the feeler members 76, 77, forwardly of the loom. Both feeler members 76, 77, are aligned with an extension on lever 78 pivoted at its end on pin 79. Torsion spring 80 keeps lever 78 against one or both of members 76, 77. Pin 81, pivotally secured to lever 78, extends rearwardly of the loom and in under the head 82 of chopper 83 when not moved out by a feeler contacting a bobbin. After each pick, the forward movement of the lay moves the pin from under the chopper head 82 and chopper 83 pivots about pin 84 without moving adjustable link 85 during normal weaving. Upon detection of substantial exhaustion of a bobbin in either shuttle by the feelers, a side slipping of the feeler tip will permit pin 81 to remain under chopper head 82 and the pin serves as a fulcrum for the chopper 83. When this occurs, movement of the shaft 60 takes place through link 85 and rearward extension 86 on hub 87 fast on shaft 60. The extent of movement determines the position of dagger 57 and its alignment with one or the other of the bunters 58, 59 on the opposite side of the loom.

Chopper 83 is moved two different extents by cam actuated link 88 (Figs. I and II). The actuating cam 89 has two lifts and the cam surface acts on roller 90 of bell-crank lever 91, which is connected to link 88. Spring 92, fixed at one end to the loom frame, holds roller 90 in engagement with the cam surface. The chopper is actuated by the cam once for each pick of weft and the high and low portions of the cam are correlated with the positions of the shuttles in the shuttle boxes. In the illustrated embodiment, replenishment takes place on the first pick after detection of weft exhaustion by the feeler. On the pick during which the top shuttle is felt, the chopper 83 is receiving its shorter stroke from the cam. On the next succeeding pick, the chopper receives its longer movement. It will thus be seen that in the event of detection of substantial weft exhaustion in either shuttle, shaft 60 will be actuated as above described and the latch mechanism will align the dagger 57 with the desired bunter for bobbin replenishment after the next pick of the shuttles.

The provision of a double different lift cam and feelers, which move the pin from under the chopper on each pick, is preferred to having the cam moving the chopper the same extent during each loom revolution, and the use of two pins, one for each feeler, which are caused to move into position under the chopper as by the side movement of the feeler tip because of the relatively delicate mechanism necessary, the holding mechanism required, as well as the desirability of stopping the loom when the shuttles are mispositioned with the resulting inaccurate boxing and "banging off" of multi-shed looms equipped with conventional picking mechanism.

To insure loom stoppage when the shuttles are improperly positioned by the operator, there is provided on shaft 12 a lifting cam 93 for controlling bell-crank lever 94 pivoted as at 95. Spring 96 keeps the roller of the bell-crank lever 94 in engagement with the cam. One arm of the bell-crank lever passes under the picking mechanism, and pivotally connected to the end thereof, is link 97 which passes through plate 98 (Fig. VIII) on the loom frame. Spring pressed pin 99 is aligned with the shipper handle 100 and enters, after each pick, into a perforation of the shuttle compartment in which there should be no shuttle. If a shuttle is present, pin 99 is pressed back against the shipper handle which becomes disengaged and the loom is stopped.

It is desirable to render the replenishing mechanism inoperative during reversal of the loom to effect pick-outs. When reversal takes place, the shipper handle 100 is in the off position and spring pressed arm 101 is moved to the right (Fig. VIII). This movement transferred through gears 102, 103 and arm 104, withdraws the pin 81 and holds it out from under the chopper head 82. Movement of arm 104 is limited by extension stop 105 contacting a convenient fixed portion (not shown).

Fig. IV illustrates the improved weft-withdrawing means for the severed weft extending to the selvages. The hooks are lay-actuated through bunter 106 engaging dagger 107. As will be seen from Fig. IV, the dagger 107 is elevated to a position against adjustable stop 108 on either of the above described movements of shaft 60 by the arm 109, which is loosely mounted on step sleeve 110 and under the influence of spring 111. Spring 111 is always under tension. When the dagger 107 strikes stop 108, arm 109 holds the two in contact by spring pressure and the weft-withdrawing means is actuated. Shaft 112 is journalled in brackets 113, 114 to the right-hand side of the loom forwardly of the shaft 60 and keyed thereon is two-armed lever 115, (Fig. IV) at one end of which is the dagger 107. At its other end, lever 115 is connected by give-way connection 116 to an extension of hook member 118. Tho hooks are integral and each has a projection 117 extending into a groove in another member so as to facilitate insertion of the severed weft and to prevent withdrawal of the severed weft from the hooks. Fixed guide 119 provides a straight path for the hooks. The shaft 112 and the hooks are yieldingly held in retracted position against stop 120, by spring 121 (Fig. V) secured to the bracket 114 and to sleeve 123, fixed on shaft 112, at its other end.

