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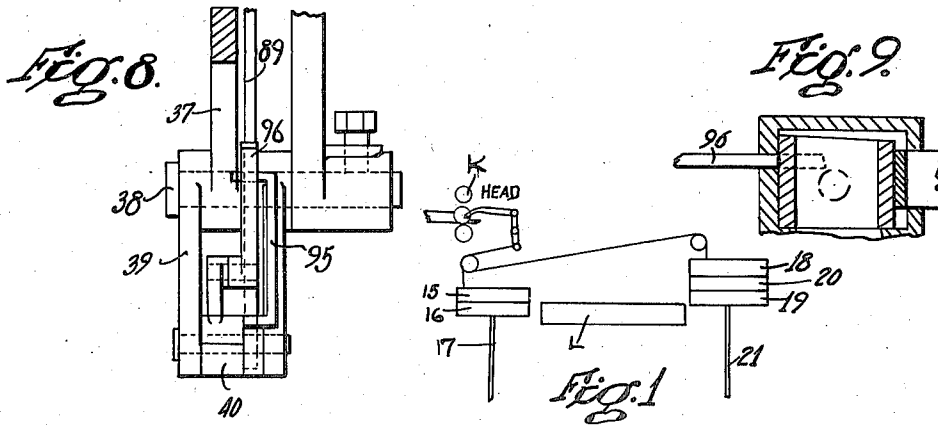
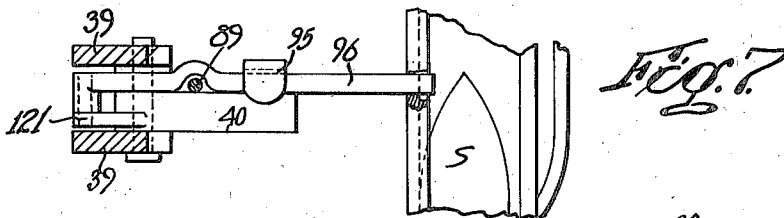
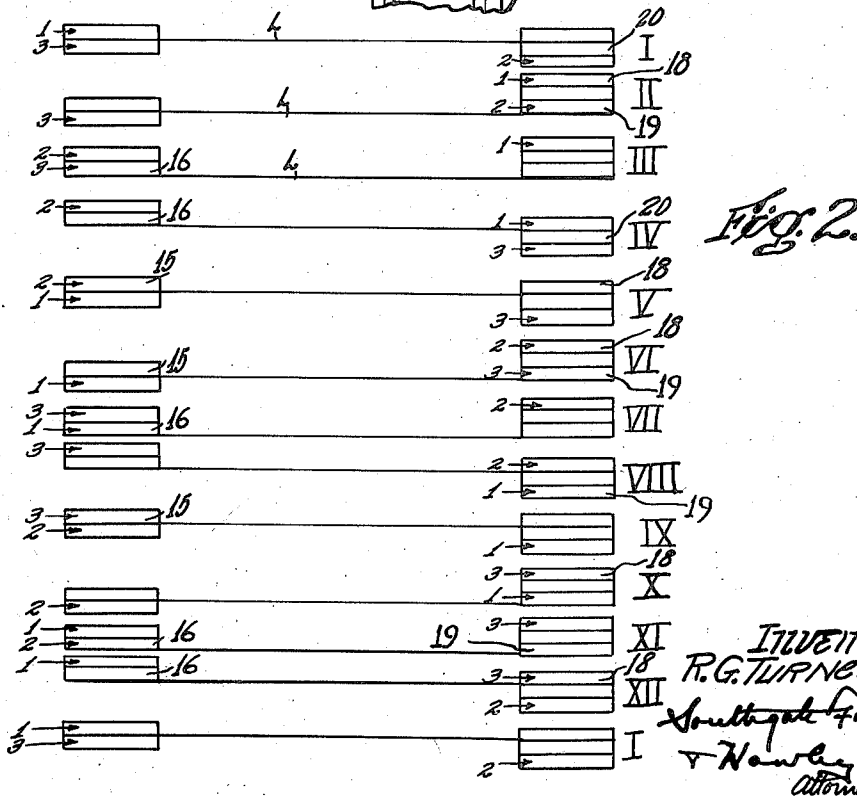
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2,058,113

