July 11, 1939. J. J. McCANN ET AL 2,166,071

FEELER AND PROTECTOR MECHANISM FOR SINGLE PICK AUTOMATIC LOOMS

Filed Sept. 29, 1937 3 Sheets-Sheet 1

FIGURE I

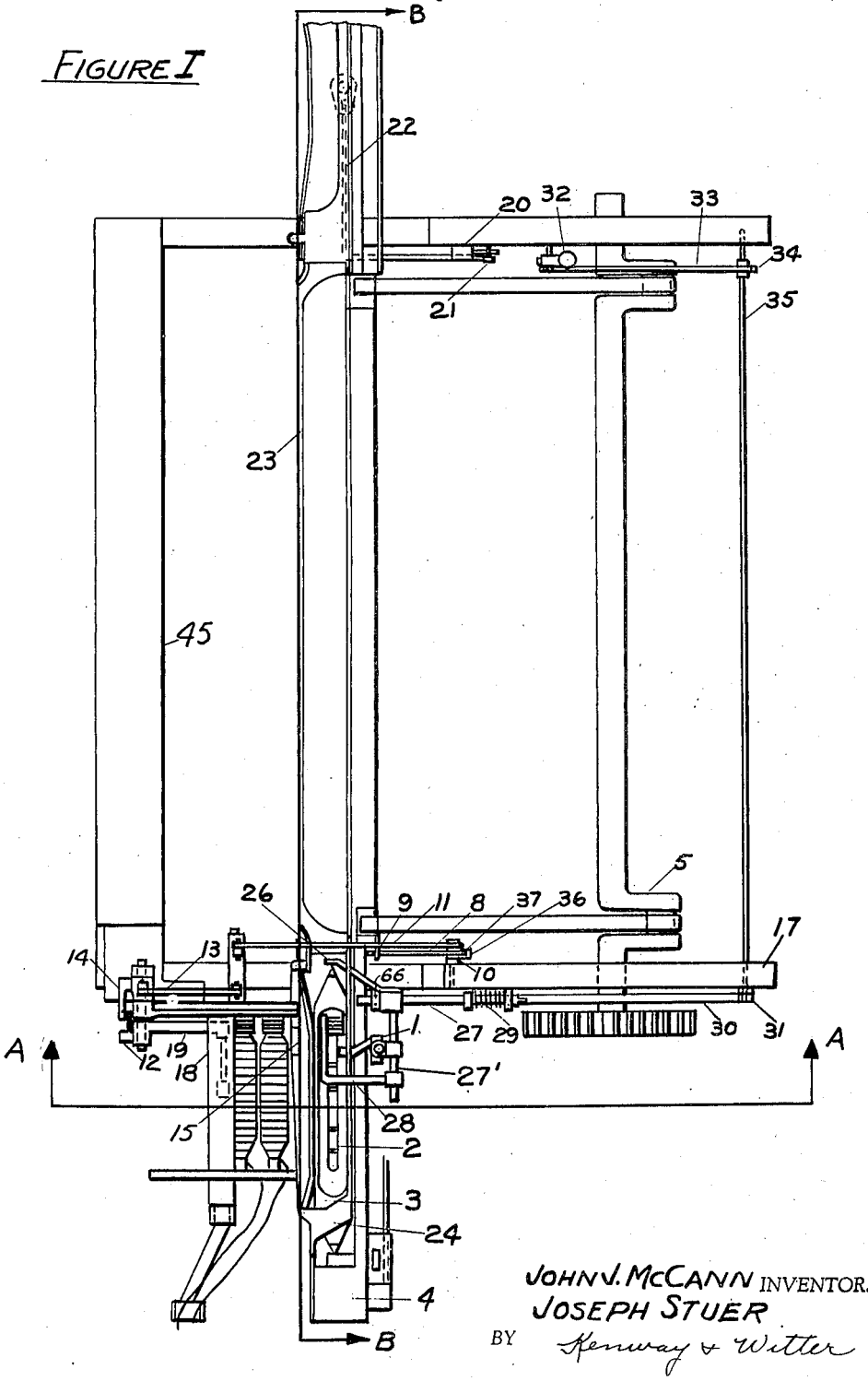


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FIGURE 2

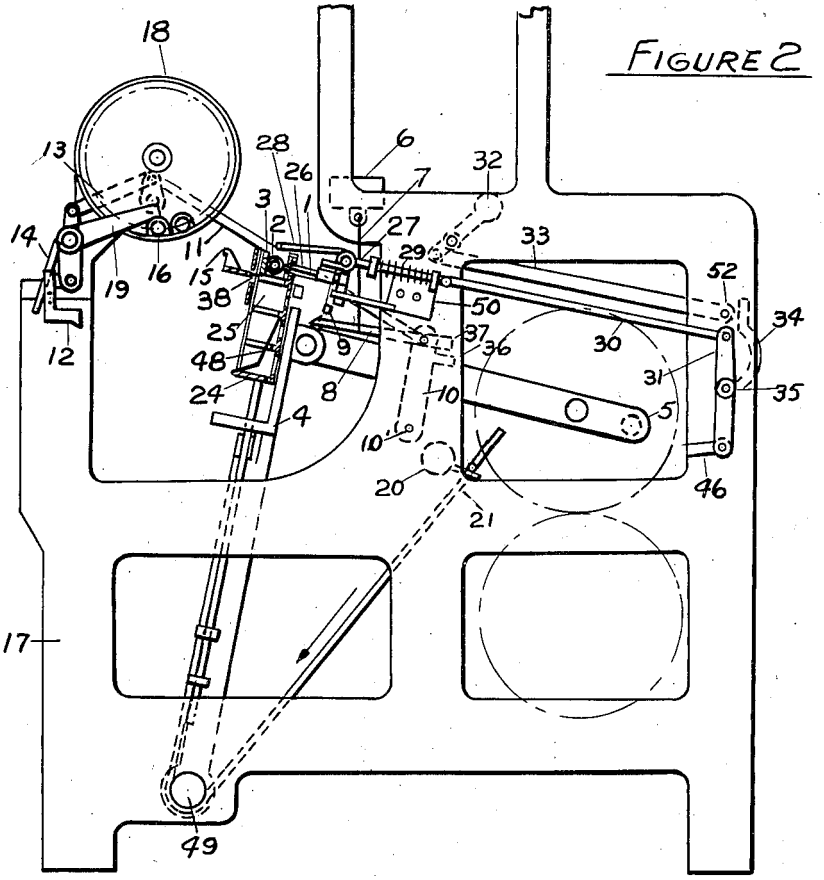


FIGURE 3

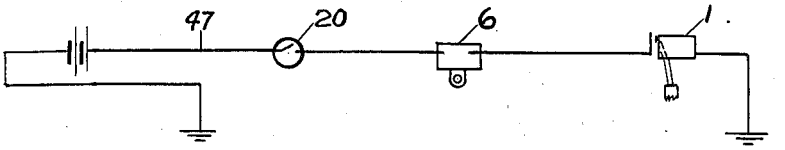


FIGURE 4

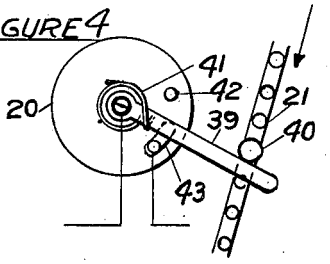


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FIGURE 5

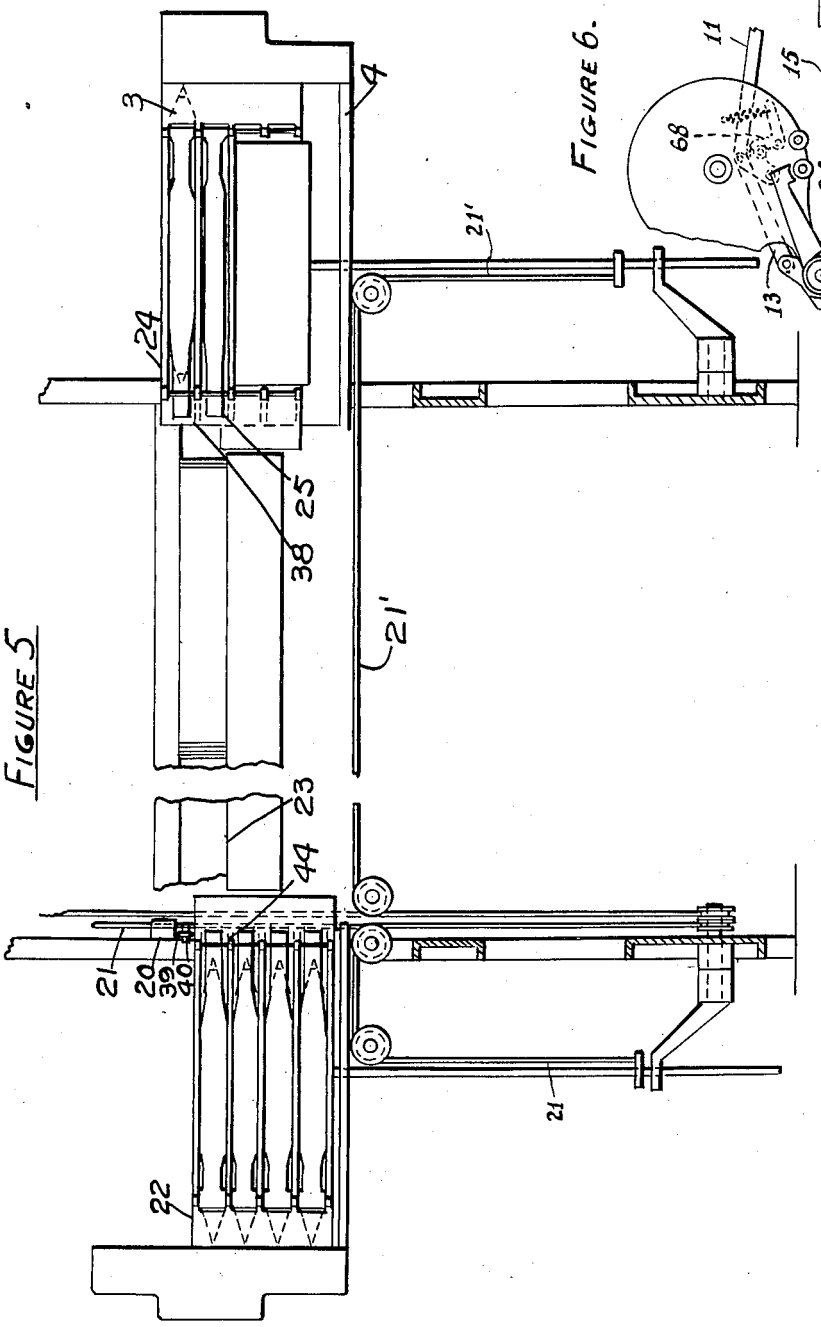


FIGURE 6.




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# UNITED STATES PATENT OFFICE

2,166,071

## FEELER AND PROTECTOR MECHANISM FOR SINGLE PICK AUTOMATIC LOOMS

John J. McCann, Lowell, and Joseph Stuer, Lawrence, Mass.

Application September 29, 1937, Serial No. 166,330

12 Claims. (Cl. 139—230)

This invention relates to automatic looms and more particularly to feeler mechanism adapted to feel the substantially exhausted filling carriers in a single pick automatic bobbin changing loom. In accordance with the invention, our novel feeler mechanism includes a feeler unit mounted on a side of the loom rearwardly of the lay and normally in forward position whereby the feeling of the bobbin is done from the rear of a shuttle carried by the lay as the lay approaches its rearmost position, this mechanism being also located on the bobbin battery side of the loom. Such location and construction of the mechanism is advantageous for various reasons as will be understood and hereafter appear. The primary object of the invention is to provide such an improved mechanism for feeling the substantially exhausted weft on a bobbin when the cooperating parts of the loom are in a predetermined position and for causing transfer substitution of a full bobbin from a battery for the exhausted bobbin.