On transfer arm shaft 52 is loosely mounted two-armed cam lever 124. Spring 125, having one end attached to an extension on bracket 114 (Fig. V), retains two-armed cam lever 124 against cam 126 fixed in shaft 112. Engagement of the dagger 107 with its bunter moves cam 126 and the two-armed cam lever to actuate the cam-type weft cutters and magazine cradle mechanism through links 127 and 128, respectively. As stated, link 128 operates the cradle 129 which holds the reserve supply of bobbins out of engagement with the bobbin in alignment with the transfer mechanism through arm 130. Movement of link 128 rearwardly causes cradle portion 131 to release a single bobbin to a position at the end of the magazine. The end support for the bobbin comprises an extension 132 on guide and adjustable spring pressed pivoted member 133 (Fig. V).

The link 127 is yieldable and moves cam cutters 134 and 135 and the supporting carriage in fixed guide 136. The cutters are normally held open by springs 137—140 and are closed by the slots in the shuttles and shuttle compartments as the cutters are moved rearwardly of the loom to sever the weft near the shuttle eye.

Fig. VI illustrates that portion of the replenishing mechanism which prevents overthrow of the transfer arm 51 during insertion of a full bobbin into either shuttle. Arm 141 is pivoted on a fixed portion of the loom and is moved only when it is desired to replenish a shuttle in the lower compartment 22b. When the shaft 60 receives the short stroke from the chopper 83, stud 142 moves up to lever 143 but does not move it and hence, stop 144 limits the downward movement of the transfer arm 51. On the longer movement of the shaft, stud 142 on an arm of step sleeve 110 engages lever 143 and pulls stop 145 into the path of movement of the transfer arm. The lever 141 has an adjustable stop 146 and moves stop carriage 147 by the flexible cable 148. Cable 148 passes about pulley 149 which is rotatably mounted on fixed pintle 150. The carriage 147 is returned to the position wherein stop 144 is aligned with the transfer arm by spring 151 pressing against it and the fixed member, 152, of the magazine.

Referring specifically to Fig. III, the shaft 60, which extends from one side of the loom to the other, carries, on the replenishing side of the loom, elevating arms, for dagger 107 controlling the weft withdrawing hooks, the cutters and the cradle, as well as the dagger 57 which controls the transfer arm 51.

The loom frame 10 and bracket 61, in conjunction with collar 153, limit the lateral movement of

shaft 60. A clutch member 154 is fixed to the shaft 60 and moves the step sleeve 110 clockwise (Fig. I). When the shaft 60 receives its short movement, the first tooth of latch member 66 engages 69, the transfer dagger 57 is lifted into alignment with the bunter 58 and stud 142 moves up to, but does not move the lever 143 and the stop carriage mechanism. In addition, the dagger 107 is elevated against stop 108, as hereinbefore described, and the bobbin transfer is effected and the mechanism reset. When the shaft 60 receives its greater movement, the second tooth of latch member 66 engages 69, the transfer dagger 57 is lifted into alignment with the bunter 59 and stud 142 moves up to and moves the lever 143 and the stop carriage mechanism. The dagger 107 is elevated the same extent as on the shorter movement by virtue of the hub of arm 109 being loose on step sleeve 110 and moved therewith through tensioned torsion spring 111. Stop collar 155 is also fixed to step sleeve 110 and maintains arm 109 out of engagement with the dagger 107 during normal weaving. Stop collar and the hub of arm move together on the short movement of shaft 60, but on the longer stroke, stop 108 limits the movement of dagger 107 and arm 109, and the projection stop collar 155 moves away from it. The shaft 60 is reset by the spring 64 before the step sleeve 110 is released from the control of its latch arm 66 and member 69 by stud 70 on the lay 17. When the stud 70 releases the latch, the step sleeve returns to its position by gravity and stop collar 155 pressing on the loose hub.

