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(54) **Apparatus and method for automatically securing borderwires on mattress innersprings.**

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Description

The present invention relates to both an apparatus and a method for securing borderwires on a mattress innerspring of a bedding type of mattress according to the preamble of claims 1 and 14 respectively.

Such an apparatus for securing borderwires on a mattress innerspring is known from U.S. Patent No. 4,724,590. This apparatus comprises mattress innerspring and borderwires support means on which a mattress innerspring, having borderwires positioned in opposite side thereof, is supported; clip wrapping means positioned adjacent to said support means for wrapping clips on the borderwires and coils of the mattress innerspring along an edge to secure the borderwires to the mattress innerspring; drive means for advancing the mattress innerspring and the borderwires along the support means in the direction of the clip wrapping means; and control means for sequentially deactivating the drive means and activating the clip wrapping means whereby the coils of the mattress innerspring are successively secured to the borderwires along said edge thereof. Although being proved in practice, this apparatus results in a relatively complex structure. So, the horizontal disposition of the mattress innerspring and the borderwires on the support means comprises a plurality of components such as horizontally spaced, freely rotatable rollers, all together four clip wrapping means etc.

Moreover, a method for securing borderwires on coils of a mattress innerspring belonging to the above mentioned apparatus is disclosed in the U.S. Patent No. 4,724,590. This method comprises following steps: providing support means for supporting the mattress innerspring and the borderwires; advancing the mattress innerspring and the borderwires along the support means to a clip wrapping station positoned adjacent to the support means; interrupting the advance of the mattress innerspring and the borderwires at the clip wrapping station; simultaeously wrapping a plurality of clips on the borderwires and the coils of the mattress innerspring along an edge thereof at the clip wrapping station; continuing the advance of the mattress innerspring and the borderwires along the support means and the interruption thereof at the clip wrapping station until the borderwires are secured to the coils of the mattress innerspring along the edge thereof. This method is often and successfully used in pratice. Indeed this method resides in the amount of handling work that needs to be carried out in turning the mattress innerspring and the borderwires after being wrapped with clips on opposite edges thereof due to the disposing, supporting and advancing the mattress innerspring and the borderwires in a horizontal plane. Therefore, such handling takes relatively long time to carry out and increases the cost of the securing.

Thus, it is an object of the present invention to provide an apparatus and a method for securing borderwires on a mattress innerspring eliminating the above mentioned inconveniences.

According to the apparatus of the invention, this object is achieved by the fact that the support means is constructed such that the mattress innerspring, having borderwires positioned in opposed relation an opposite side thereof, is supported on said edge in a substantially upright position.

According to the method of the invention, this object is reached by providing support means for supporting the mattress innerspring and the borderwires on the edge in a substantially upright position; advancing said edge of the mattress innerspring and the borderwires along the support means to the clip wrapping station; continuing the advance of said edge of the mattress innerspring and the borderwires along the support means; and turning the mattress innerspring and the borderwires while supported in a substantially upright position on the support means until the coils of the mattress innerspring and the borderwires along each of the other edges thereof have been wrapped with clips at the clip wrapping station.

Preferred embodiments of the invention are described in the claims 2 to 13 and 15, respectively.

Further caracteristics and advantages will become apparent from the detailed description of the apparatus and the method according to the invention, illustrating examples in the accompanying drawings, wherein:

Fig. 1 is a view in perspective of an embodiment of the apparatus of the present invention with a mattress innerspring and borderwires positioned thereon;

Fig. 2 is a rear view in perspective of said embodiment of the invention;

Fig. 3 is a fragmentary view in elevation of a portion of the back of said embodiment of the apparatus showing various of the control components of the apparatus;

Fig. 4 is a fragmentary view of the clip wrapping station of said embodiment of the apparatus;

Fig. 5 is an enlarged fragmentary sectional view taken substantially along line 5-5 of Fig. 4;

Fig. 6 is a view corresponding to the view of Fig. 5 showing a modification of the clip wrapping station;

Fig. 7 is a top plan view in elevation of an embodiment of the stop means of the apparatus;

Fig. 8 is a fragmentary view in perspective of the carriage means and components of its associated drive means;

Fig. 9 is a fragmentary view in perspective of the unique safety means carried on the carriage means of said embodiment of the invention;

Fig. 10 is a fragmentary view in perspective of a modification of the carriage means showing clamp means for engaging a mattress innerspring as it is advanced toward the clip wrapping station of the apparatus;

Figs. 11 and 12 are top plan views of the safety means on the carriage means showing it in its normal position in Fig. 11 and its carriage deactivating position in Fig. 12;

Figs. 13 through 15 are views of an element of the gripper means associated with the turning or rotating means for engaging a mattress innerspring and borderwires as they are being rotated by the turning or rotating means;

Fig. 16 is a fragmentary frontal view of said embodiment of the apparatus showing a mattress innerspring and borderwires being engaged by the stop means at the clipwrapping station of the apparatus;

Fig. 17 is a fragmentary frontal view of said embodiment of the apparatus showing a mattress innerspring and borderwires being advanced through the clip wrapping station into the rotation zone;

Figs. 18 and 19 are fragmentary frontal views snowing a mattress innerspring and borderwires in the rotation zone and being rotated at that zone;

Fig. 20 is a flow diagram showing the sequence of operations carried out by the apparatus; and

Fig. 21 is a schematic logic circuit diagram of an embodiment of the control means for carrying out the various operations of the apparatus as illustrated in Fig. 20.