Cooperating with the feeler mechanism are safety elements for permitting actuation of the feeler mechanism only on the one pick of a cycle of picks where a transfer is desired when the shuttle boxes are in a predetermined position, for preventing feeling and also stopping the loom when the shuttle is not properly boxed, and also for stopping the operation of the loom when a bad transfer is made and a bobbin is left protruding up out of the shuttle where it might cause damage to the loom and fabric.

A further object of the invention resides in the mounting of the feeler unit for yielding movement bodily and rearwardly away from the lay against the action of resilient means and to means for withdrawing the feeler unit rearwardly and bodily from cooperation with the shuttle box, and more particularly to means for thus withdrawing the feeler unit when the drive to the head motion is disconnected whereby the feeler will not interfere with manual movement of the shuttle boxes.

These and other features of the invention will be best understood and appreciated from the following description of a preferred embodiment thereof selected for purposes of illustration and shown in the accompanying drawings in which—

Fig. 1 is a plan view of a loom embodying our invention,

Fig. 2 is a side elevation thereof, partially in section on line A—A of Fig. 1,

Fig. 3 is a wiring diagram of the feeler circuit,

Fig. 4 is a detail view of a switch in the circuit, and

Fig. 5 is a front elevation of the loom, partially in section on line B—B of Fig. 1.

Fig. 6 is a fragmentary view of Fig. 2 but showing the parts in another position.

In the drawings, the frame of the machine comprises loom sides 17 connected together in the usual manner. Movable shuttle boxes 22 and 24 with multi-cells are provided respectively at the two loom sides rearwardly of the breast beam 45, the box 22 containing four active cells, while, as illustrated, only the two top cells of box 24 are utilized. The race 23 extends horizontally between the boxes 22 and 24. The lay 4 is pivoted to the frame at 49, the shuttle boxes being carried thereby and the lay being operated forwardly and rearwardly by a crank shaft 5. A bobbin battery 18 is provided adjacent to and above the shuttle box 24.

The shuttle boxes are mounted for vertical movement and are adapted to be elevated to the proper positions by box chains 21 and 21' extending over suitable sheaves, the chain 21 being arranged automatically to close a switch 20 when the box 22 is in a predetermined position as and for the purpose hereafter described.

Our invention relates more particularly to novel feeler mechanism for a loom of this nature and of the single pick automatic type. To this end, we mount a feeler unit 1 on rods 27 and 27' (Fig. 1), the rod 27 being slidably mounted in brackets 50 on the loom side and being normally forced to the extreme forward position against a stop 66 by a spring 29. The feeler unit includes a feeler element positioned to extend through an opening in the rear wall of the shuttle 3 and feel the bobbin 2 therein as the lay approaches its rearmost position. Also carried by the rods 27 and 27' are arms 26 and 28. The arm 26 is substantially on a level with the feeler but located inwardly of the inner end of the shuttle when the shuttle is in its proper position in the box, and the arm 28 extends to a position above the shuttle as illustrated in Fig. 2. The functions of these arms are to prevent the normal operation of the mechanism should the shuttle be improperly located in the box or the bobbin improperly located in the shuttle, all as hereafter more specifically described.

A lever 31 pivoted to the frame at 35 has its top end connected by a rod 30 to the rod 27. A link 46 connected to the bottom end of the lever 31 is arranged to cause disengagement of the clutch or other controlling mechanism for the

loom drive when the lever is rotated clockwise (Fig. 2). It will be apparent that rearward movement of the rod 27 thus serves to stop the machine and that such rearward movement is automatically produced through engagement of a misplaced shuttle 3 with the arm 26 or of a protruding bobbin 2 with the arm 28, upon rearward movement of the lay.