Operation

The mechanism above described in detail operates selectively as follows, when substantial exhaustion of the weft on the bobbin of either shuttle is detected by the feeler mechanism. The shuttles are positioned at opposite sides of the loom, one in an upper compartment and the other in a lower compartment. The arrangement of shuttles is such that the shuttle 38 is in the upper compartment on the feeler side of the loom as the chopper 83 is about to receive its shorter stroke from the low lift portion of actuating cam 89. If substantial weft exhaustion is detected by the side-slip feeler, extension 76 of the feeler will not remove the pin 81 from the path of the chopper head 82 and the pin 81 will serve as a fulcrum for the chopper 83 and shaft 60 will rotate sufficiently so that the step sleeve 110 will be engaged by clutch 154, fast on shaft 60 and the first tooth of latch arm 66 will engage the member 69 and be retained thereby. The movement of step sleeve 110 and its arm 67 will elevate dagger 57 (Fig. VII) into the path of movement of bunter 58 on the lay 17, and on the next forward movement of the lay, the transfer arm 51 on shaft 52 will descend and a bobbin will be transferred into the shuttle 38. Simultaneously with the above outlined operation, arm 109 on step sleeve 110 moves the dagger 107 upwardly against stop 108 (Fig. IV) and into the path of bunter 106 to operate the weft-withdrawing lever 115 and its hooks so that the severed weft extending to the selvage is withdrawn as the lay 17 moves rearwardly.

The movement of the lever 115 keyed to shaft 112 will move cam 126 and two-armed cam lever 124, and through link 127 will actuate the cam cutters 134, 135 to sever the thread from the old bobbin. Cradle 129 will also be activated and a full bobbin will pass over cradle portion 131 to the end of the magazine in position for insertion into a shuttle. When the lay 17 moves rearwardly, the parts assume their original positions, as stud 70 has released the latch after the daggers 57 and 107 were engaged by the bunters 58 and 106, respectively.

Detection of substantial exhaustion of the lower shuttle occurs when the chopper 83 is about to receive its longer stroke. In this case, extension 77 fails to remove the pin 81 from the path of the chopper head 82 and the pin 81 will again act as the fulcrum for the chopper head to actuate the shaft 60 through its greater movement so that the second tooth of latch arm 66 will engage 69 and elevate dagger 57 into the path of movement of the bunter 59 on the lay 17. Stop 145 will be drawn into the path of the transfer arm. On the next forward movement of the lay, the transfer arm on shaft 52 descends and a bobbin will be transferred through the upper shuttle compartment into the shuttle 37 in the lower compartment. As before, the dagger 107 will again be moved against stop 108 but stop collar 155 on shaft 60 will move out of engagement with the hub of arm 109 and reengage it when resetting of the mechanism again takes place. It will be clear that the cutters 134 and 135 and the weft-withdrawing hook lever 115, as well as the crade 129, will be operated as before through shaft 112 and cam 126.

Having described a preferred embodiment of our invention, we claim:

1. In a loom of the bobbin-changing type; a pair of automatic weft-replenishing bobbin shuttles; a shuttle box at one side of the loom comprising a pair of aligned compartments for boxing the shuttles and a continuous bobbin passage therethrough; a bobbin support; means for engaging a bobbin on the support and for transferring it in the same substantially straight line into a shuttle in either of the compartments of the shuttle box; means for giving said first-named means either of the selected extents of movement and means including bobbin feeler mechanism for governing said selection.

2. In a loom of the bobbin-changing type; a pair of automatic weft-replenishing bobbin shuttles; a shuttle box at one side of the loom comprising a pair of superposed vertically-aligned compartments for boxing the shuttles and a continuous bobbin passage therethrough; a bobbin support; means for engaging a bobbin on the support and for transferring it substantially vertically into a shuttle in either of the compartments of the shuttle box; means for giving said first-named means either of the selected extents of movement and means including bobbin feeler mechanism for governing said selection.

3. In a multiple shed loom of the bobbin-changing type; a pair of shuttles; a shuttle box mounted at one side of the loom comprising two superposed vertically-aligned shuttle compartments with a straight vertical opening extending continuously therethrough; weft-replenishing mechanism including a lay-actuated member arranged to be passed two different extents into the vertical opening of the shuttle box to selectively replenish exhausted individual shuttles in the respective compartments; means for giving said member either of the selected extents of movement and means including bobbin feeler mechanism for governing said selection.

