

[54] **MATTRESS HANDLING APPARATUS**

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[52] U.S. Cl. **214/1 Q, 198/33 AD, 214/6 C**

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[58] Field of Search 198/20 R, 33 R, 33 AC, 33 AD;
112/3 R; 214/1 R, 1 Q, 1 QA, 1 QB, 6 C

[56] **References Cited**

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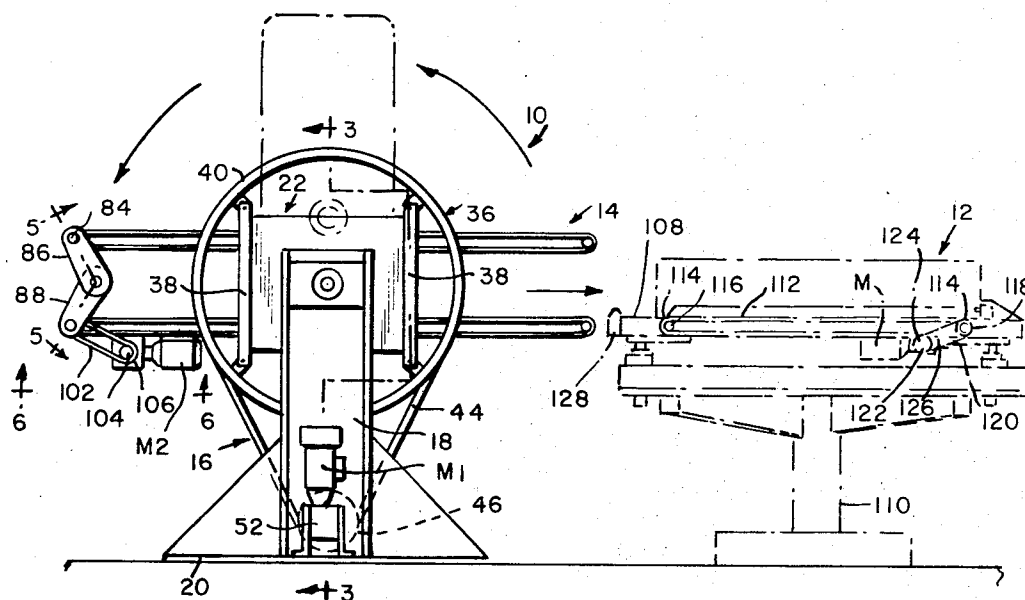
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ABSTRACT

Mattress handling apparatus comprising a cradle having spaced parallel grids adapted to receive a mattress therebetween, said cradle being rotatable about a horizontal axis to present one open end in a position to receive the mattress and when the mattress is wholly contained to an inverted position to present the other open end to said position for discharge of the mattress. There are conveyor belts on the grids for moving the mattress onto the cradle and off the cradle and reversibly drivable mechanism for moving the grids toward and away from each other to clamp the mattress prior to turning and unclamp it after turning. The apparatus is adapted to be used in conjunction with mattress closing apparatus to receive a mattress assembly which has been sewn on one side, invert it, return it to the closing apparatus for sewing on the other side and finally to effect discharge of the completed mattress.

