Aug. 20, 1935. O. V. PAYNE 2,012,053

PICKING MOTION FOR LOOMS

Filed Sept. 24, 1934 3 Sheets-Sheet 1

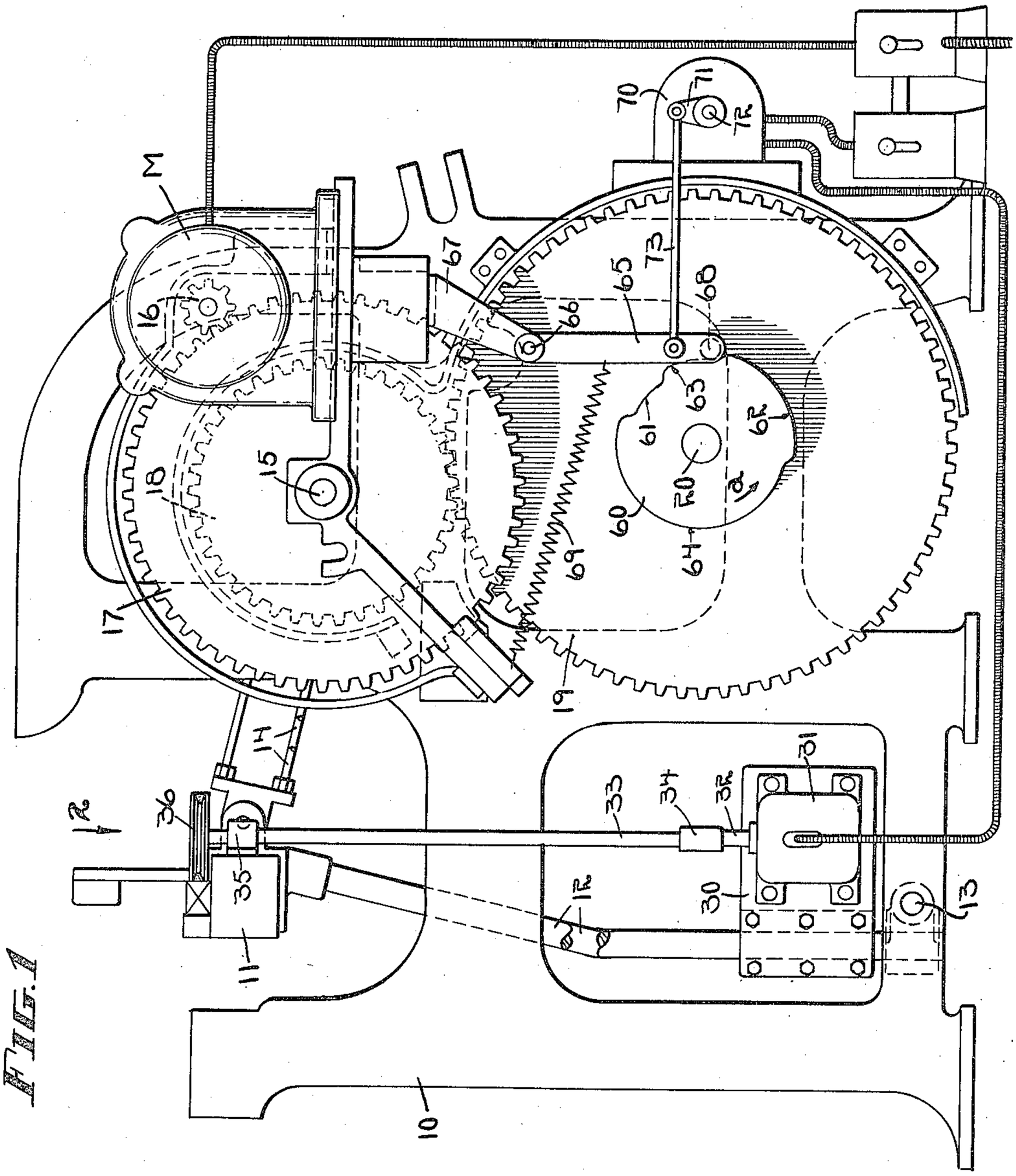