4. In a loom of the bobbin-changing type; a pair of automatic weft-replenishing bobbin shuttles; picking mechanism for picking the shuttles

oppositely and simultaneously across the loom; a shuttle box mounted at one side of the loom, having a pair of superposed vertically-aligned shuttle compartments and a straight bobbin passage extending therethrough, for boxing the shuttles; a bobbin support; means for engaging a bobbin on the support and transferring it vertically into a shuttle in either compartment of the shuttle box and means for giving said first-named means either of the two selected extents of movement and means including bobbin feeler mechanism for governing the extent of movement.

5. In a double shuttle loom of the bobbin-changing type; a shuttle box with two superposed vertically-aligned shuttle compartments at each side of the loom; a pair of shuttles; means for concurrently throwing the shuttles in opposite directions between corresponding compartments of the respective shuttle boxes; a magazine for filled bobbins on one side of the loom; and means movable two different extents relatively to said shuttle compartments to vertically replace bobbins in the respective shuttles with filled bobbins from the magazine at different times while said shuttles respectively rest temporarily in their respective compartments in one of the shuttle boxes; means including bobbin feeler mechanism for selecting in which of either shuttle compartment a shuttle is to be replenished and actuating means for the movable means whereby a bobbin is transferred into a shuttle in the selected compartment.

6. In a bobbin-changing loom; a shuttle on each side of the loom; picking mechanism for picking the shuttles oppositely and simultaneously across the loom; a shuttle box comprising two aligned shuttle compartments having a continuous bobbin passage therethrough; bobbin replenishing means comprising a member movable two different extents to engage a bobbin and to transfer it into a shuttle in either compartment depending on the extent of movement of the movable means; replenishing initiating means including bobbin feeler mechanism at the opposite side of the loom for detecting substantial weft exhaustion and for selecting which of the two extents of movement the movable means receives and means for moving the movable means whereby replenishing is effected.

7. In a loom according to the combination set forth in claim 6; a chopper; a fulcrum about which said chopper pivots, after detection of substantial weft exhaustion by the bobbin feeler mechanism, to set the replenishing means for the selected of the two extents of movement of the movable member.

8. In a loom according to the combination set forth in claim 6; a cradle; exhausted bobbin weft-severing mechanism and means actuated with the movable bobbin engaging member to operate the cradle and the severing mechanism.

9. In a loom according to the combination set forth in claim 6; a shipper handle on the detector side of the loom; movable detecting means aligned with the shipper handle during weaving; actuating means for the aligned means to position it in feeling position opposite a shuttle compartment in which no shuttle is to be present, whereby the detecting means will be moved and the shipper handle will be disengaged in the event of the presence of a shuttle in the compartment opposite the said detecting means as the lay approaches front center.

10. In a loom according to the combination set forth in claim 6; a shipper handle on the detecting side of the loom; means movable when the shipper handle is moved to off-position to isolate the bobbin feeler mechanism from the remainder of the replenishing mechanism, whereby detection of weft when the shipper handle is in off-position will not result in a bobbin transfer.

11. In a bobbin-changing loom; a shuttle on each side of the loom; picking mechanism for picking the shuttles oppositely and simultaneously across the loom; a shuttle box comprising two aligned shuttle compartments having a continuous bobbin passage therethrough; bobbin replenishing means comprising a member movable two different extents to engage a bobbin and to transfer it into a shuttle in either compartment depending upon the extent of movement of the movable means; replenishing initiating means including bobbin feeler mechanism at the opposite side of the loom for detecting substantial weft exhaustion and for selecting which of the two extents of movement of the movable means receives; a chopper; a movable chopper fulcrum; means on the bobbin feeler mechanism for controlling the relative position of said fulcrum and the chopper; setting means for the replenishing means; actuating means for the chopper to cause it to engage the fulcrum and to set the setting means and means for moving the movable means whereby replenishment is effected.

12. In a loom according to the combination set forth in claim 11, wherein the setting means comprises a double latch device.

13. In a loom according to the combination set forth in claim 11 having a releasing means on the lay and wherein the setting means comprises a double latch device which is released after setting, on the next forward movement of the lay.