PICK AND PICK BOBBIN CHANGING LOOM

Filed June 13, 1934

5 Sheets-Sheet 1



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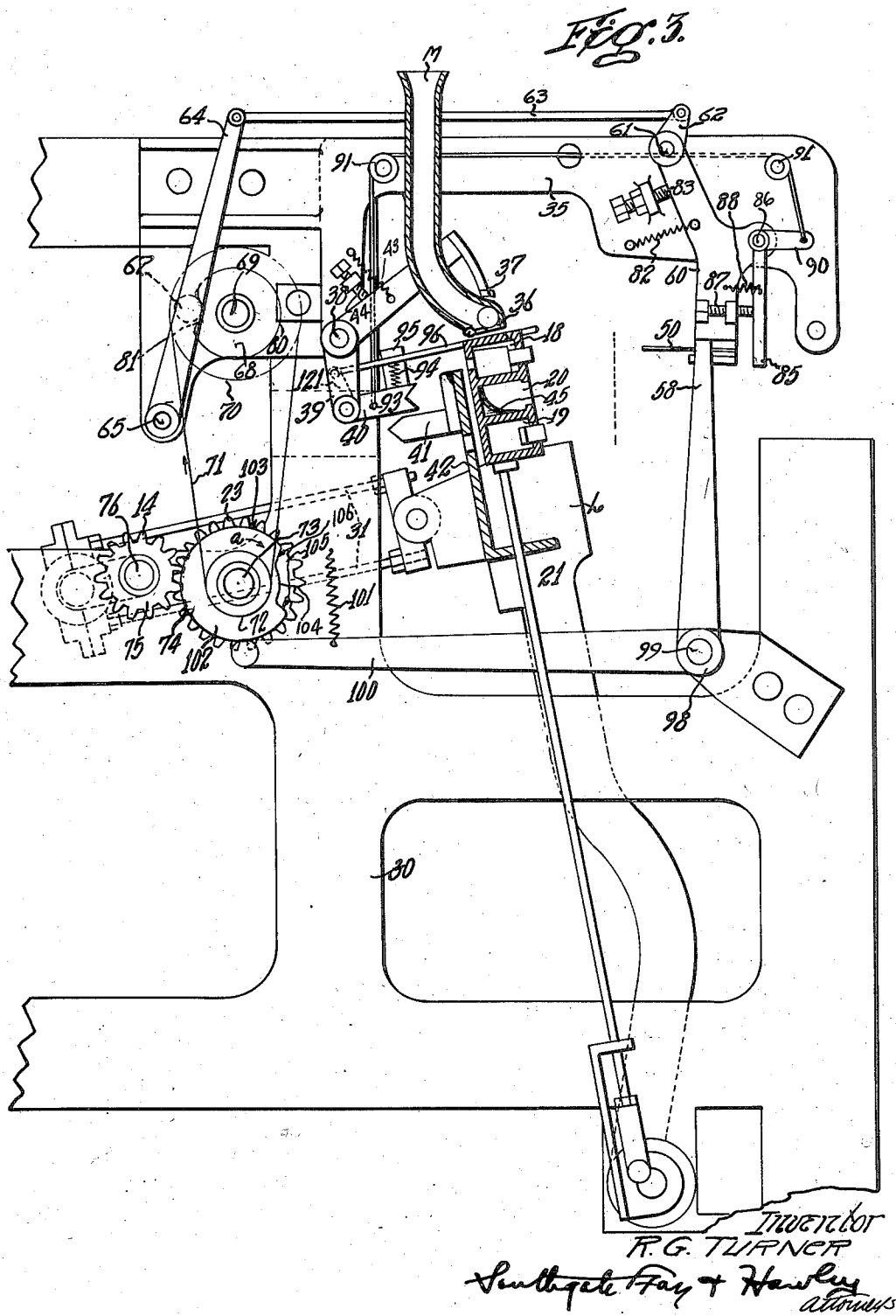
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PICK AND PICK BOBBIN CHANGING LOOM

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5 Sheets-Sheet 2



Oct. 20, 1936.

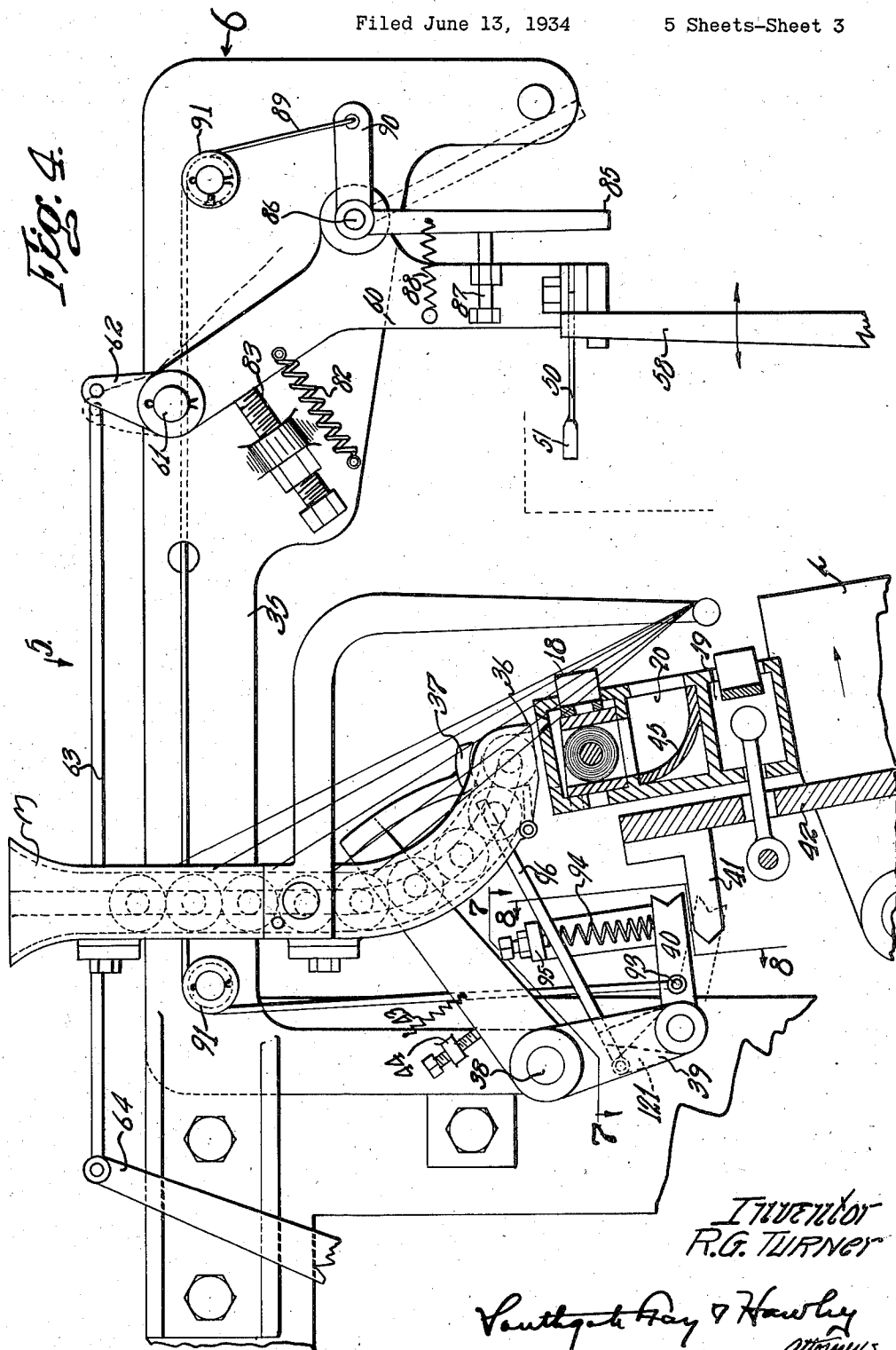
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PICK AND PICK BOBBIN CHANGING LOOM