FIG. 1

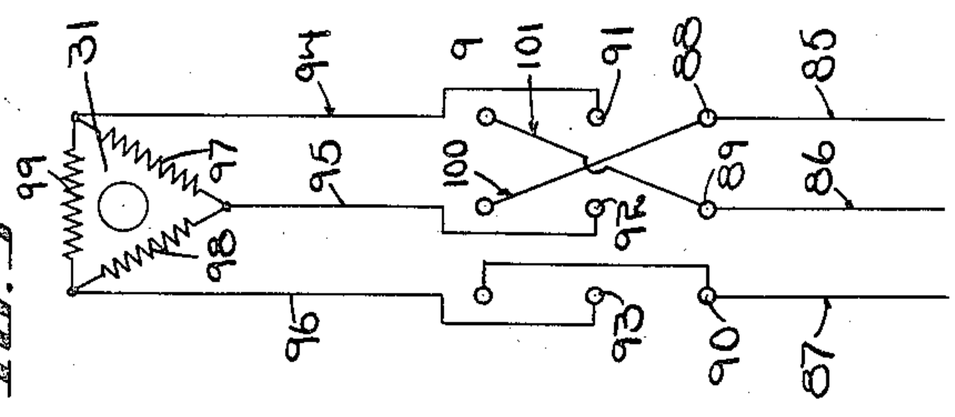

FIG. 4

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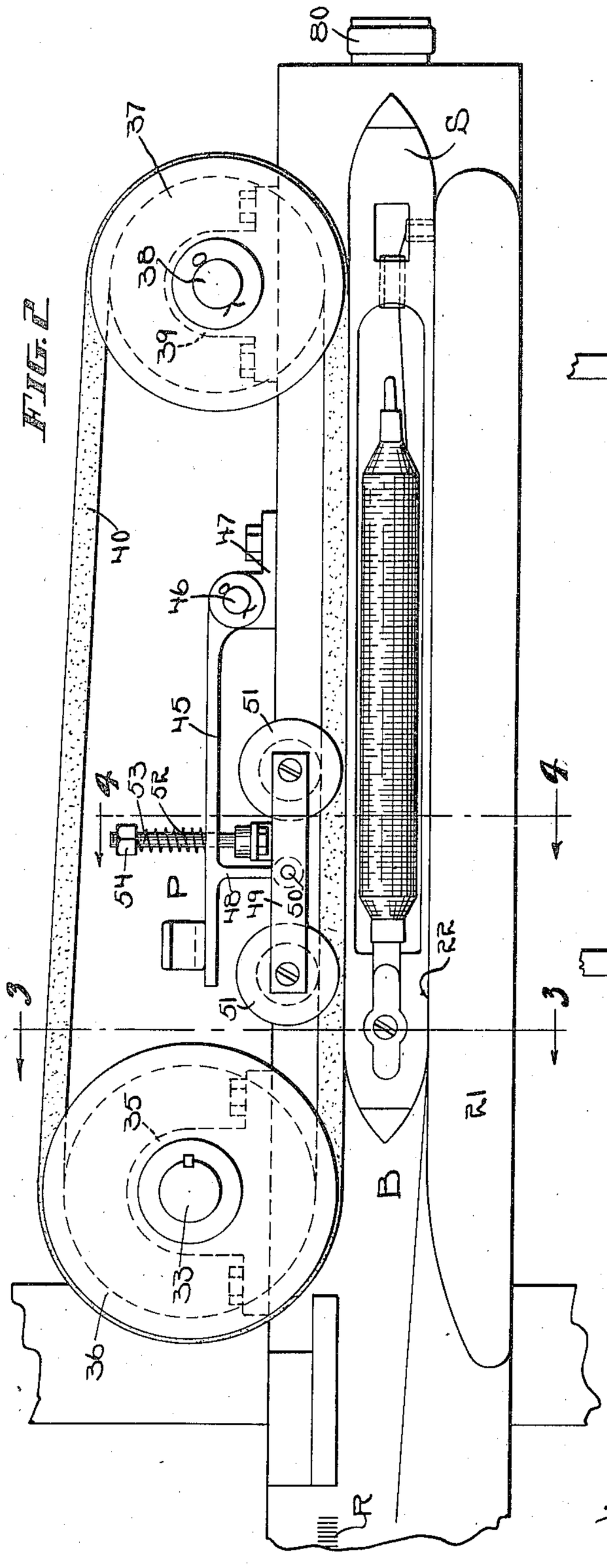