The following mechanism is provided for causing the transfer of a bobbin 16 from the battery 18 under the control of the feeler 1. Carried by and located rearwardly of the lay 4 is a pin 9 and arranged to cooperate therewith is the hooked end of a latch 8 pivoted to a lever 10 in turn pivoted to the frame at 10'. Links 11 and 13 connect the lever 10 with an arm 14 arranged to set the dog 12 in position to be engaged by a bumper 15 carried by the shuttle box on the lay, whereby to operate the arms 19 and effect transfer of a new bobbins 16 into the shuttle 3 upon forward movement of the lay. An arm 60 on which the dog 12 is pivotally mounted is one piece together with the arms 19 and this piece is mounted to pivot on a shaft 60. Forward movement of the links 11 and 13 pivot the arm 14 counter-clockwise (Fig. 6) whereupon engagement of this arm with the dog raises the dog to the position of Fig. 6. It is desirable however that such transfer shall take place only when the boxes are in a predetermined position, such as the position illustrated in Fig. 5, and the following described mechanism which causes engagement of the latch 8 with the pin 9 only at this time automatically produces this function.

Located above the latch 8 is a solenoid 6, and a wire 7 connects the armature of the solenoid with the latch in such manner that energizing of the solenoid causes lifting of the latch into engagement with the pin 9. The electric circuit 47 extends through the solenoid (Fig. 3), through the switch contacts of the feeler unit 1, and through a normally open switch 20. The terminals of the switch 20 comprise an arm 39 thereof and a contact 43 (Fig. 4), and a spring 41 normally holds the arm against a stop pin 42 in which position the switch is open. The switch 20 is arranged to be closed automatically when the boxes 22 are in a predetermined position, such as the position illustrated in Fig. 5. To effect this function a lug 40 is attached to the chain 21 in such position that movement of the chain in the direction of the arrows (Figs. 2 and 4) placing the box 22 in its lowermost position and the top cell 44 thereof in alignment with the race 23 closes the switch. When the box 22 is in this position the box 24 is in the position shown in Figs. 2 and 5 and its bottom cell 24 is empty and in alignment with the race 23 and an inactive shuttle 3 is in the top cell. While we have herein illustrated the lug 40 and switch 20 located to effect closing of the switch when the box 22 is in its lowermost position, it will be understood that by proper adjustment the arrangement can be made to close the switch when any one of the cells of the box 22 is in alignment with the race, whereby to provide protection against doffing of a bobbin at the wrong time.

It is believed that the operation of our improved feeler mechanism as above described will now be apparent. The feeler unit 1 is located on the battery side of the loom and is mounted on a loom side 17 rearwardly of the lay 4. As the lay approaches its rearmost position under the action of the crank 5, the feeler element is engaged. First, it will be understood that the switch 20 is open except when the box 22 is in its lowermost position (Figs. 2 and 5), and therefore no transfer can be effected except when the top cell 44 of the box 22 is in alignment with the race.

A transfer is possible therefore only when the top cell 44 of the shuttlebox 22 on the side opposite to the bobbin battery 18 is at the race 23 and the shuttlebox 24 under the bobbin battery 18 has its second and empty cell 25 at the race 23 where the feeler element can feel the inactive bobbin 2 in the top cell 38 of the shuttle box 24 and only under these conditions is it possible to complete the electrical circuit.

Assuming that the parts are in the position illustrated in Figs. 2 and 5, the bobbin 2 is brought into contact with the feeler upon rearward movement of the lay. If the filling on the bobbin is substantially exhausted, the feeler makes an electric contact, through the use of any of the well-known feeler mechanisms. The switch 20 being closed, this contact causes the solenoid 6 to be energized whereby raising the latch 8 into engagement with the pin 9. Forward movement of the lay thereupon pivots the lever 10 forwardly and, acting through the links 11 and 13 and arm 14, pivots the dog 12 upwardly from the position of Fig. 2 to the position of Fig. 6 wherein the nose 65 of the dog is in position to be engaged by the bumper 15 to effect the transfer of a new bobbin 16 into the shuttle 3 from the bobbin battery 18 by means of the transfer arms 19 in a manner similar to that employed in all bobbin changing looms. The movement of the shuttles and shuttle boxes is so arranged that under the above mentioned conditions the second cell 25 of box 24 is empty and permits the bobbin 2 to pass through this empty cell and down a shute 48 on its way out after a bobbin transfer.