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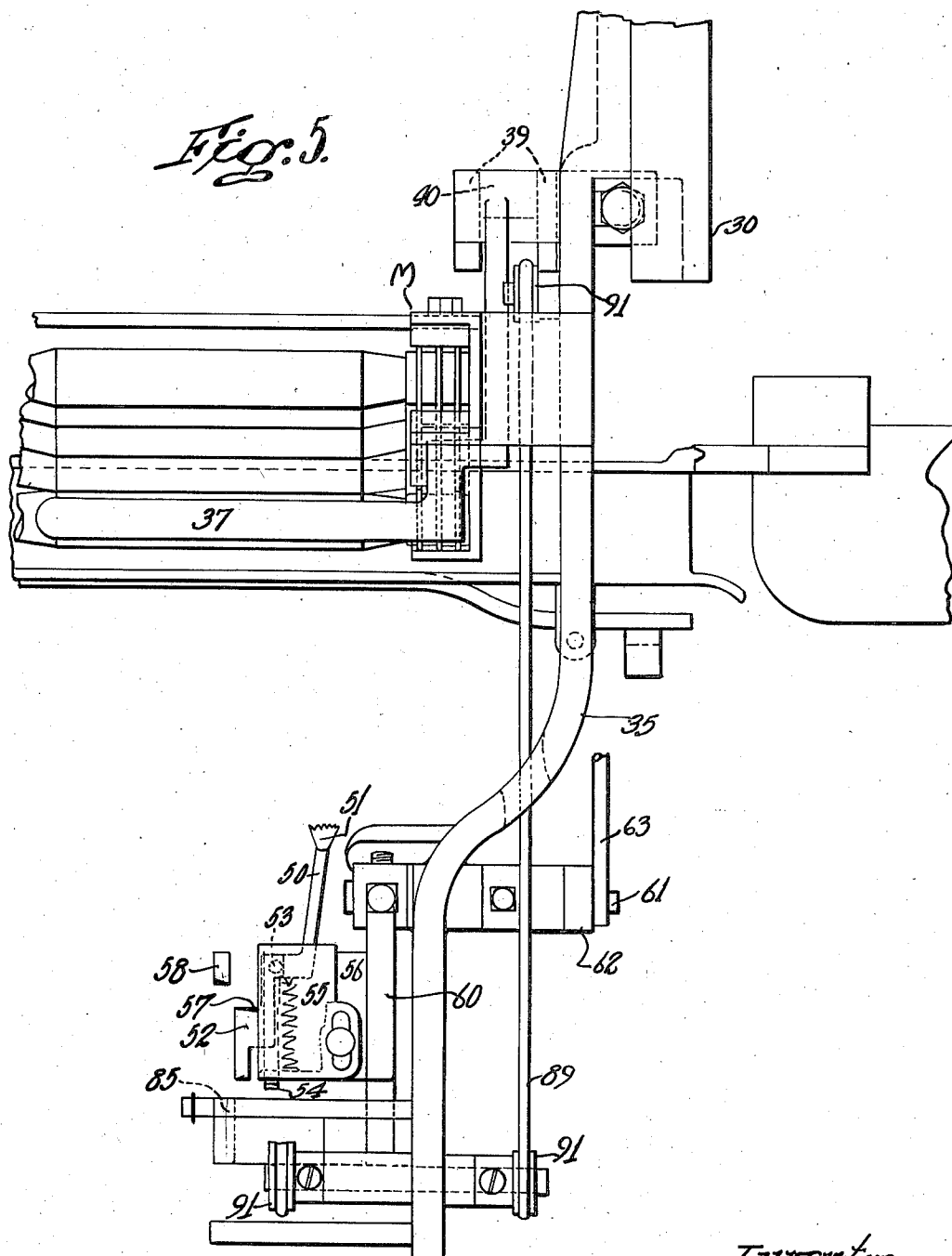
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PICK AND PICK BOBBIN CHANGING LOOM