The embodiment of the invention illustrated, and designated generally by reference numeral 10, comprises an elongated, generally rectangularly shaped frame member 12 which is maintained in a substantially upright position with relation to a floor surface 13, for example, by support members 14-14. The frame member 12 and the support members 14-14 advantageously are fabricated of hollow bar stock utilizing a minimum number of structural elements consistent with providing a self-supporting, high strength, stable, relatively lightweight unit which can be moved, if necessary, by an operator. In the embodiment of the invention shown, movement of the entire unit advantageously is facilitated by providing casters 15-15 on the support members 14-14. Adjustable stabilizers 16-16 desirably are positioned on the members 14-14 to maintain the unit in a preselected position on the floor surface 13 during operation.

As best illustrated in Figs. 1 and 2 of the drawings, the frame member 12 advantageously is tilted rearwardly at an angle of declination of the order of about 15° to vertical, and is provided with a smooth-surfaced skin or facing 18 desirably formed of a thin, lightweight material such as aluminum sheeting or sheet metal. The slight inclination of the frame member 12 maintains the center of gravity of a mattress innerspring 20 and its associated borderwires 22 and 24 in a position such that they will remain in contact with the facing 18 throughout the clip wrapping operation. The facing 18 provides a Snag-proof surface along which the mattress innerspring 20 and the borderwires 22 and 24 are advanced as clips are being wrapped on the borderwires and the coils 20a forming the margins of the mattress innerspring, and , also, as the mattress innerspring and borderwires are rotated on the apparatus as will be described.

The front of the frame member 12 is provided with an outwardly, extending relatively narrow ledge or platform 26 on which an edge of the mattress innerspring 20 and the borderwire 22 and 24 ride as they are advanced in the direction of the clip wrapping station of the apparatus. The front of the frame member 12 also is provided with a paddle-like member 28 which lies in substantially the same plane as the ledge or platform 26, and is mounted for rotation on a pivot pin 29 carried on the frame 12 (see Fig. 16). In the embodiment of the invention shown, rotation of the paddle-like member 28 desirably is achieved by means of an air cylinder 30, the lower end of the piston housing of which is pivotally mounted to an extension 12a of the frame member 12, while the free end of the piston rod 30a of which is pivotally secured to the paddle-like member 28 (see Figs. 17, 18, and 19). The paddle-like member 28 advantageously is provided with a plurality of spaced, transverse slots 28a through each of which a gripper 32 extends when rotated by an air cylinder 34 (see Figs. 13, 14, and 15). The grippers 32 are activated when an edge of a mattress innerspring and the borderwires have passed through the clip wrapping station, and have been advanced onto the paddle-like member 28 to be rotated through an angle of 90° to position another, unclipped edge of the mattress innerspring and the borderwires on the ledge or platform 26 (see Figs. 18 and 19). The grippers 32, when activated, engage the coils and the borderwires, at spaced intervals, and hold them rigidly against an upwardly extending guide member 28b provided on the paddle-like member 28.

As best illustrated in Figs. 4 and 5 of the drawings, the clip wrapping station of the apparatus comprises a pair of clip wrapping tools 36-36 which are movably mounted on a slotted bar 40 secured to the frame member 12. The clip wrapping tools 36-36 are of a type similar to the clip wrapping tool

disclosed in U.S. Patent No. 4,546,528, and in U.S. Patent No. 4,724,590, in that each comprises a housing connected to a source of air under pressure for driving a reciprocatable blade or plunger which sequentially severs clips from lines 42-42 of interconnected clips spirally wound on feed rolls 46-46 rotatably supported on a bar 12b secured to the frame member 12 (see Figs. 1 and 2). A preferred form of the clips and the feed rolls are disclosed in U.S. Patent No. 4,508,220.

Each of the tools 36-36 has an anvil or forming jaw 36a for cradling the borderwires 22 and 24, and the coils 20a which form the margins of the mattress innerspring 20 (see Fig. 5). As best shown, in Fig. 4, the forming jaws 36a of the tools 36-36 are positioned in opposed relation to one another in recesses 26a-26a formed adjacent to the inner end of the ledge or platform 26. The slots 40a in the bar 40 on which the tools 36-36 are movably mounted enable adjustment of the tools toward and away from each other to accommodate mattress innersprings of different thicknesses.

In Fig. 6 of the drawings, a variation of the mounting of the tools 36-36 on the frame member 12 is illustrated. In the embodiment shown, the slotted bar 40 is connected to the piston rod of an air cylinder 50. A pair of guide pins 52-52 serve to assure precise reciprocatable movement of the tools 36-36 with relation to the coils of a mattress innerspring. This arrangement has special applicability to a mattress innerspring formed of continuous coils having lengths such that they have to be severed at their ends to provide a mattress innerspring of desired dimensions. The severed portions of the coils require that the forming jaws of the clip wrapping tools be positioned below the severed portions of the coils while the mattress innerspring is in motion, and for the clip wrapping tools to move reciprocatably with relation to each coil of the mattress innerspring to enable clips to be properly secured on the coils and the borderwires. Referring, again, to Figs. 4 and 5 of the drawings, a pair of coil engaging members 54-54 are positioned in opposed relation to one another along the ledge or platform 26 adjacent to the clip wrapping tools 36-36. As shown, each of the members 54-54 has a reciprocatable coil engaging head portion 54a secured to the end of the piston rod 56 of an air cylinder 58. Each of the members 54-54 also is provided with a pair of compression springs 60-60 which are carried on rods 62-62, the inner ends of which are secured in the head portion 54a of the members 54-54. The head portion 54a of the members 54-54 act in unison to depress the coils 20a of a mattress innerspring inwardly (see Fig. 5) to position the coils in proper alignment with the borderwires 22 and 24 during each clip wrapping operation of the tools 36-36. The air cylinders 58 are in synchronous operation with the tools 36-36 so that the head portions 54a only come into contact with the coils 20a when the tools 36-36 are activated. The compression springs 60-60 return the head portions 54a to their normal retracted position each time the members 54-54 and the tools 36-36 are deactivated.