FIG. 2

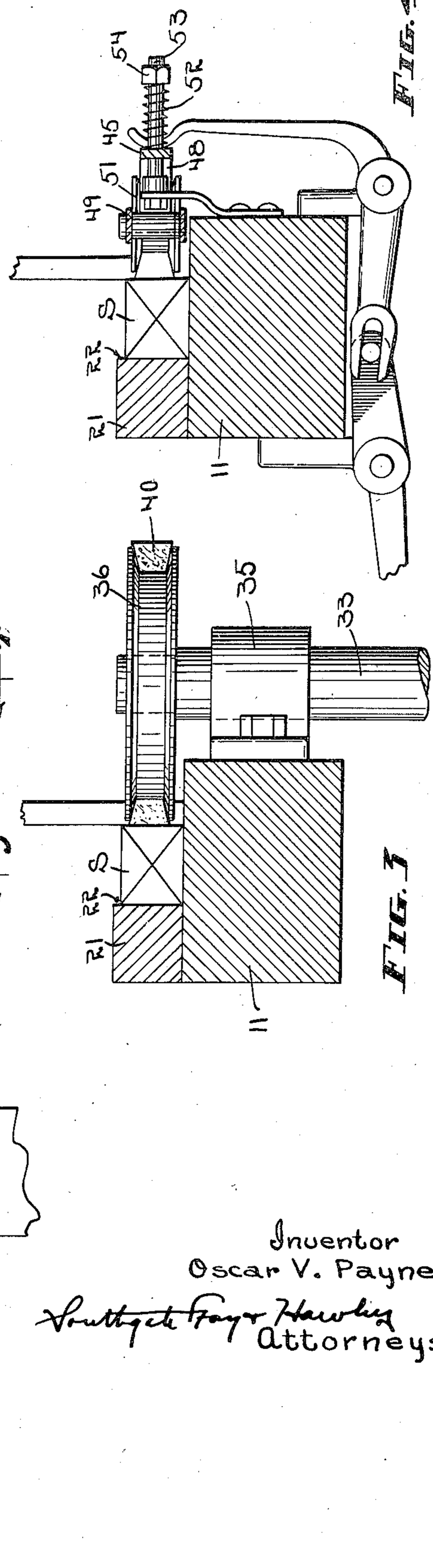

FIG. 4

FIG. 3

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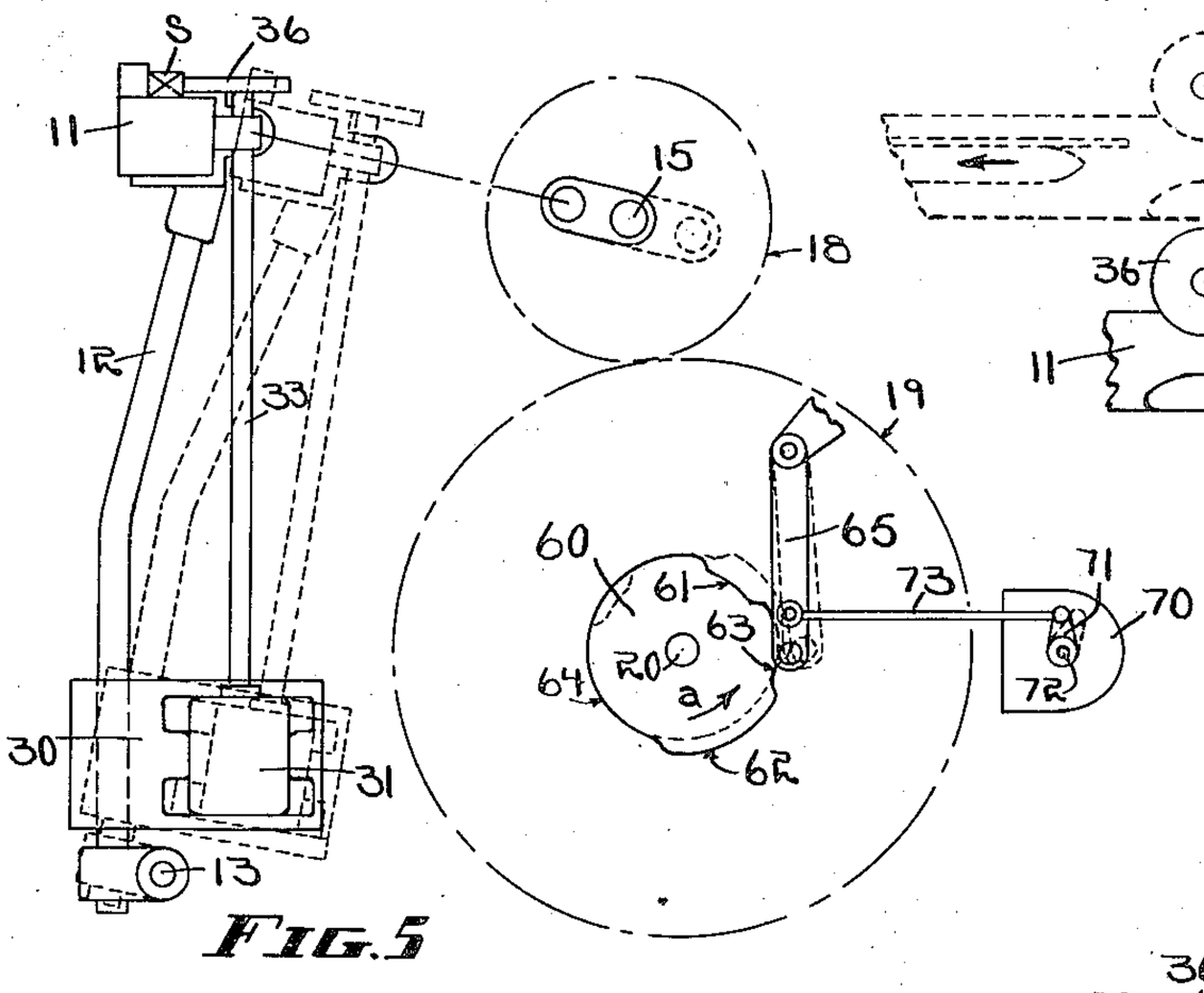