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5 Sheets-Sheet 4



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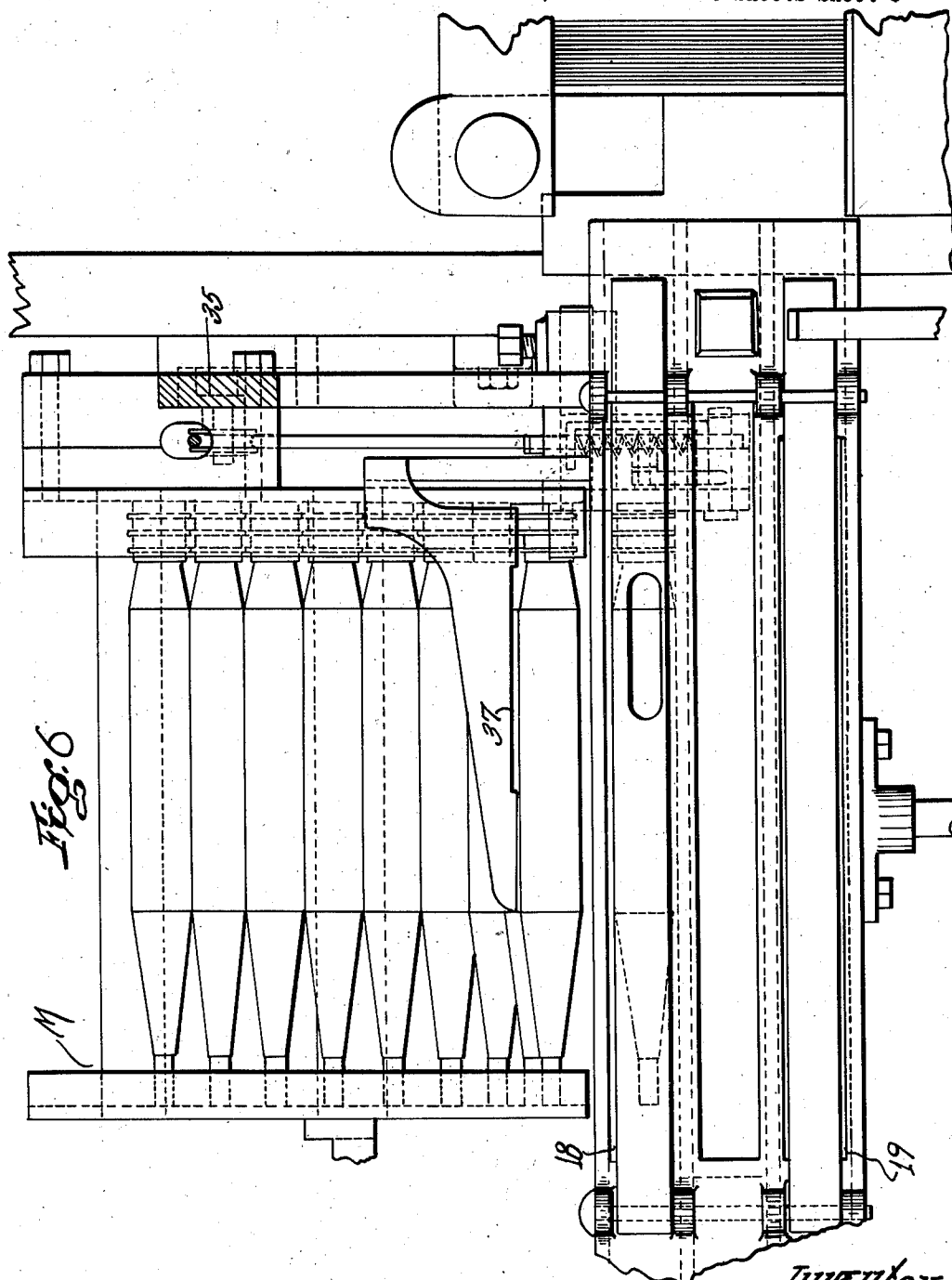
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PICK AND PICK BOBBIN CHANGING LOOM

Filed June 13, 1934

5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,058,113

PICK AND PICK BOBBIN CHANGING
LOOMRichard G. Turner, Worcester, Mass., assignor to
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Application June 13, 1934, Serial No. 730,479

4 Claims. (Cl. 139—232)

This invention relates to improvements in so-called pick and pick looms and it is the general object of the invention to provide a loom of this kind in which a plurality of shuttles follow each other in a given rotation or sequence and wherein the replenishment of weft follows exhaustion of weft in any shuttle.

For the purposes of mixing filling both as to size, color and character of twist it has been common heretofore to employ a loom having shifting boxes at one end and a single box at the other end adjacent weft replenishing mechanism. In looms of this type each shuttle lays two successive picks, and where the yarn is substantially uniform and subject to only slight variations, such mixing is found adequate. When there is any considerable variation in size or other characteristic of the yarn, however, it is desirable to mix the filling one pick at a time so that each shuttle will lay but one pick and then be moved out of action to be followed by another shuttle which will also lay a single pick of the same character of filling.

When three shuttles are employed for this purpose they can be handled successfully by a lay having a pair of shifting shuttle boxes at each end, the boxes shifting so as to present the three shuttles in picking position in a fixed rotation, with the shuttles following each other and being active for but one pick at a time. With such an arrangement the shuttle boxes at the right end of the loom, for instance, can be made to shift on even beats of the loom to be up for two picks and then down for two picks, while the shuttle boxes at the left hand side of the loom shift on the odd picks, they likewise being up for two picks and down for two picks but having their movements during the interval during which the other boxes are not shifting.