The clip wrapping station of the apparatus includes sensing means advantageously in the form of fiber optic switches 70, 72 and 74, and their associated optic elements 76,77 and 78 (see Figs.3 and 4). The switches 72 and 74 are connected in series and act in unison. The optic elements 76,77 and 78 are positioned on the frame member 12 at a point above the coil engaging member 54 located adjacent to the inner margin of the ledge or platform 26. The element 76 senses the end coils of a mattress innerspring. The elements 76,77 and 78 act to accurately and consistently send signals to the switches 70,72 and 74 when the coils are in a clip wrapping position. The switches 70,72 and 74, in turn, activate control means for the clip wrapping tools 36-36 and the coil engaging members 54-54.

In the embodiment of the apparatus illustrated, the advance of the mattress innerspring 20 and the borderwires 22 and 24 in the direction of the clip wrapping station advantageously is achieved by means of a motor driven carriage 80. The carriage 80 is generally U-shaped in configuration, and is provided with a plurality of rollers 82 which ride along the upper and lower margins, and the inner wall of a guide plate 84 positioned on the frame member 12 at substantially a right angle with relation to the upper surface of the ledge or platform 26. The carriage 80 is engaged by means of pins 86 on an endless chain 88 driven by a sprocket carried on a shaft on which a pulley 90 is mounted. The pulley 90 is driven by a belt 92 connected to a pulley mounted on the shaft of a motor 94 secured to the frame member 12 (see Fig. 2). The motor 94 is provided with a brake and a clutch for controlling the forward and reverse movement of the carriage 80 along the guide plate 84.

As shown in Fig. 9, the carriage 80 has an outwardly extending pusher bar 100 which is adapted to contact a mattress innerspring and borderwires as they are advanced by the carriage 80, while in a substantially upright position as shown in Fig.1, along the ledge or platform 26 in the direction of the clip wrapping station. The pusher bar 100 desirably is mounted by means of a set screw 102 on a rotatable rod 104 on which is secured a pivotable reflector 106. The rod 104 also carries a compression spring 108 positioned between an arm member 110 and a washer 112 carried on the rod 104. A photoelectric cell 114, mounted at the end of the frame member 12, transmits a beam 116 which is intercepted by the reflector 106. The

reflector 106 and the cell 114 comprise a unique safety device for stopping the advance of the carriage 80 when the mattress innerspring and the borderwires encounter an unprogrammed interruption either as they are advanced along the ledge or platform 26 in the direction of the clip wrapping station, or when they may, for some reason, tilt or fall against the pusher bar 100. Thus, referring first to Figs. 11 and 12, the reflector 106 and the photoelectric cell 114 are shown in Fig. 11 in their normal position during advance of the carriage 80 in the direction of the clip wrapping station. When the advance of the mattress innerspring and the borderwires experiences an unprogrammed interruption, the pusher bar 100 and the rod 102 move rearwardly against the action of the compression spring 108 causing the reflector 106 to pivot outwardly as shown in Fig. 12 thereby interrupting the beam 116 emitted by the cell 114. Interruption of the beam 116 deactivates the motor 94, stopping the carriage 80. The other contingency the safety device is intended to meet is, as indicated above, the situation where the mattress innerspring and the borderwires may be caused to tilt against the pusher bar 100. As shown in Fig. 9, when for some reason, this occurs, the pusher bar 100 is rotated downwardly. At the same time, the arm member 110 is rotated downwardly to a position in front of the reflector 106 causing the beam 116 to be interrupted and the motor 94 to be deactivated. A detent formed on the rod 104 serves to maintain the pusher bar 100 in its normal, outwardly extended position when it is in contact with a mattress innerspring and borderwires being advanced along the ledge or platform 26 by the carriage 80.

In Fig. 10, a modification of the pusher bar is illustrated. As shown, the bar 120 is provided with a slot 122 through which a pivotally mounted gripper member 124 extends. The member 124 is adapted to engage the coils at the rear of a mattress innerspring as it is being advanced toward the clip wrapping station. The coil gripping action of the member 124 desirably is controlled by a programmed air cylinder 126 secured to the pusher bar 120. This arrangement acts to overcome inertial stresses as a mattress innerspring and borderwires move along the ledge or platform 26, and has special utility in those instances where large sized mattress innersprings are being processed on the apparatus.

Referring to Fig. 8, a disc member 130 is shown mounted on the shaft on which the pulley 90 is mounted. The disc member 130 is formed with spaced radial portions 132 which in cooperation with a non-contact solid state sensor 134 comprise a proximity switch. The switch counts the shaft rotations whereby the carriage 80 will travel the proper distance in reverse after each successive rotation of a mattress spring and borderwires on the apparatus.

As best shown in Figs. 3 and 7, retractable stop means advantageously is provided for the apparatus to establish a reference point with respect to the coils of a mattress innerspring as it and the borderwires enter the clip wrapping station upon each rotation of the mattress innerspring and the borderwires. In the embodiment of the apparatus illustrated, the stop means comprises an air cylinder 140 which is adjustably mounted on the rear of the frame member 12. A slot 142 is formed in the guide plate 84 for enabling the reciprocatable tip 144 of the piston rod of the cylinder 140 to make contact with the leading edges of a mattress innerspring and borderwires as they enter the clip wrapping station (see Fig. 16). The cylinder 140 is associated with a limit switch 146 which is activated when the lead end of the mattress innerspring and the borderwires make contact with the tip 144 of the piston rod of the cylinder 140. The cylinder 140 is connected by conduits 148 and 150 to a pneumatic solenoid valve which is in communication with a source 152 of air under pressure (see Figs. 1 and 2). The solenoid valve is one of a bank of similar valves, designated generally by reference numeral 154, the function of which will become clear as the description proceeds (see Fig. 3). The apparatus also is provided with a main control panel 156 which is mounted on the rear of the frame member 12 (see Fig. 2), and an operator panel 158 mounted on the front of the frame member 12 (see Fig. 1).