FIG. 5

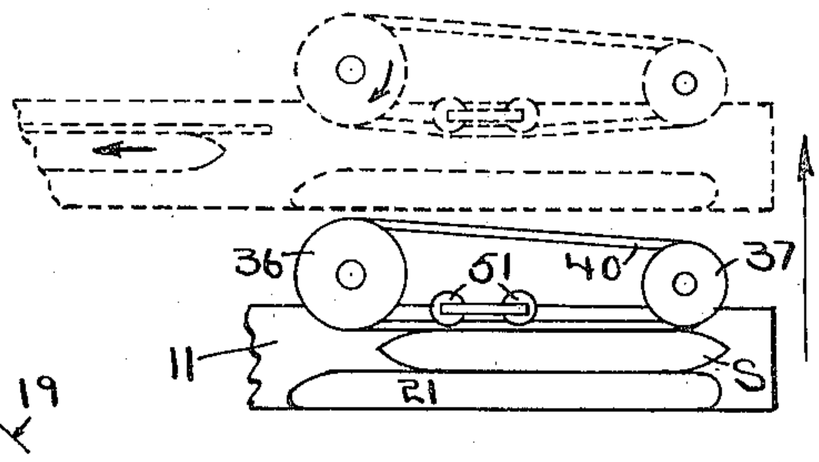

FIG. 7

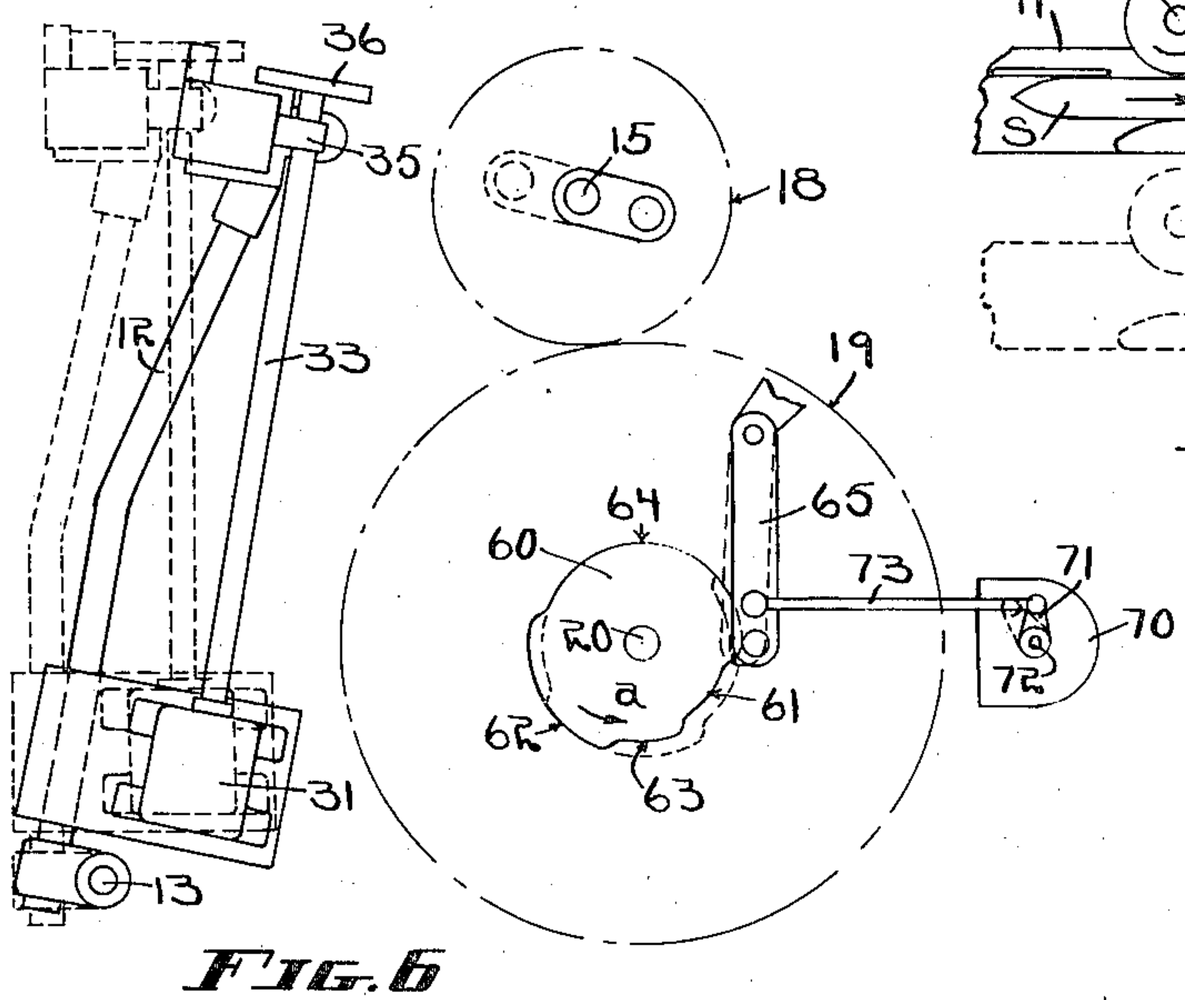

FIG. 6

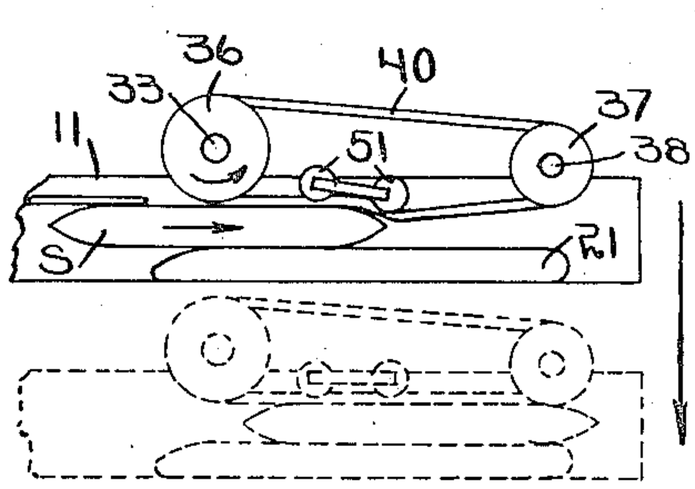

FIG. 8

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UNITED STATES PATENT OFFICE

2,012,053

PICKING MOTION FOR LOOMS

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Application September 24, 1934, Serial No. 745,306

20 Claims. (Cl. 139—142)

This invention relates to picking motions for looms and it is the general object of the invention to provide a silent and efficient means to propel the shuttles in looms.

It is customary to pick shuttles by means of a stick acting through a picker located behind the shuttle and moved inwardly at the time of picking. The stopping of the stick and also the shuttle causes considerable noise and loss of adjustment of the parts involved, and it is an important part of my invention to provide a friction drive for the shuttle which will eliminate the stick and usual picker. This result I may attain by an endless belt driven by an electric motor and held against the shuttle by pressure rolls or the like. The belt is in position to contact with the shuttle whenever the latter is boxed, and switch controls excite the motor at the time of picking. In this way the frictional force is distributed over a large area simultaneously and very little wear results on any one part of the shuttle. The motor is of the start and stop type and is practically instantaneous in its response after the switch is closed.

It is a further feature of my invention to place the shuttle as it enters the box and move it to a position where it will derive the full benefit of the subsequent picking stroke of the belt. To accomplish this result I use a reversing switch to give the motor a reverse motion tending to drag the shuttle deep into the shuttle box. In this way a maximum surface of the shuttle is in contact with the belt to insure proper picking.

A still further object of my invention relates to pressure means to cause the belt to conform to the contour of the shuttle. As a specific means to accomplish this result I may employ a pair of rolls on a floating support and yieldingly held in position to cause a normal deflection of part of the belt toward the shuttle path. In this way the rounded nose and shoulder of the shuttle are in driving relation with the belt. The rolls and their supports may be associated with loom protector mechanism if desired.