3 Claims, 10 Drawing Figures



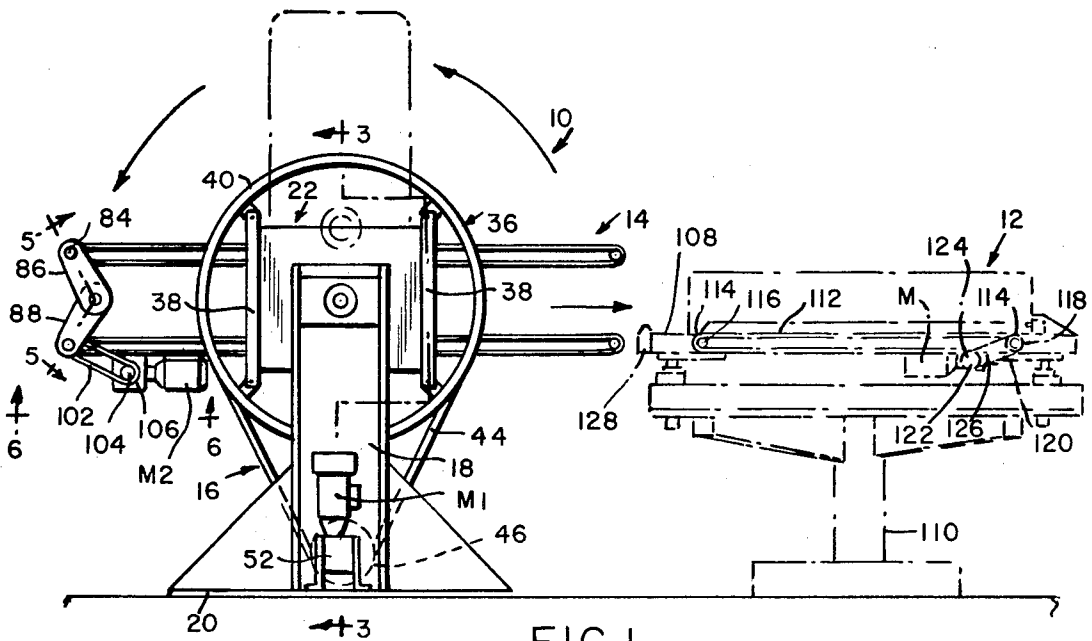


FIG. 1

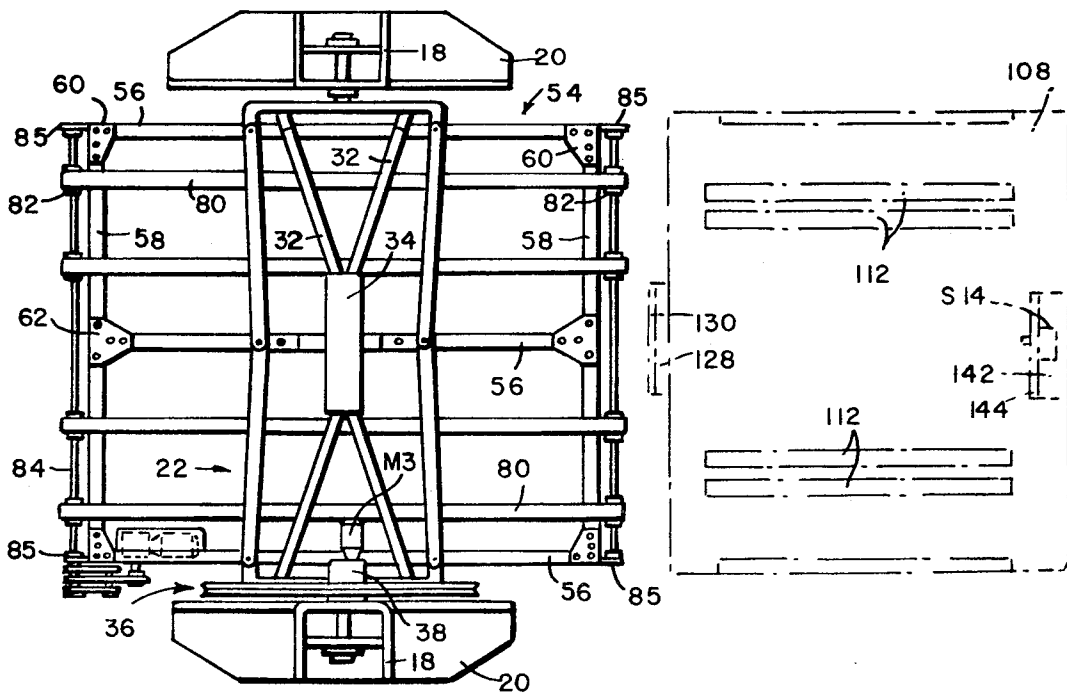


FIG. 2

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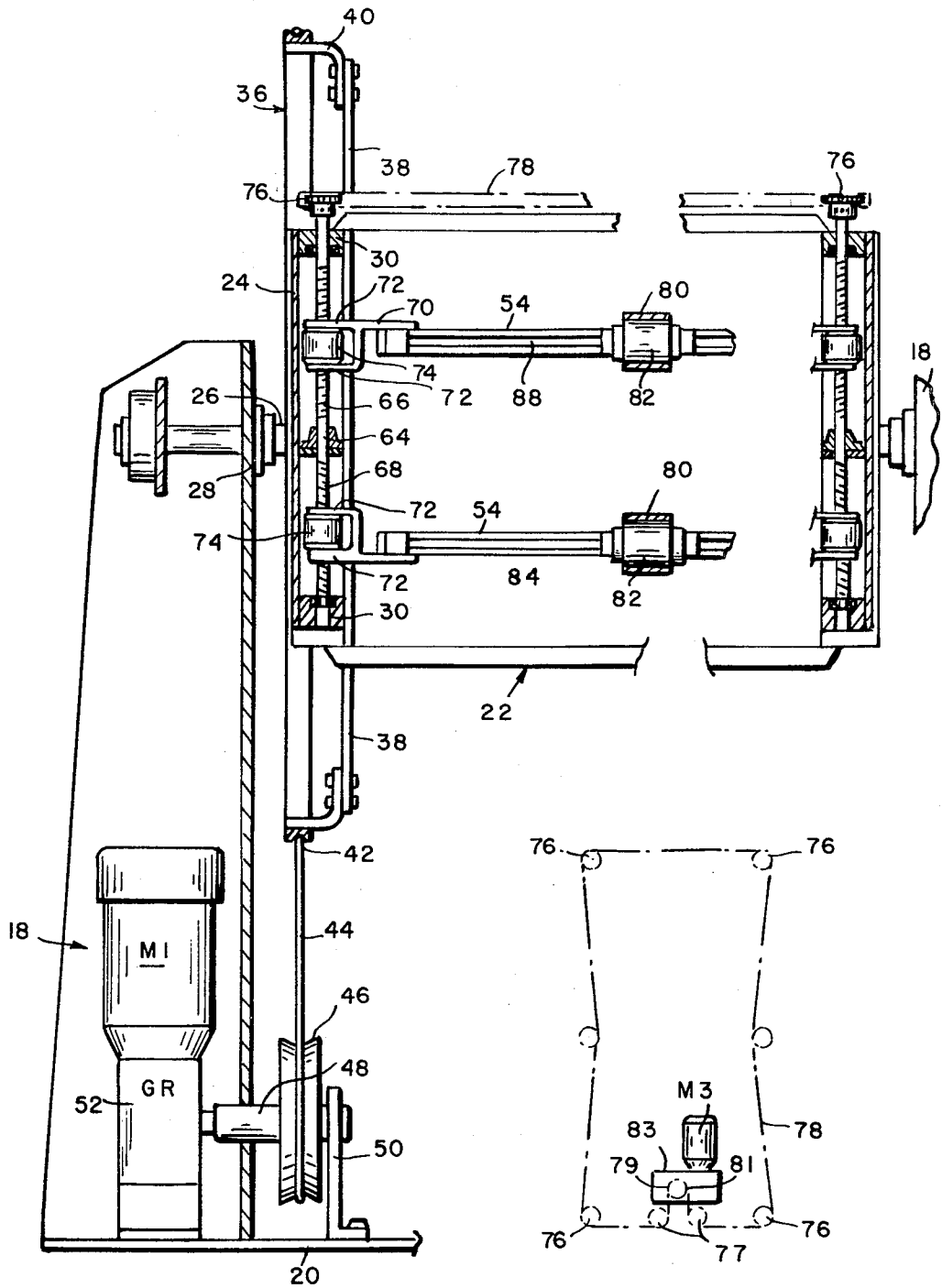