Such a mode of operation results in a sequence of shuttles wherein each shuttle will return to a given box every twelfth pick, and wherein a given box will be occupied by an idle shuttle at rest with respect to the lay at four-pick intervals and for a period covering the greater part of two successive beats of the lay. This latter feature results in holding a shuttle inactive from a period beginning at a picking point in the cycle and ending approximately one and one-half beats or more later, this interval ending when the boxes next move with respect to the lay to return to active position. During this interval the lay is at its back position for two successive beats and is at its forward position between these two successive beats while the idle shuttle is at rest with respect to the lay, and I make use of this fact to

detect and also replenish the supply of the shuttle which is temporarily idle during this interval. Because of the short time interval between indication and replenishment, occurring while the shuttle acted upon is idle, I am not limited to the rotation or sequence described in detail herein-after, and it is to be understood that this sequence is given merely to illustrate a use of my invention.

I find it convenient to place the detector mechanism in front of the lay and cause it to detect on the front center position of the lay following the completion of the box shift which renders the detected shuttle idle. The replenishment occurs substantially one-half a pick later when the depleted shuttle, still idle with respect to the lay, reaches the second of its back center positions. In this way I avoid the necessity of storing an indication and can detect and replenish a shuttle during its period of inaction.

When the invention is used with the twelve pick shuttle sequence described hereinafter, I provide control mechanism for determining the times of operation for both the detecting and replenishing mechanisms without the necessity of connecting with the pattern mechanism. This result can be accomplished by an appropriate reduction gearing requiring the control means to operate at four-pick intervals and in the proper sequence so that the detector and replenishing mechanisms may operate as already mentioned.

It is a further object of my invention to provide a common support for the detector and replenishing mechanisms together with their operative connections so that existing looms can have the support applied to them and the parts operatively related to the loom by simple connections which as shown hereinafter include gearing to the top or crank shaft of the loom. The support may take the form of a plate which is attached rigidly to some part of the loom frame such as the arches, and movement of the plate will move all of the coacting automatic parts so that separate adjustments at the loom are unnecessary.

It is a further object of my invention to use a modified form of box cell structure in which the second box, or the one under the top box, is provided with a temporary deflector or baffle to direct the outgoing depleted bobbin forwardly and downwardly at the time of transfer. With such an arrangement the first and third boxes constitute the pair at the replenishing end of the loom and the ordinary box movements derived from the pattern mechanism, such as the Knowles head for instance, can be used as already con-

structed and no modification of the box motion for that end of the loom is necessary.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth in the claims.

In the accompanying drawings, wherein a convenient embodiment of my invention is set forth, Fig. 1 is a diagrammatic front elevation of a loom with shifting shuttle boxes at each end thereof, together with the so-called Knowles head for controlling the shifting movements of the boxes,

Fig. 2 shows diagrammatically a twelve-pick sequence of shuttle motions which will place the shuttles periodically in position for cooperation with my invention, but I am not limited to this sequence,

Fig. 3 is a sectional end elevation of the loom showing the detector in abnormal or detecting position,

Fig. 4 is a view similar to the upper part of Fig. 3, but on a larger scale,

Fig. 5 is a plan view looking in the direction of arrow 5, Fig. 4,

Fig. 6 is a front elevation looking in the direction of arrow 6, Fig. 4,

Fig. 7 is a horizontal section on line 7—7, Fig. 4,

Fig. 8 is a vertical section on line 8—8, Fig. 4,

Fig. 9 is a vertical section through the shuttle and shuttle box being replenished and showing the shuttle feeler which revokes transfer.

Referring particularly to Fig. 1, the lay L has at the left side thereof upper and lower shifting shuttle boxes 15 and 16, respectively, which are positioned by a force derived from the Knowles head K and transmitted through a box lifter rod 17. At the opposite end of the lay are other shifting shuttle boxes having upper and lower cells 18 and 19, respectively, between which is a blank cell 20 for discharge of an empty bobbin. These boxes are also positioned by a box lifter rod, such as 21, positioned by the Knowles head. While I have specified a Knowles head as the mechanism for determining the location of the shifting shuttle boxes, yet I do not wish to be limited to such a box control and the form specified is merely for the purposes of illustration.

The pattern chain is so built that the left boxes will be down as shown in Fig. 1 for a period of two successive picks, and during this period the shuttle boxes at the opposite end of the loom will shift. In this way the drop boxes at each end are up for two picks and are then down for two picks, but the shifting at one end of the loom takes place while the boxes at the other end are at rest relatively to the lay, that is, the boxes do not shift together. This relation is specified in order to facilitate a description of a sequence of shuttles which may be employed in the construction of my invention, but I do not wish to be limited to such a sequence of motions of either the shuttle boxes or the shuttles. As set forth more particularly hereinafter three shuttles follow each other in rotation, each active for but one pick at a time.

In Fig. 2 I illustrate the twelve successive picks of a repeat such as can be used with my present invention, and in this figure the numerals with the arrow headed leaders designate the shuttles which occupy the boxes already described. In this figure the top of the lay L represents the

race plate along which the shuttles pass across the loom.