The connections 11—13—14 have two positions permitted by a spring actuated latch 68, one position being shown in Fig. 2 and the other position being shown in Fig. 6. During the final forward motion of the lever 10, a lug 36 thereon engages the tail 37 of the latch 8 and pulls the latch from engagement with the pin 9. Forward motion of the dog 12 by engagement therewith of the bumper 15 will also act to reset the actuator of the bobbin changing mechanism back to the position of Fig. 2.

The shuttle 3 is shown in proper position in the shuttle box in Fig. 1 and it will be noted that the arm 26 projects into the box beyond the inner end of the shuttle, the lay being in its rearmost position. Should the shuttle not get all the way into the box, whereby its inner end projects inwardly of the loom beyond the inner position of the arm, the shuttle will engage the arm upon rearward movement of the lay and force the feeler unit rearwardly. The feeler is thereby prevented from contacting with the bobbin whereby a transfer cannot be made while the shuttle is misplaced longitudinally, this action also stopping the loom if the displacement of the shuttle is excessive.

The bad transfer of a new bobbin 16 may result in the bobbin protruding up out of the shuttle 3. In this case, the bobbin will engage the arm 28 upon rearward movement of the lay, and force the rod 27 rearwardly. Such action also forces the rod 30 rearwardly and stops the machine through the link 46 and its connections to the clutch or other drive controlling element.

The feeler unit indicated at 1 may be of any known construction and embodies various coop-

erating parts. The electric circuit indicated in Fig. 3 includes the feeler contacts and is under the control of such contacts. This circuit is therefore a part of the feeler mechanism herein described and adapted to control the bobbin transfer mechanism. The feeler unit **1** is mounted on the rod **27'** carried by the rod **27** and is thus supported for resilient movement bodily and rearwardly against the action of the spring **29** as illustrated in Fig. 1. As thus supported, the feeler unit may be withdrawn against the action of the spring **29** and when thus withdrawn it is free from any cooperating engagement with the shuttle box or elements carried thereby. In the drawings we have illustrated means for not only thus withdrawing the feeler unit but also for disengaging the head motion clutch.

The following described manually operated mechanism is adapted both to disengage the head motion clutch and hold the feeler withdrawn from the shuttle box while changing the head motion and while the loom is stopped. A lever **32** pivoted to the frame carries a rearwardly extending link **33** having its rear end **52** connected to the head motion clutch through suitable mechanism and in alignment with an arm **34** fast to the shaft **35**. Anti-clockwise movement of the lever **32** (Fig. 2) disengages the head motion clutch and causes rotation of the shaft **35** which through the lever **31** withdraws the feeler and all attached parts from the shuttle box. The free end of the lever **32** is weighted sufficiently to counterbalance the spring **29** and hold the feeler in retracted position.

It is also apparent that various single pick mixes of the filling up to five shuttles can be woven automatically in this loom. Three shuttle single pick ground fabric can be woven with automatic bobbin changing in combination with two colors hand fed shuttles or four shuttle single pick automatic ground fabric with one color hand fed, as well as other combinations. It may also be noted that in accordance with our improved mechanism, changing from one type of fabric to any of the other aforementioned types requires a change only in the box pattern chain of the head motion.

While we have herein shown and described a preferred embodiment of the invention, it will be understood that the same is susceptible of various modifications within the scope of the claims appended hereto. For example, it will be apparent that any suitable electrically or mechanically operated feeler may be employed and other controls herein illustrated as performed electrically may by suitable apparatus be performed mechanically.

We claim:

1. In an automatic loom, a race, a movable multi-cell shuttle box cooperating therewith, a lay carrying the shuttle box, feeler mechanism including a feeler arranged to feel a bobbin for substantially exhausted filling when the shuttle holding the bobbin in the box is out of alignment with the race, means carried by said mechanism and extending forwardly to such position that its forward portion is in longitudinal alignment with the shuttle being felt and slightly spaced from its inner end when the shuttle is properly boxed and when the lay is in its rearmost position, said means being adapted to prevent the feeler from operating on the bobbin and to cause displacement of the mechanism when the shuttle holding the bobbin is not properly boxed longitudinally, an arm carried by said mechanism in position to be engaged by a bobbin projecting from the shuttle and cause displacement of said mechanism, and means arranged to provide connection from the feeler mechanism to controlling mechanism for stopping the loom when said displacement is excessive.