FIG.3

FIG.4

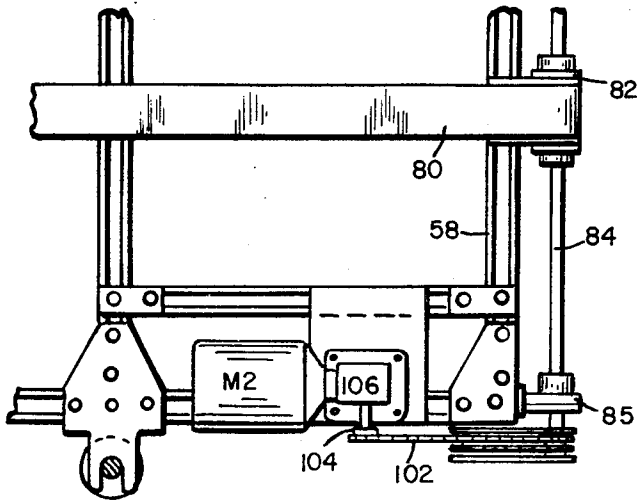


FIG. 6

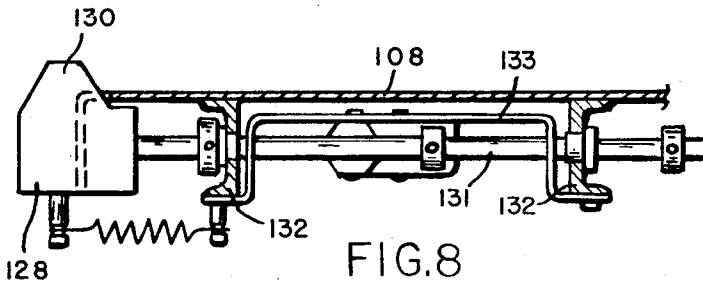


FIG. 8

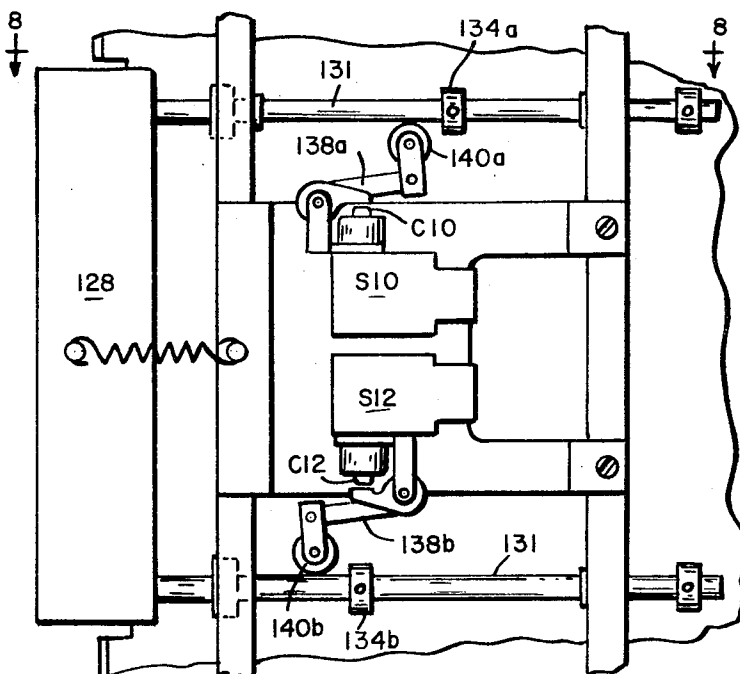


FIG. 7

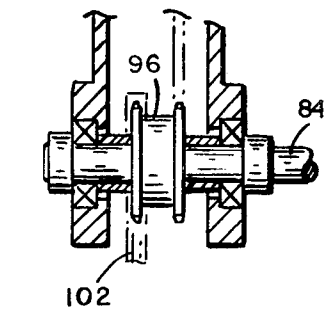
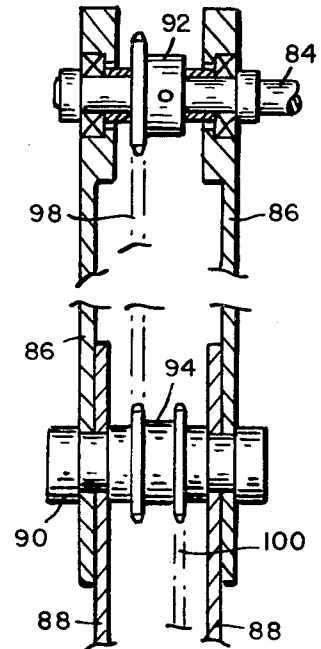