In Fig. 20, the sequence of steps involved in securing borderwires on a mattress innerspring with the apparatus of the present invention is schematically illustrated in block form. With the carriage 80 in its fully retracted position, an operator places a mattress innerspring and borderwires on the ledge or platform 26, on edge, in a substantially upright position. The angle of declination from vertical of the facing or skin 18 of the frame member 12 causes the mattress innerspring and the borderwires to rest against the facing or skin and prevents them from tipping in a direction which otherwise may shift their center of gravity beyond the outer edge of the ledge or platform 26. In order to assure proper alignment of the borderwires with relation to the coils along the margins of the mattress innerspring, the operator desirably initially manually wraps clips on all four corners of the stacked elements. After positioning the mattress innerspring and the borderwires on the apparatus, the operator then presses the start button on the operator panel 158. The carriage 80 advances the leading edge of the mattress innerspring and the borderwires to the stop means where they make contact with the retractable tip 144 of the air cyl-

inder 140 (see Fig. 16). The tip 144 retracts and the coil sensors 76,77 and 78 are enabled. The carriage 80 then advances the mattress innerspring and the borderwires into the clip wrapping station. When the coil sensors "see" a coil, the carriage 80 is momentarily stopped, and the clip wrapping tools 36-36 and the coil engaging members 54-54 are activated. After clips have been wrapped on the coils and the borderwires, the clip wrapping tools and the separators are deactivated. This sequence is repeated until clips have been wrapped along an entire edge of the mattress innerspring and the borderwires.

When the last clip has been wrapped, on the edge of the mattress innerspring and the borderwires supported on the ledge or platform 26, a limit switch or end-clip switch, designated by reference numeral 160, (see Fig.3) is activated and the coil sensors 76,77 and 78 are disabled. The carriage 80 advances the mattress innerspring and the borderwires to a limit switch 162 (see Fig. 3) which, when activated, reverses the grippers 32 positioned along the paddle-like member 28, and the air cylinder 30 for rotating the mattress innerspring and the borderwires. The paddle-like member 30 is then rotated through a 90o angle, and an unclipped edge of the mattress innerspring and the borderwires come to rest on the ledge or platform 26 (see Fig. 19). As illustrated in Figs. 1 and 2, four sensors 170,172,174 and 176 are positioned on the frame member 12. One, or more, depending upon the dimensions of the mattress innerspring and the borderwires, of these "height" sensors are activated by the mattress innerspring and the borderwires, of these "height" sensors are activated by the mattress innerspring and the borderwires as they are in the clip wrapping sequence. Energization of the sensors 170,172,174 and/or 176 activates the carriage 80, causing it to travel to a point along the ledge or platform 26 a sufficient distance to accommodate the next edge of the mattress innerspring and the borderwires to be wrapped with clips. The paddle-like member 28 then returns to its normal position, and the stop pin 144 is extended. The carriage 80 is again reactivated, and the clip wrapping sequence, and the rotation of the mattress innerspring and the borderwires by the paddle-like member 28 are repeated until clips have been wrapped on each side of all four edges of the mattress innerspring and the borderwires. When the clipping operation has been completed, the clipped unit is removed and transferred to storage for shipment.

In Fig. 21, an embodiment of a control system for the apparatus is schematically shown. The operator panel 158 has a start-cycle switch designated P.B. 1, a stop cycle switch, P.B. 2, and a recycle switch P.B. 3. Relays, designated C.R. 1, C.R. 2 and C.R. 3 are provided for intermittently stopping and starting the carriage 80, causing the carriage to move forward, and causing the carriage to reverse its direction of travel, respectively, Mechanical switches, in the form of limit switches identified as L.S. 1, L.S. 2, and L.S. 3 are provided for, respectively to disable the sensors 76,77 and 78; to reverse the travel of the carriage 80; to activate the grippers 32 on the paddle-like member 28; and the paddle-like member 28 itself; and to activate the retractable stop means 140. The fiber optic sensors 70,72 and 74, designated as F.O. 1, and F.O. 2 and F.O. 3, sense the side coils on a mattress innerspring and the end coils thereof, respectively. The bank of pneumatic solenoid valves 154 advantageously includes five members designated S.V. 1, S.V. 2, S.V. 3, S.V. 4 and S.V. 5. Valve S.V. 1 activates the clip wrapping tools 36-36. Valve S.V. 2 activates the coil engaging members 54-54. Valva S.V. 3 activates the paddle-like member 28. Valve S.V. 4 activates the stop means 140. Valva S.V. 5 restricts the speed at which the air cylinder 30 for the paddle-like member 28 is exhausted and thus has a cushioning effect. The switches, otherwise known as Reed switches, and designated R.S. 1, R.S. 2 and R.S. 3 act, respectively, to terminate the stroke of the air cylinder 30 for rotating the paddle-like member 28 thereby stopping rotation of the mattress innerspring and the borderwires, and deactivating the grippers 32; to restrict the exhaust of the forward stroke of the air cylinder 30; and to restrict the reverse stroke of said cylinder. The "height" sensors 170,172, 174 and 176 identified as P.E. 2, P.E. 3, P.E. 4 and P.E. 5 in Fig. 21, as stated above, are activated in accordance with the perimetric dimensions of the mattress innerspring and the borderwires, and cause the carriage 80 to travel a predetermined distance in reverse. The photoelectric eye 114, designated as P.E. 1, is a component of the safety feature provided on the carriage 80, which comprises the disc 130 and the non-contact sensor 134, identified as PROX. 1, serves to count the shaft rotations of the motor 94 for predetermining the proper travel in reverse of the carriage 80 to accommodate an unclipped edge of the mattress innerspring and the borderwires.

It should be understood that various modifications may be made in the embodiment of the invention illustrated and described in accordance with the appended claims.