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 an end elevation of a loom having my invention applied thereto,

Fig. 2 is an enlarged plan view in the direction of arrow 2, Fig. 1,

Figs. 3 and 4 are vertical sections on lines 3—3 and 4—4, respectively, Fig. 2,

Figs. 5 and 6 are diagrammatic views of the parts in different positions,

Fig. 7 indicates diagrammatically the action of picking, and

Fig. 8 is similar to Fig. 7 but relates to shuttle placing, and

Fig. 9 is a diagram of the electric circuit for the picking motor.

Referring particularly to Fig. 1, the loom frame 10 supports a lay 11 having lay swords 12 movable about the lay axis 13. Connectors 14 are between the lay and the top or crank shaft 15 driven by a motor M on the loom frame and having a pinion 16 meshing with a gear 17 on the shaft. A top gear 18 meshing with a bottom gear 19 on the two pick shaft 20, gear 19 being twice the size of gear 18. Shipping and driving connections may be used to start and stop the loom, including some well known form of clutch not shown. As shown in Fig. 2 the lay has a shuttle box B formed with a box front 21 having a smooth rear wall 22 substantially parallel to the reed R. The usual picker and stop for the shuttle S are omitted, but otherwise the matter already described is of common construction.

In carrying my invention into effect I secure a bracket 30 on the lay sword and secure thereon a motor 31 with its axis vertical. The motor shaft 32 may be connected to an upright shaft 33 by a sleeve 34 fastened to both shafts. The top of shaft 33 rotates in a bearing 35 secured to the back of the lay and has keyed or otherwise fastened thereto a grooved pulley 36 which lies behind the shuttle path. The pulley turns with the motor 31 and swings back and forth with the lay.

A second grooved pulley 37 is mounted to rotate freely on a stud 38 secured in a stand or bearing 39 mounted on the back of the lay. A V-belt 40 is trained around both pulleys tightly enough to be moved whenever pulley 36 is turned by motor 31, but is sufficiently loose to be deflected appreciably by the pressure mechanism designated generally at P.