FIG. 5

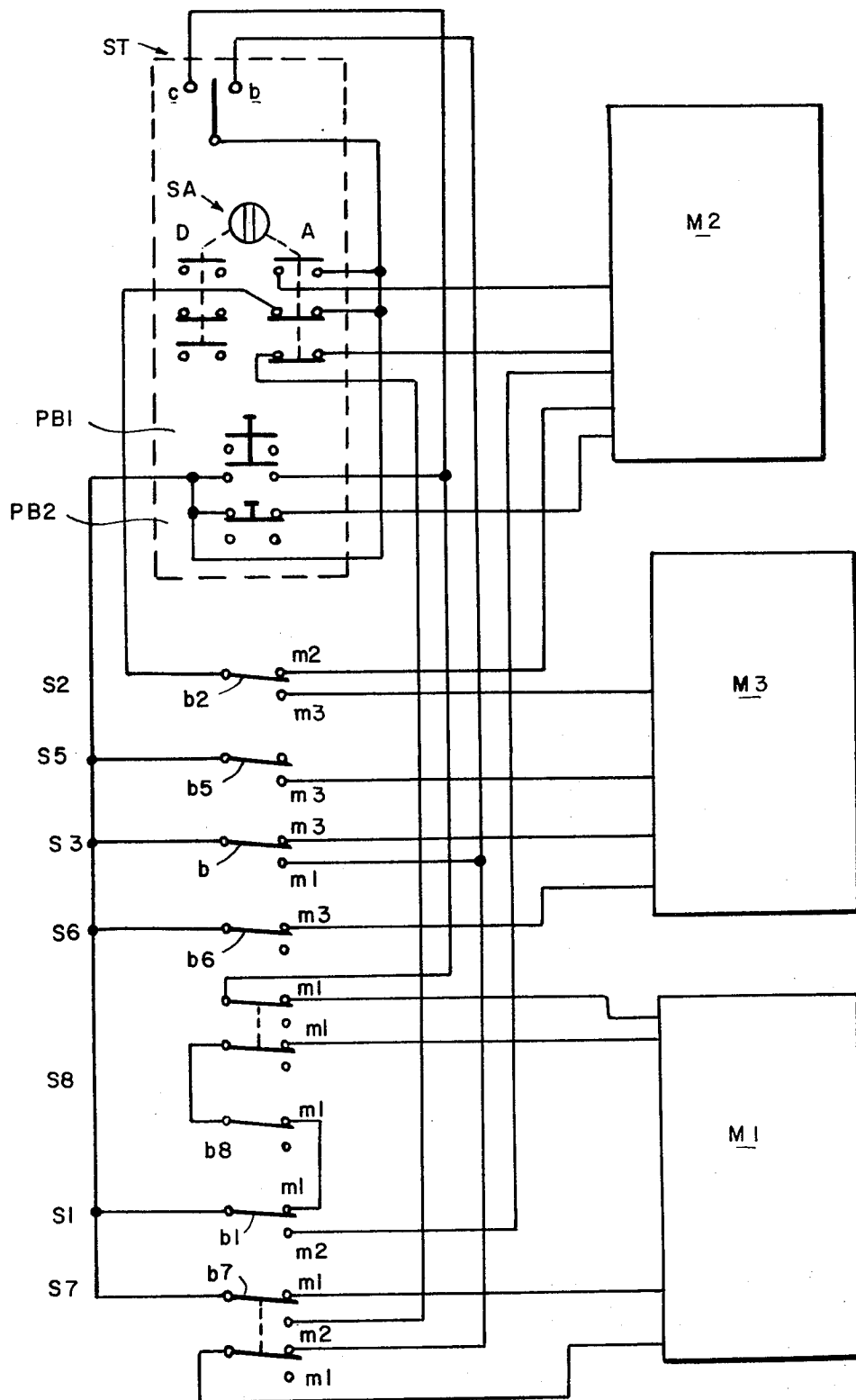


FIG.9

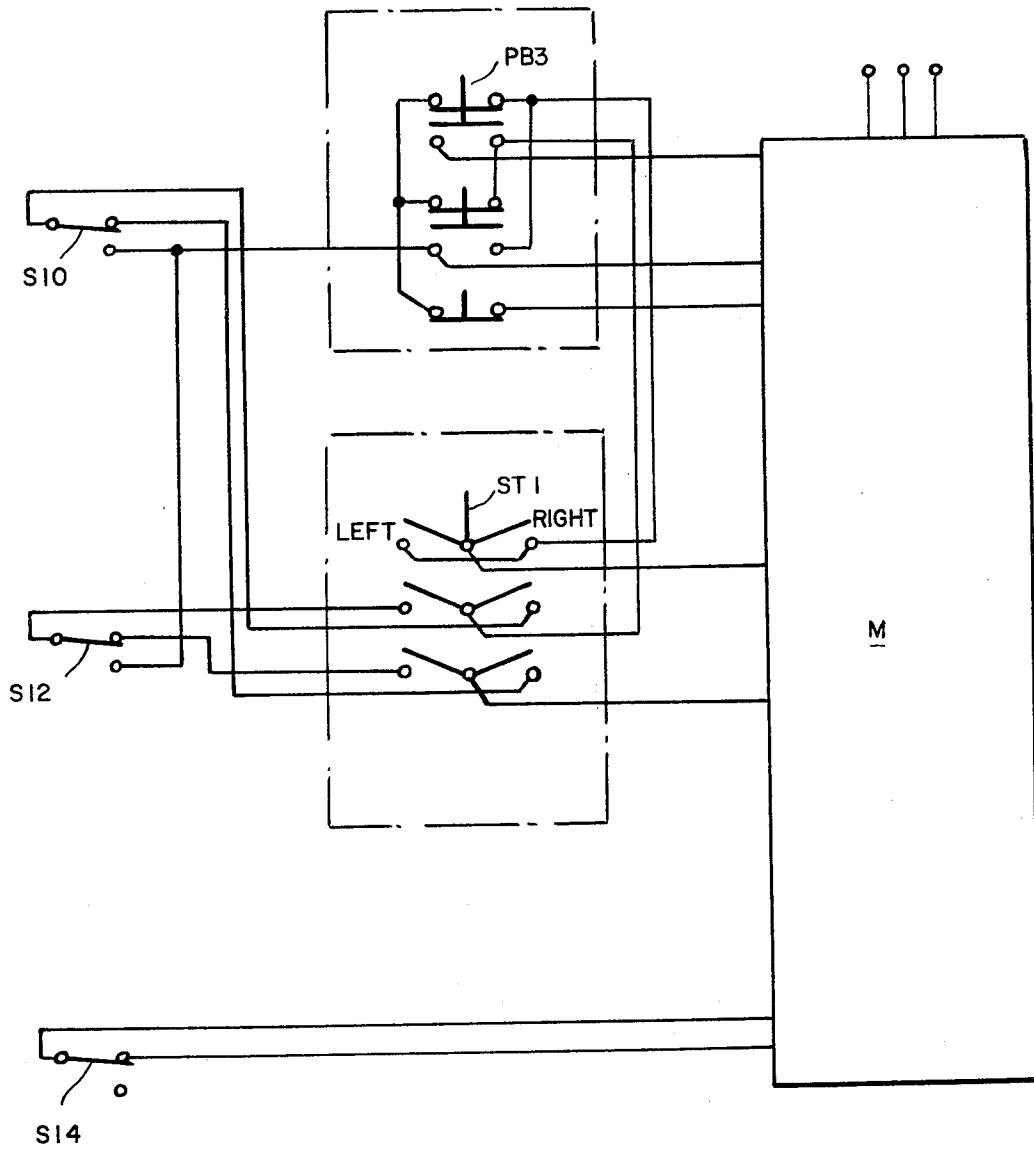


FIG.10

MATTRESS HANDLING APPARATUS

BACKGROUND OF THE INVENTION

Mattress handling apparatus for turning a mattress over between sewing operations is not new, such an apparatus being shown in British Pat. No. 1,144,954, wherein a mattress sewing machine has on its mattress supporting table an elevating device and conveyor belts which operate in conjunction following a sewing operation to raise one end of the mattress to a perpendicular position so as to permit it to be tipped over onto its opposite side for sewing on the other side. The aforesaid turning devices are associated with the sewing apparatus and are only partially automatic in that substantially no control is maintained during turning of the mattress to insure that its inverted position is identical with its original position so as to be lined up with the sewing instrumentalities. The present invention has for its objects to provide mattress handling apparatus which is separate from the sewing apparatus and can be used independently thereof or in conjunction therewith as desired; an apparatus which will receive the mattress from a predetermined position of sewing, invert it and return it to said position; an apparatus which is wholly automatic in that no manual lifting and/or shifting of the mattress is required by operators; and an apparatus which is simple to operate, inexpensive to construct and may be used with other than mattress sewing apparatus wherever mattresses are required to be turned over for finishing and/or inspection operations.

SUMMARY

Mattress handling apparatus comprising a cradle adapted to receive a mattress, said cradle having open ends through which the mattress may be introduced and discharged, means for effecting movement of the cradle to present one open end in a position to receive the mattress with one broad side facing downwardly and when wholly contained therein to present the other open end to said position initially occupied by the one end to discharge the mattress with said one broad side facing upwardly. The cradle comprises spaced parallel grids supported for rotation about a horizontal axis to present first one open end to said position and then to present the other open end to said position, means for effecting rotation of the cradle and conveyor belts associated with the grids operable to move a mattress onto the cradle and after inversion to move the mattress off of the cradle. There is motor-driven mechanism on the cradle for moving the grids toward and away from each other to clamp the mattress prior to turning of the cradle and to release the mattress following turning of the cradle.