Claims

1. Apparatus for securing borderwires (22, 24) on a mattress innerspring (20), comprising: mattress innerspring and borderwires support means (12, 18, 26, 28) on which a mattress

innerspring (20), having borderwires (22, 24) positioned in relation on opposite side thereof, is supported; clip wrapping means (36-36, 36a) positioned adjacent to said support means (12, 18, 26, 28) for wrapping clips on the borderwires (22, 24) and coils (20a) of the mattress innerspring (20) along an edge to secure the borderwires (22, 24) to the mattress innerspring (20); drive means for advancing the mattress innerspring (20) and the borderwires (22, 24) along the support means (12, 18, 26, 28) in the direction of the clip wrapping means (36-36, 36a); and control means for sequentially deactivating the drive means and activating the clip wrapping means (36-36, 36a) whereby the coils (20a) of the mattress innerspring (20) are successively secured to the borderwires (22, 24) along said edge thereof, **characterized in that** the support means (12, 18, 26, 28) is constructed such that the mattress innerspring (20), having borderwires (22, 24) positioned in opposed relation on opposite side thereof, is supported on said edge in a substantially upright position.

2. Apparatus according to claim 1, characterized in that means (30) is provided for turning the mattress innerspring (20) and the borderwires (22, 24) on the support means (12, 18, 26, 28) to present a different edge of the mattress innerspring (20) and the borderwires (22, 24) to the clip wrapping means (36-36, 36a).

3. Apparatus according to claim 1 and/or 2, characterized in that control means (162) is provided for sequentially turning the mattress innerspring (20) and the borderwires (22, 24) on the support means (12, 18, 26, 28) until clips have been wrapped along each edge of the mattress innerspring (20) and the borderwires (22, 24), and in that the clip wrapping means (36-36, 36a) is adjustable to enable said means (36-36, 36a) to accomodate mattress innerspring (20) of different thicknesses and construction.

4. Apparatus according to any of the claims 1 to 3, characterized in that mattress innerspring coil engaging means (54-54, 54a, 56, 58, 60) is provided along the support means (12, 18, 26, 28) for aligning the coils (20a) of the mattress innerspring (20) with the borderwires (22, 24) during activation of the clip wrapping means (36-36, 36a), and in that the drive means comprises a motor (94) operatively connected to a movable carriage (80) provided with gripper means (100; 120) for engaging the rear end of the mattress innerspring (20) and the borderwires (22, 24) supported on the edge on the support means (12, 18, 26, 28).

5. Apparatus according to any of the claims 1 to 4, characterized in that the drive means includes power driven carriage means (82, 84) mounted on the support means (12), and in that deactivating means is provided for controlling the travel of the drive means in response to any unprogrammed interruption of the movement of the mattress innerspring (20) and the borderwires (22, 24) in the direction of the clip wrapping means (36-36, 36a).

6. Apparatus according to claim 5, characterized in that the deactivating means comprises a photoelectric cell (114), and includes pivotally mounted reflector means (106) for deenergizing the photoelectric cell (114) when the movement of the drive means is interrupted by an unprogrammed event.

7. Apparatus according to any of the claims 2 to 6, characterized in that gripper means (28a, 28b, 32, 34) is provided for maintaining the mattress innerspring (20) and the borderwires (22, 24) on the support means (28) during turning.

8. Apparatus according to any of the claims 1 to 7, characterized in that sensor means (76, 77, 78) is provided for sequentially deactivating the drive means as the drive means advances the mattress innerspring (20) and the borderwires (22, 24) along the support means (12, 18, 26, 28), and for activating the clip wrapping means (36-36, 36a), and movement of the drive means in a direction away from the clip wrapping means (36-36, 36a).

9. Apparatus according to any of the claims 2 to 8, characterized in that air cylinder means (30) is provided for turning the mattress innerspring (20) and the borderwires (22, 24) on the support means (28), and in that sensor means (162) is provided for activating the air cylinder means (30), and in that clip supply means (42-42, 46-46) is connected to the clip wrapping means (36-36, 36a).

10. Apparatus according to any of the claims 1 to 9, characterized in that reciprocatable stop means (140, 144) is provided for engaging the lead end of the mattress innerspring (20) and the borderwires (22, 24) prior to activation of the clip wrapping means (36-36, 36a) to establish a reference point for the control means, and in that sensor means is provided for ac-

tivating the stop means, and in that control means includes switch means (160) for deactivating the drive means when clips have been wrapped along all edges of the mattress innerspring (20) and the borderwires (22, 24).

11. Apparatus according to any of the claims 1 to 10, characterized in that the support means (12, 18, 26, 28) comprises a frame member (12) having an upwardly extending portion for maintaining the mattress innerspring (20) and the borderwires (22, 24) in a substantially upright position an the support means (12, 18, 26, 28), and a guide portion (26) along which an edge of the mattress innerspring (20) and the borderwires (22, 24) are advanced by the drive means, and in that a segment (28) of the guide portion (26) is pivotally mounted with relation to the support means (12, 18, 26, 28), the upwardly extending portion of the frame member (12) is provided with a smooth surface (26) to enable the mattress innerspring (20) and the borderwires (22, 24) to be moved freely therealong.

12. Apparatus according to claim 11, characterized in that sensor means (170, 172, 174, 176) is associated with the upwardly extending portion of the frame member (12), the energization of the sensor means (170, 172, 174, 176) being dependent upon the perimetric dimensions of the mattress innerspring (20) and the borderwires (22, 24), and in that the upwardly extending portion and the guide portion (26) are adjustably mounted on the frame member (12), and in that the control means includes a plurality of pneumatic solenoid valves (154) in communication with a source (152) of air under pressure.