It may be assumed that the sequence will start as shown in position I with shuttles 1 and 3 in lowered boxes 15, and 16, respectively, at the left side of the loom, and the shuttle 2 in the bottom box 19 below the race at the right hand side of the loom. Shuttle 1 is picked to the top cell 18 at the right side, after which the boxes at that side will be raised to assume position II. This brings shuttle 2 opposite the race and it will be picked across to the left into box 15 which has remained opposite the race for its reception. Thereafter boxes 15 and 16 rise so that the shuttle 3 can be picked across to the right, the box 19 remaining at rest relatively to the lay so that the shuttle 3 can enter as suggested in position III. In this first series of three successive picks each shuttle has laid a single pick.

Continuing, box 18 will be dropped into alignment with the lay as shown in position IV, box 16 remaining up, and shuttle 1 goes to box 16. On the next pick box 15 will be lowered so that shuttle 2 can be picked across into box 18 as shown in position V, and the right hand boxes will then be raised so that shuttle 3 will be opposite the race and can be picked into box 15, as indicated in position VI. This completes the second series of the shuttles.

As shown in position VII, box 16 rises so that shuttle 1 can be picked to the right side, after which the right box is dropped so that shuttle 2 is opposite the race as indicated in position VIII, and goes to box 16. On the next pick box 15 drops into alignment with the race so that shuttle 3 can be picked to the right as indicated in position IX. The third series of three picks is thus completed.

In position X it is suggested that the shuttle 1 is again active and after arriving at the right hand side of the loom, box 16 rises so that shuttle 2 can be active as set forth in position XI, going to box 19. Thereafter box 18 at the right hand end of the loom drops to be aligned with the lay and shuttle 3 is picked across to the left and enters lower box 16 which has remained in alignment with the race since the previous pick. This completes the last series of three picks, one from each shuttle, and also completes the rotation or sequences of twelve successive picks. Position I at the bottom of Fig. 2 is given to indicate the beginning of the second sequence.

An inspection of Fig. 2 will show that boxes 18 and 19 are in raised position for two successive positions, such as II and III, and also for position VI and VII, as well as positions X and XI. In other words, in each sequence or rotation of twelve picks the boxes at the right end of the loom are up for three periods of two successive picks each, one period for each shuttle. Thus, in positions II and III shuttle 1 is in the upper box 18; in positions VI and VII shuttle 2 is in the upper box 18, and in positions X and XI shuttle 3 is in raised box 18.

The shuttle sequence just described is old in non-automatic looms of the so-called two by two type with two shifting shuttle boxes at each end of the loom, and the sequence itself forms no part of my present invention. It will be understood that box 18 is up and at rest relatively to the lay for a period including a back center position of the lay, the next front center position, and the following or second back center position of the lay.

Referring particularly to Fig. 3, the loom frame 30 supports the lay L which moves to front and back center position by means of connector rods 31.

5 Secured to the upper part of the loom frame is a plate 35 which carries the major part of the devices forming the subject matter of my present invention. Secured to this plate is a gravity feed magazine M having a bobbin guideway with a delivery throat 36 located immediately above box 18 when the latter is raised and the lay in back center position. There will normally be a bobbin at the throat under a transferrer arm 37 pivoted at 38 to the plate 35. A depending arm 15 39 of the transferrer has pivoted thereto a latch 40 the forward end of which is notched to receive a bunter or dagger 41 secured to and projecting rearwardly from the lay end 42. The transferrer arm may be held yieldingly in raised position in the usual manner, as by means of a spring 43 against a stop 44. When the latch 40 drops into alignment with the bunter 41 during a backward movement of the lay the transferrer arm will move the bobbin in the magazine throat down into the shuttle in box 18, the depleted or empty bobbin moving down through the blank box 20 and being deflected forwardly by a baffle plate 45 removably held in position.

The weft detector 50 which enters the box 18 30 when the latter is raised may be of the side slip type as shown in Fig. 5 and comprises a detector tip 51 to have direct contact with the bobbin being detected and also a forwardly extending finger 52. The detector 50 pivots about stud 53 carried by slide 54, and the detector and slide are held yieldingly in rear position by compression spring 55 confined by the housing 56 of the detector. The finger 52 may have a rearwardly extending beveled notch 57 and is normally located at one side of the back and forth working stroke path of an actuator 58 having a beveled forward edge to enter notch 57, as suggested in Fig. 5.

A detector supporting lever 60 pivoted at 61 to 45 plate 35 has a driving arm 62 to which is connected a rearwardly extending rod 63 attached to the upper end of a control lever 64. The latter is pivoted at 65 to plate 35 and carries a roll 67 which coacts with a cam 68 fixed to a stub shaft 69 on plate 35.

Cam 68 rotates with a sprocket wheel 70 secured to shaft 69 and driven by a chain 71 trained around a smaller sprocket 72. The latter is fastened to a second stub shaft 73 mounted on the 55 loom frame and carrying a large spur gear 74 meshing with a smaller pinion 75 fastened to the crank shaft 76 of the loom. The relation of the gearing and sprockets is such that the cam 68 is given a complete revolution every fourth pick of the loom, and gear 74 a revolution every second pick.

The cam 68 has a high dwell 80 and a recess 81 to receive the roll 67. During the greater part of the time the dwell holds the lever rearwardly with the result that the detector lever 60 and the detector 50 are held far enough forward to permit unobstructed shifting of boxes 18, 19 and 20. The recess 81, however, arrives under the roll 67 at four-pick intervals and operates to permit the 70 detector to be moved rearwardly by spring 82 after the box 18 has shifted upwardly and has come to rest with respect to the lay. This will be during the first of the two picks during which box 18 will be idle. Adjustable stop screw 83 75 limits rearward movement of the detector.