The pressure mechanism comprises a lever 45 pivoted around stud 46 on lay carried stand 47. A forwardly extending finger 48 on the lever has pivoted to it a floating lever 49 as at 50, and each end of the lever 49 carries a grooved roll 51. The latter are pressed against the belt by a spring 52 on a rod 53 passing through the lever 45 and anchored to the lay. A nut 54 holds the spring compressed and affords means for varying the

pressure of the spring. By reason of the rolls the belt is urged forwardly against the shuttle S, and the latter in turn is held against the box front 21.

Since the belt is in shuttle engaging position at all times, the motor for it must be at rest part of the time and in motion at other times. Furthermore, the motor is reversed to place the shuttle and run forwardly to pick. The control for these various operations are effected as shown herein by a cam moving in timed relation with the bottom shaft 20.

As shown in Figs. 1, 5 and 6 a cam 60 is secured to shaft 20 and has a low shuttle placing motor reversing dwell 61, a high shuttle picking dwell 62 to drive the motor forwardly, and an intermediate short stop dwell 63 lying between the other two dwells. There is also a long intermediate stop dwell 64 corresponding to the time the shuttle is on the other side of the loom. A cam lever 65 pivoted at 66 to a fixed stand 67 has a roll 68 held against the cam by a spring 69.

A motor switch 70 has an arm 71 on a switch shaft 72 and connected by a link 73 to the lever 65. The cam turns constantly in the direction of arrow *a*, Figs. 1, 5 and 6, and moves the lever 65 and therefore the switch arm and shaft to three different positions.

When the shuttle is approaching the shuttle box long dwell 64 is holding the switch in neutral or stopping position and the picking motor is at rest. The flight of the shuttle is so timed with the loom parts that as the roll reaches the end of the long dwell 64 the shuttle will be just entering the shuttle box, assuming some such position as shown in full lines, Fig. 8. As the loom continues to turn the roll moves to the low dwell 61 and moves the switch arm to the left, from the full to the dotted lines of Fig. 6. This causes a reverse motion of the motor 31 and the belt is turned in such a direction as to move the shuttle into the box as the lay advances to the dotted lines position of Fig. 8. A stop 80 fixed to the lay may be used to limit movement of the shuttle into the box.

During the time the lay is in forward position the shuttle is ordinarily at rest so far as movement lengthwise of the shuttle is concerned and to meet this condition the short intermediate dwell 63 arrives under the roll, moving switch arm 71 back to upright neutral position, see full lines Fig. 5.

As the lay approaches the middle position on its backward stroke, the normal times for picking, high dwell 62 comes under roll 68 and throws the switch arm 71 to the right or dotted line position of Fig. 5. This closes the circuit on the motor 31 to drive it in a forward direction, moving the shuttle from the full line top center position of Fig. 7 to the dotted position and along the lay to the opposite side.

During both the boxing and picking of the shuttle the rolls will assume the position indicated in full lines in Fig. 8, causing the belt to conform to the rounded end of the shuttle. When the belt moves to place or pick the shuttle the latter slides along the box front 21 which is smooth enough to offer a minimum of resistance to shuttle motion.

The electrical connections for the motor, which may be of the three phase alternating current induction type, are shown in Fig. 9. The power wires 85, 86 and 87 are connected to posts 88, 89 and 90, respectively, of switch 70, and posts 91, 92 and 93 of the switch are connected by wires 94 and 95, and 96, respectively, to the windings 97, 98 and 99, respectively, of the motor. Crossovers 100 and 101 permit reversal of the connections between wires 85 and 86, and the posts 91 and 92, while wire 87 is arranged to connect straight through to wire 96 when the switch is thrown either direct or reverse.

The relation of the switch to the motor control will be apparent, it is believed, from the drawings. When the arm 71 is to the right, as dotted in Fig. 5, current flows through wires 85, 86 and 87 to wires 94, 95 and 96, respectively, with results already described. When the switch is reversed, however, wires 85, 86 and 87 are connected to wires 95, 94 and 96, respectively, a condition existing when the arm 71 is in the position shown dotted in Fig. 6. When the arm 71 is in neutral or mid-position, the switch is open and the power wires are disconnected from the motor. While a specific type of motor has been shown, yet I do not wish to be limited to such a motor, nor the type of reversing switch shown.

From the foregoing, it will be seen that I have provided a loom wherein the shuttle is picked by a silent friction element normally placed to engage the shuttle and actuated at the proper time to propel the shuttle. In this way a contact of large area is provided and the shuttle can start to move with its actuator instead of being struck by a moving part having a high rate of speed. The shuttle is therefore subjected to a force acting uniformly along its length and there is no tendency for the actuator to wear grooves or depressions in the shuttle wall. It will also be seen that the picking motor is reversible to place the shuttle preparatory to picking. Furthermore, the belt engages a large area of the shuttle and has a portion thereof deformable to follow the outline of the shuttle to insure maximum surface contact both for the placing and picking operations.