2. In an automatic loom, a race, a shuttle box arranged to cooperate therewith, a lay carrying the shuttle box, and means mounted on a side of the loom rearwardly of the lay and arranged to operate stopping mechanism of the loom when a bad transfer of a bobbin leaves a bobbin protruding from its proper position in the shuttle box, said means being arranged to be operated by engagement of said protruding bobbin therewith upon rearward movement of the lay.

3. In a loom, a race, a shuttle box cooperating therewith, a lay carrying the shuttle box, feeler mechanism including a feeler unit, means including resilient means mounting the feeler unit for yielding rearward movement bodily on one of the loom sides and rearwardly of the shuttle box and in position adapting its feeler element to feel a bobbin therein for substantially exhausted weft as the lay approaches its rearmost position, and an arm associated with the feeler unit and extending forwardly to such position that its forward portion is in longitudinal alignment with the shuttle being felt and slightly spaced from its inner end when the shuttle is properly boxed and when the lay is in its rearmost postion, whereby the arm and feeler unit will be forced back by the lay should the shuttle be improperly boxed longitudinally.

4. In a loom, a race, a shuttle box cooperating therewith, a lay carrying the shuttle box, feeler mechanism including a feeler unit, means including resilient means mounting the feeler unit for yielding rearward movement bodily on one of the loom sides and rearwardly of the shuttle box and in position adapting its feeler element to feel a bobbin therein for substantially exhausted weft as the lay approaches its rearmost position, an arm carried by the feeler unit and extending forwardly to such position that its forward portion extends over and closely adjacent to the top of the box holding the shuttled bobbin to be felt when the lay is in its rearmost position, whereby the arm and feeler unit will be forced back by the lay should the bobbin project upwardly from the shuttle.

5. In a single pick automatic loom, a race, movable multi-cell shuttle boxes at opposite ends of the race, a lay carrying the shuttle boxes, a feeler unit rearwardly of one of said boxes and in position to feel a bobbin therein for substantially exhausted weft as the lay approaches its rearmost position, mechanism mounting the feeler unit on one of the loom sides for yielding bodily movement rearwardly away from the lay, an arm associated with said mechanism and extending forwardly to such position that its forward portion is in longitudinal alignment with the shuttle to be felt and slightly spaced from its inner end when the shuttle is properly boxed and when the lay is in its rearmost position, whereby the arm and feeler unit will be forced back by the lay should the shuttle be improperly boxed longitudinally, and means associating said mechanism with controlling mechanism for stopping the loom when the feeler unit is forced back excessively.

6. In a single pick automatic loom, a race, movable multi-cell shuttle boxes at opposite ends of the race, a lay carrying the shuttle boxes, a feeler unit rearwardly of one of said boxes and in position to feel a bobbin therein for substantially exhausted weft as the lay approaches its

rearmost position, mechanism mounting the feeler unit on one of the loom sides for yielding bodily movement rearwardly away from the lay, an arm associated with said mechanism and extending forwardly to such position that its forward portion extends over and closely adjacent to the top of the box holding the shuttled bobbin to be felt when the lay is in its rearmost position, whereby the arm and feeler unit will be forced back by the lay should the bobbin project upwardly from the shuttle, and means associating said mechanism with controlling mechanism for stopping the loom when the feeler unit is forced back excessively.

7. In a loom, a race, movable multi-cell shuttle boxes at opposite ends of the race, a lay carrying the shuttle boxes, a feeler unit including a feeler element, means mounting the feeler unit on one of the loom sides rearwardly of one of the boxes and above the horizontal plane of the race, a stop for limiting movement of the unit forwardly, means yieldingly and normally holding the feeler unit forwardly against the stop in a position adapting the feeler element to feel a bobbin for substantially exhausted weft in an inactive shuttle in said one box as the lay approaches its rearmost position, a bobbin battery on the side of the loom carrying the said feeler, transfer mechanism under the control of the feeler for transfer substituting a bobbin from the battery for an exhausted bobbin upon forward movement of the lay directly following the feeling of the exhausted bobbin by said feeler, said transfer system including a transfer operating dog having two positions respectively in and out of the path of forward movement of the lay, and means under the control of the feeler unit for causing movement of the dog into said path when the feeler feels an exhausted bobbin.