The parts which more immediately control the transferrer latch comprise a depending finger 85 pivoted at 86 to the lever 60 and normally held rearwardly against an adjustable stop screw 87 by a tension spring 88 attached to lever 60. A 5 flexible connection, such as a light chain 89, is connected to an arm 90 and is trained over sheaves 91 on the plate 35. At its lower end the cord is attached as at 93 to the latch 40. A light spring 94 may if desired be located between latch 10 40 and a stop 95 which projects up from the latch and overhangs the spring and a revoker 96 held yieldingly against the stop by the spring.

A setting lever 98 pivots about fixed stud 99 and has a rear arm 100 held by spring 101 against a cam 102. The latter has high and low dwells 15 103 and 104, respectively, between which extend inclines 105 and 106, respectively. This cam is secured to and moves with the spur gear 74 in the direction of arrow *a*, Fig. 3. As shown in Fig. 3 20 the lay has reached its first back center position after complete up shifting of box 18. When the lay next reaches front center, the feeler will detect, and cam 102 is so arranged that lever arm 100 will have a quick up motion from dwell 103 25 to dwell 104 along incline 105.

In operation, when box 18 is down the dwell 80 will hold the detector lever 60 forwardly so that there will be no possibility for interference between the detector 50 and the shifting of the 30 boxes. As the boxes 18, 19 and 20 have shifted upwardly and box 18 has come to rest with respect to the lay, see Fig. 3, recess 81 of cam 80 will move under roll 67 and spring 82 will move lever 60 to the full line position shown in Fig. 3. 35 The time of operation just given for this movement need not be exactly as specified, inasmuch as the motion of the detector toward the box can begin before the boxes actually come to rest, since they arrive at their final position while the lay is moving backwardly and away from the feeler and the latter part of the upward shift of the box 18 therefore takes place when it is too far behind the detector to reach the latter. If 40 desired, therefore, the recess of cam 80 can operate to release the detector earlier than hereinbefore specified.

Upon the subsequent forward movement of the lay box 18 will be idle and its shuttle will be presented to the detector. If sufficient weft for 50 continued weaving be present the detector finger 50 will move forwardly without angular motion. At this same time also the actuator 58, which in effect is the upper end of lever 98, moves forwardly but in a path to clear the detector finger 55 or extension 52. As shown in Fig. 5 this extension also clears the lower end of finger 85 and there is no relative movement of this finger 85 with respect to the feeler lever 60. As the lay recedes the detector finger 50 will move rearwardly by expansion of spring 55, but the actuator 58 will remain forwardly for an appreciable interval. Spring 82 is sufficiently strong to hold lever 60 against forward action under influence 60 either of spring 82 or 88.

When shuttle 1 again enters box 18 twelve picks later if its weft supply should be depleted the detector 50 will swing pivotally in a right hand direction as viewed in Fig. 5 in a manner well-known in side slip feelers and notch 57 will move 70 directly in front of the path of the advancing actuator 58. The lay will remain in forward position long enough to enable the actuator to enter notch 57, after which continued forward motion of the actuator will move the extension 52 for- 75

wardly and against depending finger 85. The latter will thereupon swing to the dotted line position shown in Fig. 4 against the action of spring 88. Up motion of arm 90 slackens cord 89, and the latch 40 falls to the dotted line position of Fig. 4.

Dwell 104 of cam 102 is long enough to hold actuator 58 and finger 85 forwardly until the lay in its backward motion can cause the bunter 41 to engage the lowered latch 40. Transfer of the reserve bobbin in the magazine throat then ensues in known manner. At any convenient time incline 106 can engage arm 100 to cause return of the actuator and detector to normal position.

While the specific description already given has been with reference to shuttle 1 yet it will be understood that the same sequence of operations can occur four picks later with respect to shuttle 2 and eight picks later with respect to shuttle 3.

The weft detector may be the well-known type shown in patent to Payne No. 1,738,198 and of itself forms no part of my present invention. I do not wish to be limited to any particular type of weft detecting mechanism inasmuch as any of the well-known mechanisms of this kind can be mounted on lever 60 and moved rearwardly for the purpose of effecting detection and known devices which are set into action by an indicating operation of the detector can be used to swing finger 85 so that it will slacken flexible cable 89.

As shown in Figs. 3 and 4 the shuttle feeler or revoker 96 is pivoted to a horn 121 of the latch 40 and extends forwardly to be struck by a misplaced shuttle in raised box 18 and turn the latch up out of the path of the bunter. Any well-known thread holder can be used to hold the ends of the reserve bobbins, and a thread cutter, though not shown, may be used to sever the threads of the outgoing and incoming bobbins.