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 having a lay, a shuttle box on the lay, a shuttle actuator extending along the lay and forming part of the shuttle box and positioned at all times to engage the shuttle frictionally when the latter is in the box, an electric motor operatively connected to the actuator and idle during a part of the cycle of loom operations, and means to excite the motor to cause the actuator to pick the shuttle out of the box by frictional force when the picking point is reached in the cycle of the loom.

2. In a loom having a lay, a shuttle box carried by the lay, a belt movable along the lay and forming one side of the shuttle box and positioned at all times to engage frictionally a shuttle in the box, an electric motor operatively connected to the belt and idle during a part of the cycle of loom operations, and a controller for the motor operating in timed relation with the loom to excite the motor and cause the belt to move in a direction to pick the shuttle out of the box by a frictional force when the loom reaches the picking point in its cycle of operations.

3. In a loom having a lay, a shuttle box thereon, a shuttle actuator located on one side of the box positioned at all times for frictional engagement with a shuttle entering or leaving the box,

drive means for the actuator at rest during a part of the cycle of loom operations, and means operative when the loom reaches the picking point in its cycle of operations to set the drive means in motion to give the actuator a movement to pick the shuttle out of the box by a force transmitted frictionally.

4. In a loom having a lay, a shuttle box on the lay, a belt to engage a shuttle frictionally extending along and forming one side of the shuttle box, a pair of spaced pulleys around which the belt is trained, an electric motor operatively connected to one of the pulleys and idle during a part of the cycle of loom operations, and control means effective when the loom reaches the picking point in its cycle of operations to set the motor in motion to give said belt a movement in a direction to pick the shuttle out of the box by a force transmitted frictionally.

5. In a loom having a lay, a shuttle box on the lay, a belt forming part of and extending along the shuttle box and positioned at all times to engage frictionally a shuttle entering or leaving the shuttle box, a pair of spaced pulleys rotatably mounted on the lay and around which the belt is trained, an electric motor operatively related to one of the pulleys and idle during a part of the cycle of loom operations, a control switch for the motor, and means operative when the loom reaches the picking point in its cycle of operations to move the switch in a direction to cause the motor to move the belt in a direction to pick the shuttle out of the shuttle box.

6. In a loom having a lay, a shuttle box, a belt forming part of the shuttle box at rest during a part of the cycle of loom operations and positioned at all times to engage frictionally a shuttle entering or leaving the box, and means operative when the loom reaches the picking point in its cycle of operations to set said belt into motion and move the same in a direction to pick the shuttle out of the shuttle box by frictional contact therewith.

7. In a loom operating with a shuttle, a shuttle box to receive a shuttle, a belt extending along and forming part of the shuttle box and positioned at all times to engage frictionally a shuttle when the latter is in the shuttle box, and intermittently actuated means operatively connected to the belt to give the latter periodic movements in a direction along the shuttle box and in frictional contact with the shuttle to pick the latter out of the box.

8. In a loom operating with a shuttle having a rounded nose, a shuttle box to receive a shuttle, a belt extending along and forming part of the shuttle box and positioned at all times to engage frictionally a shuttle in the shuttle box, intermittently actuated means operatively connected to the belt to give the latter periodic movements in a direction along the shuttle box and in frictional contact with the shuttle to pick the latter out of the box, and means pressed against the belt to cause the same to conform to and lie in frictional contact with the rounded nose of the shuttle.

9. In a loom having a shuttle box, a belt extending along and forming part of the shuttle box and positioned at all times for engagement with a shuttle in the shuttle box, a pair of spaced rolls to engage the belt at spaced points and move the same inwardly with respect to the shuttle box towards a shuttle in the box, and a floating yielding mounting for said rolls causing the latter to require the belt to conform to the outline of the shuttle in the box.

10. In a loom having a shuttle box, a belt extending along and forming part of the shuttle box and positioned at all times to have frictional engagement with a shuttle in the shuttle box, means to move the belt periodically and while in frictional contact with the shuttle to pick the latter out of the box, and means to cause the belt to conform to the shape of the shuttle as the latter moves along the shuttle box.

11. In a loom having a shuttle box, a belt extending along and forming part of the shuttle box and positioned at all times to engage a shuttle in the box, an electric motor operatively connected to the belt and idle during a part of the cycle of loom operations, a reversing switch to cause said motor to move in opposite directions, and a controller for said switch to cause the motor to turn the belt in a direction to place the shuttle into the box for proper subsequent picking when the loom reaches the shuttle boxing point in its cycle of operations and to cause said motor to move the belt to pick the shuttle out of the box when the loom reaches the picking point in its cycle of operations.