8. In an automatic loom, a race, a movable shuttle box at one side of the loom and at one end of the race, a lay carrying the shuttle box, feeler mechanism including a feeler unit, means including resilient means mounting the feeler unit for yielding rearward movement bodily on one of the loom sides and rearwardly of the shuttle box and normally in forward position wherein the feeler thereof is adapted to feel a bobbin in the shuttle box for substantially exhausted weft as the lay approaches its rearmost position, and means for withdrawing the feeler unit bodily and rearwardly away from the lay against the action of the resilient means and holding it thus withdrawn.

9. In an automatic loom, a race, movable multi-cell shuttle boxes at opposite ends of the race, a lay carrying the shuttle boxes, a bobbin battery at one side of the loom, feeler mechanism including a feeler unit, means mounting the feeler unit for yielding rearward movement on one of the loom sides at the battery side of the loom and rearwardly of one of said boxes and normally in forward position wherein the feeler thereof is adapted to feel a bobbin for substantially exhausted weft as the lay approaches its rearmost position, transfer mechanism under the control of the feeler mechanism for transfer substituting a bobbin from the battery for an exhausted bobbin upon forward movement of the lay directly following the feeling of the exhausted bobbin, means for shifting the shuttle boxes to different elevations, a transfer dog beneath the battery and forwardly of the lay, the dog having operative and inoperative positions and in the former being adapted to be engaged by the lay to effect transfer of a bobbin from the battery, means under the control of the feeler mechanism for moving the dog to operative position when the feeler feels an exhausted bobbin, and means rendering the feeler mechanism inoperative to cause such movement of the dog when the shuttle boxes are in other than a predetermined position of elevation.

10. In an automatic loom, a race, movable multi-cell shuttle boxes at opposite ends of the race, a lay carrying the shuttle boxes, a bobbin battery at one side of the loom, feeler mechanism including a feeler unit, means mounting the feeler unit for yielding rearward movement on one of the loom sides at the battery side of the loom and rearwardly of one of said boxes and normally in forward position wherein the feeler thereof is adapted to feel a bobbin for substantially exhausted weft as the lay approaches its rearmost position, transfer mechanism under the control of the feeler mechanism for transfer substituting a bobbin from the battery for an exhausted bobbin upon forward movement of the lay directly following the feeling of the exhausted bobbin, the feeler mechanism including an electric circuit having a switch and a solenoid therein, means automatically closing the switch when the shuttle box on the loom side opposite to the feeler is in a predetermined elevation, a latch arranged to engage the lay, means causing the armature of the solenoid to engage the latch with the lay when the solenoid is energized, and connections from the latch to the transfer mechanism for causing the said bobbin transfer upon forward movement of the lay when the latch is thus engaged with the lay.

11. In an automatic loom, a race, movable multi-cell shuttle boxes at opposite ends of the race, a lay carrying the shuttle boxes, a feeler unit mounted on a loom side rearwardly of the lay and normally in position wherein the feeler thereof is adapted to feel a bobbin for substantially exhausted weft as the lay approaches its rearmost position, resilient means normally forcing the feeler unit forwardly toward the lay, a stop limiting such movement, a manually operable member, means including a link operatively associated with said member for operating the head motion drive control, and connections to the feeler unit so associated with said means that movement thereof in one direction by said member withdraws the feeler unit rearwardly against the action of the resilient means.

12. The loom defined in claim 7 in which the last named means includes a latch having two positions wherein the dog is given said movement into said path when the latch is moved from one such position to its other position and means cooperating with the feeler unit for moving the latch from said one position to said other position when the feeler feels an exhausted bobbin.

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