The mattress handling apparatus is adapted to be employed in conjunction with mattress sewing apparatus on which a mattress assembly is sewn on first one side and then on the other side for the purpose of turning the mattress assembly between sewing operations. When used in such combination the sewing apparatus is provided with conveyor belts operable, in conjunction with the conveyor belts on the cradle, to move the mattress from the sewing apparatus onto the cradle and after inversion to move the mattress off of the cradle onto the sewing apparatus. Following completion of the sewing operations on both sides the mattress handling apparatus is employed to remove the finished mattress

from the mattress closing apparatus and discharge it at the far side away from the mattress closing apparatus. Suitable control circuits including motors for effecting movement of the conveyor belts on the respective apparatus, a motor for effecting rotation of the cradle and a motor for effecting clamping and unclamping of the mattress on the cradle, together with switches to effect their operation in the proper sequence are provided.

The invention will now be described in greater detail with reference to the accompanying drawings wherein:

FIG. 1 is an elevation of a mattress handling apparatus and mattress closing apparatus arranged in conjunction to enable sewing a mattress on one side on the mattress closing apparatus, turning it over by means of the mattress handling apparatus, and sewing it on the other side;

FIG. 2 is a plan view of the apparatus shown in FIG. 1;

FIG. 3 is an elevation, to larger scale, partly in section taken on the line 3—3 of FIG. 1;

FIG. 4 diagrammatically illustrates the drive for effecting movement of the clamping grids on the mattress handling apparatus to and from each other;

FIG. 5 is a section taken on the line 5—5 of FIG. 1 to very much larger scale;

FIG. 6 is a view taken on the line 6—6 of FIG. 1 to very much larger scale;

FIG. 7 is a view taken of the underside of the mattress closing apparatus of a portion to much larger scale showing switch operating mechanism employed in conjunction with the control of conveyor belts on the mattress closing apparatus;

FIG. 8 is a section taken on the line 8—8 of FIG. 7;

FIG. 9 is a wiring diagram by means of which operation of the mattress handling apparatus is controlled; and

FIG. 10 is a wiring diagram by means of which operation of the conveyor belts on the mattress closing apparatus are controlled.

Referring to the drawings (FIG. 1) there is shown mattress handling apparatus 10 which is used in conjunction with a mattress closing machine 12 to receive a mattress which has been closed at one broad side on the closing machine, invert it and return it to the mattress closing machine for sewing at the other broad side. It is to be understood, however, that the mattress handling apparatus may be used independently of the mattress closing machine for other purposes.