13. Apparatus according to any of the claims 1 to 12, characterized in that the support means (12, 18, 26, 28) is structured to enable it to be readily moved from one location to another in a work area, and is provided with casters (15) to facilitate movement thereof from one location to another in the work area, and in that the clip wrapping means (36-36, 36a) is mounted on the support means (12, 18, 26, 28) for reciprocatable movement with relation to the coils (20a) of the mattress innerspring (20).

14. Method of securing borderwires (22, 24) on coils (20a) of a mattress innerspring (20), comprising: providing support means (12, 18, 26, 28) for supporting the mattress innerspring (20) and the borderwires (22, 24); advancing the mattress innerspring (20) and the borderwires (22, 24) along the support means (12, 18, 26, 28) to a clip wrapping station positoned adjacent to the support means (12, 18, 26, 28); interrupting the advance of the mattress innerspring (20) and the borderwires (22, 24) at the clip wrapping station; simultaeously wrapping a plurality of clips on the borderwires (22, 24) and the coils (20a) of the mattress innerspring (20) along an edge thereof at the clip wrapping station; continuing the advance of the mattress innerspring (20) and the borderwires (22, 24) along the support means (12, 18, 26, 28) and the interruption thereof at the clip wrapping station until the borderwires (22, 24) are secured to the coils (20a) of the mattress innerspring (20) along the edge thereof, **characterized in** that providing support means (12, 18, 26, 28) for supporting the mattress innerspring (20) and the borderwires (22, 24) on the edge in a substantially upright position; advancing said edge of the mattress innerspring (20) and the borderwires (22, 24) along the support means (12, 18, 26, 28) to the clip wrapping station; continuing the advance of said edge of the mattress innerspring (20) and the borderwires (22, 24) along the support means (12, 18, 26, 28); and turning the mattress innerspring (20) and the borderwires (22, 24) while supported in a substantially upright position on the support means (12, 18, 26, 28) until the coils (20a) of the mattress innerspring (20) and the borderwires (22, 24) along each of the other edges thereof have been wrapped with clips at the clip wrapping station.

15. Method according to claim 14, caracterized in that the mattress innerspring (20) and the borderwires (22, 24) are turned through an angle of approximately 90° to position each edge thereof in clip wrapping relation to the clip wrapping station, and in that the mattress innerspring (20) and the borderwires (22, 24) are advanced along the support means (12, 18, 26, 28) at an angle less than normal to the vertical plane of the support means (12, 18, 26, 28).

Patentansprüche

1. Vorrichtung zur Befestigung von Rahmen (22, 24) an einem Federkern (20) einer Matratze, umfassend: eine Matratzenfederkern- und Rahmen-Abstützeinrichtung (12, 18, 26, 28), auf der ein Matratzenfederkern (20) abgestützt wird, welcher Rahmen (22, 24) aufweist, die einander auf gegenüberliegender Seite davon angeordnet sind; eine Klammerbefestigungseinrichtung (36-36, 36a), die zu der Abstützeinrichtung (12, 18, 26, 28) zur Befestigung von

Klammern an den Rahmen (22, 24) und Federn (20a) des Matratzenfederkerns (20) längs eines Randes angrenzend angeordnet ist, um die Rahmen (22, 24) an dem Matratzenfederkern (20) zu befestigen; eine Antriebseinrichtung zur Zuführung des Matratzenfederkerns (20) und der Rahmen (22, 24) entlang der Abstützeinrichtung (12, 18, 26, 28) in Richtung der Klammerbefestigungseinrichtung (36-36, 36a); und eine Steuereinrichtung zur fortlaufenden Deaktivierung der Antriebseinrichtung und Aktivierung der Klammerbefestigungseinrichtung (36-36, 36a), wobei die Federn (20a) des Matratzenfederkerns (20) an den Rahmen (22, 24) längs des Randes davon aufeinanderfolgend befestigt werden, **dadurch gekennzeichnet**, daß die Abstützeinrichtung (12, 18, 26, 28) derart ausgebildet ist, daß der Matratzenfederkern (20), der Rahmen (22, 24) aufweist, welche einander gegenseitig auf gegenüberliegender Seite davon angeordnet sind, an dem Rand in einer im wesentlichen aufrechten Stellung abgestützt wird.

2. Vorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß eine Einrichtung (30) zur Drehung des Matratzenfederkerns (20) und der Rahmen (22, 24) auf der Abstützeinrichtung (12, 18, 26, 28) Vorgesehen ist, um der Klammerbefestigungseinrichtung (36-36, 36a) einen anderen Rand des Matratzenfederkerns (20) und der Rahmen (22, 24) zuzuführen.

3. Vorrichtung nach Anspruch 1 und/oder 2, dadurch gekennzeichnet, daß eine Steuereinrichtung (162) zur fortlaufenden Drehung des Matratzenfederkerns (20) und der Rahmen (22, 24) auf der Abstützeinrichtung (12, 18, 26, 28), bis Klammern längs jeden Randes des Matratzenfederkerns (20) und der Rahmen (22, 24) befestigt worden sind, vorgesehen ist und daß die Klammerbefestigungseinrichtung (36-36, 36a) einstellbar ist, um die Einrichtung (36-36, 36a) an Matratzenfederkerne (20) unterschiedlicher Dicke und Ausgestaltung anzupassen.

4. Vorrichtung nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß eine Matratzenfederkern-Federineingriffnehmungseinrichtung (54-54, 54a, 56, 58, 60) entlang der Abstützeinrichtung (12, 18, 26, 28) zur Ausrichtung der Federn (20a) des Matratzenfederkerns (20) gegenüber den Rahmen (22, 24) während der Aktivierung der Klammerbefestigungseinrichtung (36-36, 36a) vorgesehen ist und daß die Antriebseinrichtung einen Motor (94) umfaßt, der mit einem bewegbaren Schlitten (80) in Wirkeingriff steht, welcher mit einer Greifereinrichtung (100; 120) zum Ineingriffnehmen des rückseitigen Endes des mit dem Rand auf der Abstützeinrichtung (12, 18, 26, 28) abgestützten Matratzenfederkerns (20) und der Rahmen (22, 24) versehen ist.