14. In a bobbin-changing loom; a shuttle on each side of the loom; picking mechanism for picking the shuttles oppositely and simultaneously across the loom; a shuttle box comprising two aligned shuttle compartments having a continuous bobbin passage therethrough; bobbin replenishing means comprising a member movable two different extents to engage a bobbin and to transfer it into a shuttle in either compartment depending on the extent of movement of the movable means; replenishing initiating means including bobbin feeler mechanism at the opposite side of the loom for detecting substantial weft exhaustion and for selecting which of the two extents of movement the movable means receives; a shaft; a loose sleeve on said shaft; a setting mechanism integral with said sleeve; means for rotating said sleeve on the shaft; means through which the bobbin feeler mechanism's motion from detection of weft exhaustion is transmitted to the shaft and means for moving the movable means whereby replenishment is effected.

15. In a loom according to the combination set forth in claim 14; wherein the means rotating the sleeve consists of a clutch fixed to the shaft.

16. In a loom according to the combination set forth in claim 14; a weft hook mechanism; a weft hook mechanism dagger on a fixed portion of the loom; a bunter on the lay and means on the sleeve for aligning the weft hook dagger and the bunter during the replenishing cycle.

17. In a loom according to the combination set forth in claim 14, a dagger for the movable bobbin engaging member mounted on a fixed portion of the loom; a two-lift cam for rotating the shaft

two different extents depending upon which compartment replenishment is to be effected.

18. In a bobbin-changing loom; a shuttle on each side of the loom; picking mechanism for picking the shuttle oppositely and simultaneously across the loom; a shuttle box comprising two aligned shuttle compartments having a continuous bobbin passage therethrough; bobbin replenishing means comprising a member movable two different extents to engage a bobbin and to transfer it into a shuttle in either compartment depending upon the extent of movement of the movable means; a magazine for full bobbins; a holding mechanism for the weft ends extending from the bobbin; a deflector on said magazine about which the ends must pass when they are held by the holding mechanism, whereby sufficient slack will be provided when the bobbin is moved to the end of the magazine to prevent it from being tilted.

19. In a bobbin-changing loom; a shuttle on each side of the loom; picking mechanism for picking the shuttles oppositely and simultaneously across the loom, a shuttle box comprising two aligned shuttle compartments having a continuous bobbin passage therethrough; bobbin replenishing means comprising a member movable two different extents to engage a bobbin and to transfer it into a shuttle in either compartment depending upon the extent of movement of the movable means; said picking mechanism comprising a double picker, having a lateral extension, operating both compartments; replenishing initiating means for detecting substantial exhaustion and for selecting which of the two extents of movement the movable means receives and means for moving the movable means, whereby replenishment is effected.

20. In a bobbin-changing loom, a shuttle on each side of the loom; picking mechanism for picking the shuttles oppositely and simultaneously across the loom; a shuttle box comprising two aligned shuttle compartments having a continuous bobbin passage therethrough; bobbin replenishing means comprising a member movable two different extents to engage a bobbin and to transfer it into a shuttle in either compartment depending upon the extent of movement of the movable means; a weft hook mechanism comprising a series of weft hooks spanning the path of the severed yarn from the exhausted shuttle; replenishing initiating means for detecting substantial weft exhaustion and for selecting which of the two extents of movement the movable means receives and means movable with the movable means for actuating the weft hook mechanism.

21. In a bobbin-changing loom; a shuttle on each side of the loom; picking mechanism for picking the shuttles oppositely and simultaneously across the loom; a shuttle box comprising two aligned shuttle compartments having a continuous bobbin passage therethrough; bobbin replenishing mechanism comprising a member movable two different extents to engage a bobbin and to transfer it into a shuttle in either compartment depending upon the extent of movement of the movable means; a stop mechanism for the movable means comprising two elements which may individually limit the extent of movement of the movable means and one of which elements is normally in a position to do so, after detection of weft exhaustion in one of the shuttles; means for moving said one element out of its position and the other of said elements into limiting position, after detection of weft exhaustion in the other of said shuttles; replenishing initiating means for detecting substantial weft exhaustion and selecting which of the two extents of movement the movable means receives and means for moving the movable means whereby replenishment is effected.

WHITWORTH F. BIRD.
WILLIAM R. HEWTON.

CERTIFICATE OF CORRECTION.

Patent No. 2,136,331. November 8, 1938.

WHITWORTH F. BIRD, ET AL.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 20, for the reference numeral "49" read 59; line 32, for "(Fig. VIII)" read (Fig. VII); and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 27th day of December, A. D. 1938.

Henry Van Arsdale

(Seal) Acting Commissioner of Patents.