The mattress handling apparatus 10 comprises essentially a cradle 14 within which the mattress is adapted to be placed and a supporting frame 16 on which the cradle is mounted for rotation. Specifically, the supporting frame 16 comprises spaced, vertically disposed stanchions 18—18 (FIGS. 2 and 3) of substantially U-shaped horizontal section fixed at their lower ends to a base plate 20 with their open sides facing outwardly and a rigid box frame 22 (FIG. 3) mounted between the upper ends of the stanchions for rotation about a horizontal axis, the cradle 14 being mounted on the box frame.

The box frame 22 comprises spaced parallel, rectangular end plates 24—24 (FIG. 3) to the centers of which are fixed trunnions 26—26, the latter extending outwardly from the end plates through bearings 28—28 at the inner sides of the stanchions 18—18 which

thereby support the end plates for rotation about a horizontal axis. Rigid bars 30—30 are welded or otherwise secured to the inner sides of the end plates 24—24 at their upper and lower edges and these bars 30—30 are joined transversely by an X-frame comprising intersecting tie bars 32—32 connected at their ends to the bars 30—30 and at their intersections by plates 34.

A large diameter sheave 36 is mounted at one end of the box frame, the left as shown in FIG. 3, to effect its rotation. The sheave 36 is mounted on and secured to the box frame by spaced parallel bars 38—38 (FIG. 1) secured at the inner sides and at the opposite ends of the bars 30—30 and by angle members 40—40 at the ends of the bars 38—38 fastened to the bars 38—38 and to the sheave 36. The sheave 36 contains a groove 42 for receiving a cable 44 which is entrained about it and about a sheave 46 fixed to a shaft 48 journaled in suitable bearings 50 at the base of the machine. The shaft 48 is connected to a motor M1 by means of a gear reduction unit 52 (FIG. 3).

The cradle 14 is mounted within the box frame and comprises spaced parallel grids 54—54 of rectangular configuration between which a mattress is adapted to be disposed with the long dimension across the box frame. Each grid 54 comprises spaced parallel rails 56, of which there are three connected at their ends by transverse rails 58. The ends of the rails 58—58 at the four corners of the grids are rigidly secured by anchor plates 60 and the medial rail is connected to the end rails 58—58 by anchor plates 62. The grids 54—54 are mounted on the box frame in spaced parallel relation for movement toward and from each other on screws 64, there being four such screws (FIG. 3) journaled in the bars 30—30, each of which has right and left-hand threads 66 and 68. Each grid is provided at each end with longitudinally spaced bracket members 70—70 embodying spaced tines 72—72 between which are mounted nuts 74 through which the screws are threaded, so that rotation of the screws in unison will move the grids 54—54 toward each other or away from each other depending upon the direction of rotation of the screws. Rotation of the screws 64 is effected by means of sprocket wheels 76 fixed to the upper ends of the screws and a chain 78 entrained about the sprockets. The chain 78 at one end of the cradle is looped about a pair of spaced guide sheaves 77—77 and a drive sprocket 79 fixed to a shaft 81. A motor M3 and gear reduction unit 83 (FIG. 4) are mounted on the box frame to drive the shaft 81. The motor M3 is reversible so as to enable rotating the screws 64 to either move the grids apart or to move them together. The reason for mounting the grids 54—54 for movement toward and away from each other is to enable separating them to permit moving a mattress between the grids; then clamping the mattress therebetween by moving the grids toward each other to clamp the mattress and after inverting the mattress to release the mattress by moving them away from each other.

Each of the grids 54 has on it a plurality of longitudinally extending, transversely spaced endless conveyor belts 80 (FIG. 2), four such belts being shown. The conveyor belts 80 are entrained about longitudinally spaced sheaves 82—82 which, in turn, are fixed to transversely disposed shafts 84—84 rotatably supported at their ends in bracket plates 85—85 secured to

the opposite ends of the grids. The upper and lower runs of the belts 80 are located above and below the end rails 58—58, respectively, of the lower and upper grids in spaced parallel relation and operate to effect movement of a mattress onto the cradle and to discharge it therefrom as will appear hereinafter.

The shafts 84—84 at one end of the respective grids comprising the cradle, the left end as shown in FIG. 2, are extended beyond the bracket plates 85 and have pivotally mounted thereon pairs of articulated links 86—86 and 88—88. The links 86—86 and 88—88 are pivotally connected to each other by a stub shaft 90 (FIG. 5). A single sprocket 92 is mounted on the portion of the shaft 84 located between the links 86—86, a double sprocket 94 is mounted on the stub shaft 90 between the links 86—86, 88—88 and a double sprocket 96 is mounted on the portion of the shaft 84 between the links 88—88. A chain 98 is entrained about the single sprocket 92 and one of the sprockets of the double sprocket 94 and a chain 100 is entrained about the other sprocket of the double sprocket 94 and one of the sprockets of the double sprocket 96. The other sprocket of the double sprocket 96 has entrained about it one end of a chain 102, the opposite end of which is entrained about a sprocket 104 mounted on a shaft extending from a gear reducing unit 106 driven by a motor M2. The aforesaid drive enables continuously rotating the shafts 84—84 and hence the conveyor belts 80 independently of the position of the grids 54—54 relative to each other and while moving to or away from each other.

In operation the grids 54—54 are moved away from each other far enough to permit a mattress to be moved onto the cradle from right to left (FIG. 1) between the conveyor belts 80, the movement being effected by engagement of the mattress with the lower conveyor belt 80, the upper conveyor belts 80 being out of contact therewith. When the mattress reaches the left-hand end of the cradle a switch operated by engagement of the mattress therewith stops the belts and initiates operation of the motor M3 so as to move the grids toward each other to press the mattress between the lower and upper conveyor belts 80 and at the same time to initiate rotation of the cradle by energizing the motor M1 so as to turn the cradle over end for end thus reversing or inverting the mattress. As the cradle nears the inverted position a switch is operated to separate the grids thus to release the mattress and the conveyor belts 80 are driven in a direction to discharge the mattress from the right-hand end of the cradle onto the mattress closing machine.