12. In a loom having a lay movable about an axis, a shuttle box on the lay, a shuttle actuator forming one side of the shuttle box and positioned at all times to engage frictionally a shuttle in the box, an electric motor mounted on and movable about the axis of the lay and operatively connected to the actuator and idle during a part of the cycle of loom operations, and means operative when the loom reaches the picking point in its cycle of operations to set said motor in operation to give the actuator a movement in a direction to pick the shuttle out of the box by frictional contact therewith.

13. In a loom having a lay movable about an axis, a shuttle box thereon, a belt mounted on the lay and forming part of the shuttle box, an electric motor mounted on the lay and operatively connected to the belt, said motor and belt being at rest during a part of the cycle of loom operations and the belt positioned at all times for engagement for frictional engagement with a shuttle in the box, a reversing switch for the motor to cause the same to move in opposite directions, and a controller for the motor operating in timed relation with the loom and operative to reverse the motor to cause the belt to move a shuttle into the box by frictional contact therewith when the lay reaches the shuttle boxing point in its cycle of operations to place the shuttle for proper subsequent picking and thereafter operative to move the motor and belt to pick the shuttle out of the box by frictional contact between the shuttle and belt when the lay reaches the picking point in its cycle of operations.

14. In a loom having a shuttle box, a friction belt extending along and forming part of the shuttle box and at rest during a part of the cycle of loom operations and positioned to engage a shuttle in the box, and means first to give said belt a reverse movement to draw a shuttle into the box by frictional contact with the shuttle to establish maximum contact of area between the belt and the shuttle, and operative thereafter to give the belt a direct motion in a direction to drive the shuttle out of the box by frictional contact therewith.

15. In a loom having a lay movable about an axis, a motor normally at rest mounted on and movable about the axis of the lay, a shuttle mov-

ing element operatively connected to the motor and positioned at all times to have frictional contact with a boxed shuttle, a reversing switch for the motor, a cam having high, low and intermediate dwells, means to operatively connect the switch and cam to hold the switch open by the intermediate dwell, close the switch in one condition by the low dwell and close the switch in a different condition by the high dwell, the switch when in one condition causing the motor to move the belt in a direction to box the shuttle and when in the other condition causing the motor to move the belt in a direction to pick the shuttle out of the box.

16. In a loom having a lay movable about an axis and having a shuttle box on the lay, a belt extending along and forming part of the shuttle box and positioned at all times for frictional engagement with a shuttle in the box, a motor operatively connected to the belt and idle during a part of the cycle of loom operations, a reversible switch for the motor, a cam to control the switch having high and low dwells spaced by an intermediate dwell, means to operatively connect the cam and the switch so that the low dwell will cause one closed condition for the switch and the high dwell will cause a different closed condition for the switch and the intermediate position will cause the switch to be open, the cam effective to control the motor so that the latter will move the belt to place a shuttle in the box to establish maximum area of frictional contact between the belt and the motor, the intermediate dwell thereafter holding the motor idle and said switch thereafter movable to cause the motor to drive the belt in the opposite direction to pick the shuttle out of the box by frictional contact therewith.

17. In a loom having a lay and a shuttle box thereon, a shuttle actuator lying on one side of the shuttle box and at rest during a part of the cycle of loom operations and positioned to engage a shuttle in the shuttle box at all times, and means to set said belt in motion to pick the shuttle out of the box by a force transmitted frictionally from the belt to the shuttle.

18. In a loom having a lay and operating with a shuttle, a shuttle box on the lay, an elongated friction element extending along the lay adjacent the shuttle box and located to have contact with a shuttle in the box at points lying along the lay and on both sides of the longitudinal center of the shuttle, and means to move the element along the lay to pick the shuttle out of the box by a force transmitted frictionally from the element to the shuttle, that part of the element having contact with the rear part of the shuttle having reference to the direction in which the shuttle is picked resisting movement of the shuttle transversely of the direction of picking.

19. In a picking motion for a loom having a lay and operating with a shuttle, a shuttle box on the lay, a pair of spaced rotatable actuators located at different points longitudinally along the lay and adjacent the shuttle box, a friction belt engaging and movable by the actuators and positioned to have contact with a shuttle in the box at points which lie on both sides of the longitudinal center of the shuttle when the shuttle is at rest in the box, and means to move the actuators to pick the shuttle out of the box by a force transmitted frictionally by the belt to the shuttle, that part of the belt having contact with the rear part of the shuttle having reference to the direction in which the shuttle is picked resisting movement of the shuttle transversely of the direction of picking.

20. In a picking motion for a loom operating with a lay and a shuttle, a shuttle box on one end of the lay, a belt extending along the lay adjacent the shuttle box and positioned for frictional contact with a shuttle in the box, said belt having contact with the shuttle along portions of the latter which are behind and in front of the longitudinal center of the shuttle having respect to the direction of travel of the shuttle, and means operative to move the belt and cause the latter to pick the shuttle out of the shuttle box by a force transmitted frictionally from the belt to the shuttle, that part of the belt having contact with the rear part of the shuttle having reference to the direction in which the shuttle is picked resisting movement of the shuttle transversely of the direction of picking.

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