5. Vorrichtung nach einem der Ansprüche 1 bis 4, dadurch gekennzeichnet, daß die Antriebseinrichtung eine an der Abstützeinrichtung (12) angebrachte, motorisch betriebene Schlitteneinrichtung (82, 84) umfaßt und daß eine Deaktivierungseinrichtung zur Steuerung des Hubs der Antriebseinrichtung als Antwort auf jede unprogrammierte Bewegungsunterbrechung des Matratzenfederkerns (20) und der Rahmen (22, 24) in Richtung der Klammerbefestigungseinrichtung (36-36, 36a) vorgesehen ist.

6. Vorrichtung nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, daß die Deaktivierungseinrichtung eine photoelektrische Zelle (114) umfaßt und eine gelenkig angebrachte Reflektoreinrichtung (106) zur Entregung der photoelektrischen Zelle (114), wenn die Bewegung der Antriebseinrichtung von einem unprogrammierten Ereignis unterbrochen wird, aufweist.

7. Vorrichtung nach einem der Ansprüche 2 bis 6, dadurch gekennzeichnet, daß eine Greifereinrichtung (28a, 28b, 32, 34) zum Halten des Matratzenfederkerns (20) und der Rahmen (22, 24) auf der Abstützeinrichtung (12, 18, 26, 28) während der Drehung vorgesehen ist.

8. Vorrichtung nach einem der Ansprüche 1 bis 7, dadurch gekennzeichnet, daß eine Sensoreinrichtung (76, 77, 78) zur aufeinanderfolgenden Deaktivierung der Antriebseinrichtung, wenn die Antriebseinrichtung den Matratzenfederkern (20) und die Rahmen (22, 24) längs der Abstützeinrichtung (12, 18, 26, 28) vorwärts bewegt, und zur Aktivierung der Klammerbefestigungseinrichtung (36-36, 36a) sowie zur Bewegung der Antriebseinrichtung in einer Richtung weg von der Klammerbefestigungseinrichtung (36-36, 36a) vorgesehen ist.

9. Vorrichtung nach einem der Ansprüche 2 bis 8, dadurch gekennzeichnet, daß ein Luftzylinder (30) zur Drehung des Matratzenfederkerns (20) und der Rahmen (22, 24) auf der Abstützeinrichtung (28) vorgesehen ist, daß eine Sensoreinrichtung (162) zur Aktivierung des Luftzylinders (30) vorgesehen ist und daß eine Klammerzuführeinrichtung (42-42, 46-46) mit der Klammerbefestigungseinrichtung (36-36, 36a)

verbunden ist.

10. Vorrichtung nach einem der Ansprüche 1 bis 9, dadurch gekennzeichnet, daß eine hin- und herbewegbare Stoppeinrichtung (140, 144) zum Ineingriffnehmen des vorlaufenden Endes des Matratzenfederkerns (20) und der Rahmen (22, 24) vor der Aktivierung der Klammerbefestigungseinrichtung (36-36, 36a) vorgesehen ist, um einen Bezugspunkt für die Steuereinrichtung zu schaffen, daß eine Sensoreinrichtung zur Aktivierung der Stoppeinrichtung vorgesehen ist, und daß eine Steuereinrichtung einen Schalter (160) zur Deaktivierung der Antriebseinrichtung umfaßt, wenn Klammern längs sämtlicher Ränder des Matratzenfederkerns (20) und der Rahmen (22, 24) befestigt worden sind.

11. Vorrichtung nach einem der Ansprüche 1 bis 10, dadurch gekennzeichnet, daß die Abstützeinrichtung (12, 18, 26, 28) ein Rahmenelement (12) mit einem sich nach oben erstrekkenden Bereich zum Kalten des Matratzenfederkerns (20) und der Rahmen (22, 24) auf der Abstützeinrichtung (12, 18, 26, 28) in einer im wesentlichen aufrechten Stellung und einen Führungsbereich (26), längs welchem ein Rand des Matratzenfederkerns (20) und der Rahmen (22, 24) von der Antriebseinrichtung vorwärts bewegt werden, umfaßt und daß ein Abschnitt (28) des Führungsbereichs (26) in Bezug auf die Abstützeinrichtung (12, 18, 26, 28) gelenkig angebracht ist, wobei der sich nach oben erstreckende Bereich des Rahmenelements (12) mit einer glatten Oberfläche (26) versehen ist, um dem Matratzenfederkern (20) und den Rahmen (22, 24) zu ermöglichen, darauf entlang frei bewegt zu werden.

12. Vorrichtung nach Anspruch 11, dadurch gekennzeichnet, daß eine Sensoreinrichtung (170, 172, 174, 176) mit dem sich nach oben erstreckenden Bereich des Rahmenelements (12) verbunden ist, wobei die Erregung der Sensoreinrichtung (170, 172, 174, 176) von den Außenabmessungen des Matratzenfederkerns (20) und der Rahmen (22, 24) abhängig ist, daß der sich nach oben erstreckende Bereich und der Führungsbereich (26) an dem Rahmenelement (12) einstellbar angebracht sind, und daß die Steuereinrichtung eine Vielzahl von pneumatischen Magnetventilen (154) in Verbindung mit einer Luftdruckquelle (152) umfaßt.

13. Vorrichtung nach einem der Ansprüche 1 bis 12, dadurch gekennzeichnet, daß die Abstützeinrichtung (12, 18, 26, 28) ausgestaltet ist, um in der Lage zu sein, in einem Arbeitsraum schnell von einer Stelle zu einer anderen bewegt zu werden, sowie mit Fußrollen (15) versehen ist, um deren Bewegung von einer Stelle zu einer anderen in dem Arbeitsraum zu erleichtern, und daß die Klammerbefestigungseinrichtung (36-36, 36a) an der Abstützeinrichtung (12, 18, 26, 28) für eine hin- und hergehende Bewegung in Bezug auf die Federn (20a) des Matratzenfederkerns (20) montiert ist.