The mattress handling apparatus just described is especially designed for use with a mattress closing machine of the kind disclosed in pending application Ser. No. 887,592, filed Dec. 23, 1969, wherein a mattress assembly is mounted on a table, the table rotated about a vertical axis relative to a sewing machine for sewing the edge of the mattress at one broad side, and then the mattress is inverted and the edge of the other broad side is sewn. In the apparatus shown in the aforesaid pending application the mattress is inverted by hand. With minor modifications in the aforesaid closing machine the mattress turning apparatus, herein illustrated, can be used with it to turn the mattress automatically from one side to the other for sewing at

each side and for thereafter discharging the finished mattress.

Without in detail describing the construction and operation of the aforesaid mattress closing machine, it comprises (FIGS. 1 and 2) a horizontally disposed table 108 supported on a pedestal 110 for rotation about a vertical axis and has an upper surface of sufficient area to support a full size mattress assembly. In the machine disclosed in the pending application the mattress is held under compression during sewing and the table and a platen employed to hold the mattress under compression rotate in unison relative to the sewing machine. The aforesaid apparatus is modified to enable use of the mattress turning apparatus therewith, according to this invention, by mounting on the table 108 longitudinally disposed, spaced parallel endless conveyor belts 112, the upper runs of which are substantially parallel with the upper surface of the table. The conveyor belts, as shown in FIG. 1, are entrained about sheaves 114—114 fixed to shafts 116—116. One of the shafts 116 has on it a sprocket 118 about which one end of a chain 120 is entrained, the other end being entrained about a sprocket 122 fixed to a shaft 124 extending from a gear reduction unit 126 to which power is supplied by a motor M. The motor M is reversible so that the conveyor belts 112 may be driven in either direction.

At the left end of the closing machine (FIGS. 1, 2 and 7), that is, the end adjacent the mattress handling apparatus, there is mounted a bumper bar 128, a portion 130 of which extends upwardly from the surface of the table 108. The bumper bar is fixed to the forward ends of a pair of spaced parallel rods 131—131 mounted between rails 132—132 at the underside of the table and have mounted thereon between the rails collars 134a and 134b. A pair of switches S10 and S12 are mounted by means of a supporting bracket 133 between the rods 131—131 at the underside of the table. The switch S12 is provided with a contact element C12 and the switch S10 with a contact element C10. The switch S10 is also provided with a lever 138a mounting a roller 140a and the switch S12 is provided with a lever 138b provided with a roller 140b. The switches are arranged in a circuit which will be described hereinafter so that when a mattress lifted onto the table 108 is moved forwardly thereon toward the mattress handling apparatus by the endless belts 112 and strikes the upwardly protruding part 130 of the bumper 128 the movement of the endless belts will be reversed so as to move the mattress from left to right into engagement with a positioning member 142 (FIGS. 1 and 2), having an upwardly extending stop 144 which, by engagement with the edge of the mattress as it is moved toward the right, will stop the mattress in the proper position on the table for sewing. Contact of the mattress with the stop 142 actuates a switch S14 to stop the conveyor belts 112.

Briefly, when the mattress handling apparatus is used in conjunction with the mattress closing apparatus for turning the mattress from one side to the other for sewing at opposite sides, the mattress assembly is loaded onto the table 108 of the mattress closing apparatus, is automatically positioned thereon by the conveyor belts 112 relative to the sewing instrumentalities by means of which the sewing operation is performed, after sewing one side moved off onto the mattress handling ap-

paratus by the conveyor belts 112 and by the conveyor belts 80, clamped thereon, inverted, unclamped and moved back onto the table of the mattress closing apparatus by the conveyor belts 80 and automatically positioned thereon by the conveyor belts 112 for sewing the opposite side. Following completion of the sewing operation the mattress is again transferred from the mattress closing apparatus to the mattress handling apparatus by the conveyor belts 112 and 80 and the latter discharges the finished mattress onto a suitable conveyor for carrying it away from the apparatus.

The wiring diagram illustrating the switches by means of which the mattress handling apparatus is controlled is shown in FIG. 9. Referring to the wiring diagram, there are three reversible motors M1, M2 and M3 which, respectively, operate to rotate the cradle 14 from vertical to horizontal positions, to effect movement of the conveyor belts 80 and to effect movement of the grids 54—54 to and from each other to clamp and release the mattress on the cradle. A push button switch PB1 is provided for initiating operation of the cycle and a push button switch PB2 is provided for stopping the cycle at any time prior to its normal termination. Pressing the push button switch PB1 starts the motor M1 which rotates the cradle from its vertical at-rest position clockwise, as seen in FIG. 1, to a horizontal position for receiving a mattress from the mattress closing apparatus. As the cradle approaches the horizontal position, a switch S1, having a blade b1, by movement of the blade from contact m1 to m2 stops the motor M1 and starts the motor M2 to cause the conveyor belts 80 on the cradle to move inwardly to draw the mattress from the table onto the cradle. As the mattress reaches the innermost position on the cradle it makes contact with a limit switch S2, having a blade b2, which by movement from a contact m2 to a contact m3 stops the motor M2 and hence the conveyor belts 80 and starts the motor M3 to effect movement of the grids toward each other to clamp the mattress between the grids. As the grids approach a predetermined position of clamping a limit switch S3, having a blade b3, is actuated to move the blade from a contact m3 to a contact m1 which stops the motor M3 and starts the motor M1 to invert the cradle. As the cradle turns beyond its vertical position in a counter-clockwise direction a switch S5, having a blade b5 is actuated by movement of the blade from a dead contact to a contact m3 to start the motor M3 to effect separation of the grids and hence unclamping of the mattress and as the cradle reaches the inverted horizontal position a switch S6, having a blade b6, is actuated to move the blade from a contact m3 to a dead contact to stop the motor M3 so as to terminate separation of the grids. At the inverted horizontal position of the cradle a switch S7, having a blade b7, by movement of the blade from a contact m1 to a contact m2 is actuated to stop the motor M1 and start the motor M2 to effect movement of the conveyor belts 80 outwardly thereby moving the mattress back onto the table of the mattress closing apparatus. The switch S7 includes a safety which prevents accidentally starting the motor M1 which rotates the cradle while feeding the mattress off the cradle. The cradle is returned to its vertical position by actuating the push button PB1.