From the foregoing it will be seen that I have provided a simple means for changing bobbins in a loom operating with three shuttles which follow each other in a definite sequence so that each shuttle is idle in a cell of the shifting shuttle boxes for two successive picks of the loom during which detection and weft replenishment occur while the depleted shuttle is at rest with respect to the lay. While I have described the invention with respect to the definite sequence shown in Fig. 2, yet it will be apparent to those skilled in the art that the timing of the detecting and replenishing operations together with the controls may be employed in any loom where the shuttle box to be replenished is in an operatively relatable position with respect to the magazine for parts of two successive picks. This latter feature is due to the fact that there is no shifting of the box between indication of exhaustion by the detector and the replenishment called by the indication and in this connection certain features of my invention are usable in any sequence of shuttles where the shuttle to be replenished can be held at rest with respect to the lay during a sufficiently long time to accomplish detection and subsequent replenishment without an intervening box shift. It will also be seen that the greater part of the operating parts are mounted on plate 35 and can be adjusted before application to the loom so that a single movement of the plate will carry the detector and magazine throat as a unit with respect to the shuttle box which is to be replenished.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without

departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a loom operating with a plurality of weaving shuttles, a lay, shifting shuttle boxes at each end of the lay which shift with respect to the lay when the latter is in the forward part of its motion and are at rest relatively to the lay when the latter is in the rear part of its motion, each set of shifting shuttle boxes to be at rest with respect to the lay during a forward and the following backward movement of the lay, a weft detector mounted in front of the lay to detect in the upper shuttle box when the latter is at rest with respect to the lay, a magazine for reserve bobbins to cooperate with the shuttle boxes when the lay is in rear position, a latch to effect transfer of a bobbin from the magazine into one of the shuttle boxes and normally in inoperative position but movable to have relation with the lay to effect transfer, an actuator for the detector, means operative every fourth beat of the loom to give the actuator a working stroke which begins when the lay is in forward position and moves forwardly and remains forwardly until the lay approaches rear position, and a controller for the latch, the detector upon indication of weft exhaustion cooperating with the actuator and being moved by the latter into operative relation with respect to the controller to move the latter in a direction to effect movement of the latch into operative relation with respect to the lay, the actuator holding said controller in transferring position from the time the detector indicates exhaustion of weft until the lay nears its rear position following indication by the detector.

2. In a loom operating with a plurality of weaving shuttles, a lay, shifting shuttle boxes at each end of the lay which shift with respect to the lay when the latter is in the forward part of its motion and are at rest relatively to the lay when the latter is in the rear part of its motion, each set of shifting shuttle boxes to be at rest with respect to the lay during a forward and the following backward movement of the lay, a re-boxes bobbin magazine to cooperate with the boxes when the lay is in rear position, a latch forming part of the magazine to cooperate with the lay on transferring beats as the lay moves rearwardly, said latch normally being in idle position out of cooperative position with respect to the lay, a weft detector mounted in front of the boxes and having a side slipping movement when indicating weft exhaustion, an actuator for the detector, means operative every fourth beat of the loom to give the actuator a forward rocking stroke on detecting beats of the loom, a latch controlling lever, flexible connections between the latch controlling lever and the latch, the weft detector when indicating weft exhaustion moving into the path of the actuator and the latter moving the detector forwardly to actuate the latch controlling lever on indicating beats of the loom, said actuator holding the latch controlling lever in indicating position until the lay approaches the next rear position following indication by the detector, and means effective when the latch controlling lever is moved to indicating position to establish cooperative relation between the latch and the lay to effect transfer.

3. In a loom, a lay movable back and forth therein and having two shifting shuttle boxes at each end thereof, the boxes at one end of the loom shifting on alternate beats and the boxes at the other end shifting on intervening beats of

the loom, three shuttles to be placed by the shuttle boxes so that they are active in rotation each for but one pick at a time, a cam rotating once in four picks of the loom, a weft detector 5 controlled by the cam and rendered operative by the latter every fourth pick only to detect the condition of weft in a given shuttle box which is at rest relatively to the lay when the latter is in forward position, means controlled by the detector 10 to give indication of exhaustion of weft in the box being detected, a second cam rotating once every two picks of the loom, an actuator for the detector moved by the second cam into engagement with the detector when the latter indicates weft exhaustion and effective to move the 15 detector against the means to cause the latter to give its indicating motion, and mechanism rendered operative by said second cam to bring about a change in loom operation when said 20 means is moved by the detector.

4. In a loom operating with a plurality of weaving shuttles, a lay, shifting shuttle boxes at each end of the lay which shift with respect to the lay when the latter is in the forward part of its 25 motion and are at rest relatively to the lay when the latter is in the rear part of its motion, each set of shifting shuttle boxes to be at rest with respect to the lay during a forward and the fol-

lowing backward movement of the lay, a reserve bobbin magazine to cooperate with the shuttle boxes when the lay is in rear position, a latch forming part of the magazine to be operatively 5 related to the lay to effect transfer, a weft detector mounted in front of the boxes, a cam effective to hold the detector out of detecting position while the boxes are shifting with respect 10 to the lay and to effect movement of the detector into detecting position after the boxes have completed their shift relatively to the lay, an actuator to cooperate with the detector, a second cam 15 operatively connected to and moving with the first cam to give the actuator a forward working stroke every second beat of the loom when the detector is in detecting position through action 20 of the first cam, the second cam to hold the actuator forwardly from the time that the detector indicates until the lay reaches rear position in the next rearward movement following indication and a controller for the latch, the actuator 25 moving the detector when the latter indicates weft exhaustion into operative relation with respect to the controller, and the latter operating to effect operative relation between the latch and the lay.

RICHARD G. TURNER.

CERTIFICATE OF CORRECTION.

Patent No. 2,058,113.

October 20, 1936.

RICHARD G. TURNER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, second column, line 45-46, claim 2, for "reboxes" read reserve; 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 1st day of February, A. D. 1938.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.