For discharging the mattress after the closing operation is completed the circuit is provided with a selector switch SA for starting the motor M2 in a direction to move the belts 80 from right to left to draw the mattress onto the cradle from the mattress closing apparatus to effect discharge from the left end of the table. A toggle switch ST is provided for effecting operation of the motor M1 in a direction to turn the cradle in a counter-clockwise direction so that the discharge of the mattress may be made from the left end of the cradle without contacting the limit switch S2.

The foregoing circuitry is exclusive to the mattress handling apparatus. Additional circuitry is provided for controlling the conveyor belts 112 on the mattress closing machine, as shown in FIG. 10. With the toggle switch ST1 set to the right-hand position when push button PB3 is pressed to start the motor M the latter drives the conveyor belts 112 in a direction to draw a mattress onto the table 108. As the mattress moves from right to left on the table engagement of the leading end of the mattress with the bumper 128 moves the rods 131—131 and the collars 134a and 134b forwardly relative to the switch operating mechanism of the switches S10 and S12. Forward movement of the collar 134a by engagement with the roller 140a depresses the lever 138a thereby actuating the switch S10 which reverses the motor M so as to stop the movement from right to left of the belts and start movement from left to right. Movement of the belts from left to right carries the side of the mattress into engagement with the stop 144 and with switch S14 which stops the motor M. Following the edge closing operation the toggle switch ST1 is moved to the left-hand position whereupon when the switch PB3 is again pressed the motor M will be rotated in a direction to move the conveyor belts from right to left to transfer the mattress from the closing apparatus to the cradle. During such transfer the leading end of the mattress again engages the bumper 128. Forward movement of the collar 134b under the follower 140a fails to actuate the lever 138b and hence the switch S12; however, after the mattress moves beyond the bumper rearward movement of the collar 134b by engagement with the follower 140b actuates the switch S12 to reverse the motor M and start the conveyor belts in the reverse direction preparatory to receiving the mattress from the mattress handling apparatus and returning it to the table for a seaming operation on the opposite side. As the mattress is retransferred from the mattress handling apparatus to the mattress closing apparatus the leading side of the mattress moving off the cradle onto the table by engagement with the switch S14 stops the motor M. The opposite side of the mattress is now sewn whereupon the push button switch PB1 is closed so as to rotate the cradle to a position to receive the finished mattress from the table for discharging it from the opposite side. The selector switch ST1 is moved to the left side and the push button switch PB3 is pressed to start the motor M in a direction to cause the belts to move the finished mattress from the table onto the cradle.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents falling within the scope of the appended claims.

We claim:

1. Mattress handling apparatus comprising a cradle, supports between which the cradle is mounted for rotation about a horizontal axis, a sheave fixed to one end of the cradle, a first motor operably connected to the sheave for effecting rotation of the cradle; screws mounted on the cradle having right and left threads, grid members mounted, respectively, on the right and left threads of the screws in spaced parallel relation between which a mattress is adapted to be placed, sprockets fixed to the screws, a chain entrained about the sprockets and a second reversible motor drivingly connected to the chain for moving the grids to and from each other to clamp and release a mattress situated between the grids; a shaft mounted at each end of each grid, pulleys mounted on said shafts, belts entrained about the pulleys at opposite ends of each grid, said belts constituting conveyor means on the grids extending lengthwise thereof, and means for effecting rotation of the shafts and hence the belts, on the one hand to draw a mattress between the grids and on the other hand to discharge it from between the grids, comprising a third motor drivingly connected to one of the shafts at one end of one of the grids, and means for drivingly connecting said one shaft to the shaft at the corresponding end of the other grid, comprising articulated links connected to one end of each of said latter shafts, sprockets mounted at the articulated ends of the links, and chains entrained about each respective pair of sprockets which comprise one of the sprockets on one of the shafts and one of the sprockets at the articulated ends of the links.

2. Mattress handling apparatus according to claim 1, wherein said first motor is operative to rotate the cradle to dispose first one end and then the other at said predetermined position, said third motor is operative when the one end is at said predetermined position to move the belts in a direction to draw the mattress between the grids and when the other end is in said predetermined position to move the belts in a direction to discharge the mattress from between the grids, and wherein said second motor is operative following movement of the mattress between the grids to effect clamping of the mattress and following inversion of the cradle to effect release of the mattress.

3. Mattress handling apparatus according to claim 2, comprising a first manually operable switch for initiating operation of said first motor to dispose the cradle with the one end at said predetermined position, a second manually operable switch for initiating operation of said third motor to move the belts in a direction to draw the mattress between the grids, a limit switch operable by disposition of the mattress between the grids to stop said third motor and initiate operation of said second motor to effect clamping of the mattress, a second limit switch operable by clamping of the mattress to initiate operation of said first motor to invert the cradle, a third limit switch operable by inversion of the cradle to effect operation of said second motor to release the mattress and a fourth limit switch operable by disposition of the opposite end of said cradle at said predetermined position to initiate operation of said third motor to discharge the mattress from between the grids.

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