14. Verfahren zur Befestigung von Rahmen (22, 24) an Federn (20a) eines Matratzenfederkerns (20), umfassend: Bereitstellen einer Abstützeinrichtung (12, 18, 26, 28) zur Abstützung des Matratzenfederkerns (20) und der Rahmen (22, 24); Vorwärtsbewegen des Matratzenfederkerns (20) und der Rahmen (22, 24) entlang der Abstützeinrichtung (12, 18, 26, 28) hin zu einer Klammerbefestigungsstation, die zu der Abstützeinrichtung (12, 18, 26, 28) angrenzend angeordnet ist; Unterbrechen der Vorwärtsbewegung des Matratzenfederkerns (20) und der Rahmen (22, 24) an der Klammerbefestigungsstation; gleichzeitiges Befestigen einer Vielzahl von Klammern an den Rahmen (22, 24) und den Federn (20a) des Matratzenfederkerns (20) längs eines Randes davon in der Klammerbefestigungsstation; Fortsetzen der Vorwärtsbewegung des Matratzenfederkerns (20) und der Rahmen (22, 24) entlang der Abstützeinrichtung (12, 18, 26, 28) und die Unterbrechung davon in der Klammerbefestigungsstation bis die Rahmen (22, 24) an den Federn (20a) des Matratzenfederkerns (20) längs des Randes davon befestigt sind, **gekennzeichnet durch** Bereitstellen einer Abstützeinrichtung (12, 18, 26, 28) zur Abstützung des Matratzenfederkerns (20) und der Rahmen (22, 24) an dem Rand in einer im wesentlichen aufrechten Stellung; Vorwärtsbewegen des Randes des Matratzenfederkerns (20) und der Rahmen (22, 24) entlang der Abstützeinrichtung (12, 18, 26, 28) hin zu der Klammerbefestigungsstation; Fortsetzen der Vorwärtsbewegung des Randes des Matratzenfederkerns (20) und der Rahmen (22, 24) entlang der Abstützeinrichtung (12, 18, 26, 28) ; und Drehen des Matratzenfederkerns (20) und der Rahmen (22, 24), während diese in einer im wesentlichen aufrechten Stellung auf der Abstützeinrichtung (12, 18, 26, 28) abgestützt sind, bis die Federn (20a) des Matratzenfederkerns (20) und der Rahmen (22, 24) längs eines jeden der anderen Ränder davon mit Klammern in der Klammerbefestigungsstation versehen worden sind.

15. Verfahren nach Anspruch 14, dadurch gekennzeichnet, daß der Matratzenfederkern (20) und die Rahmen (22, 24) um einen Winkel von annähernd 90° gedreht werden, um jeden Rand davon in Klammerbefestigungsstellung zu der Klammerbefestigungsstation zu positionieren, und daß der Matratzenfederkern (20) und die Rahmen (22, 24) entlang der Abstützeinrichtung (12, 18, 26, 28) in einem Winkel kleiner als senkrecht zu der Vertikalebene der Abstützeinrichtung (12, 18, 26, 28) vorwärts bewegt werden.

Revendications

1. Appareil pour fixer des fils ou cadres de bordure (22,24) sur un ensemble de ressorts de matelas (20), Comportant : des moyens formant support (12, 18, 26, 28) pour l'ensemble de ressorts et les cadres sur lesquels un ensemble de ressorts de matelas (20), comportant des cadres (22, 24) positionnés par rapport à un côté opposé de ces derniers, est supporté : des moyens (36-36, 36a) pour poser des agrafes positionnés à côté desdits moyens formant supports (12, 18, 26, 28) pour poser des agrafes sur les cadres (22, 24) et les ressorts (20a) de l'ensemble de ressorts de matelas (20) selon un bord pour fixer les cadres (22, 24) à l'ensemble de ressorts de matelas (20) ; des moyens d'entraînement pour faire avancer l'ensemble de ressorts de matelas (20) et les cadres (22, 24) le long des moyens formant support (12, 18, 26, 28) dans la direction des moyens de pose d'agrafes (36-36, 36a) ; et des moyens de commande pour rendre inopérants de façon séquentielle les moyens d'entraînement et pour actionner les moyens de pose d'agrafes (36-36, 36a) de sorte que les ressorts (20a) de l'ensemble de ressorts de matelas (20) sont fixés successivement aux cadres (22, 24) selon les bords de ceux-ci, caractérisé en ce que les moyens formant support (12, 18, 26, 28) sont construits de telle sorte que l'ensemble de ressorts de matelas (20) comportant des cadres (22, 24), positionné en relation opposée sur son côté opposé, est supporté sur ledit côté dans une position sensiblement verticale.

2. Appareil selon la revendication 1, caractérisé en ce qu'un moyen (30) est prévu pour faire tourner l'ensemble de ressorts de matelas (20) et les cadres (22, 24) sur les moyens formant support (12, 18, 26, 28) pour présenter un autre bord de l'ensemble des ressorts de matelas (20) et des cadres (22, 24) aux moyens (36-36, 36a) de pose d'agrafes.

3. Appareil selon la revendication 1 et/ou 2, caractérisé en ce qu'un moyen de commande (162) est prévu pour faire tourner de façon séquentielle l'ensemble de ressorts de matelas (20) et les cadres (22, 24) sur les moyens formant support (12, 18, 26, 28) jusqu'à ce que les agrafes aient été posées selon chaque bord de l'ensemble de ressorts de matelas (20) et les cadres (22, 24), et en ce que les moyens de pose d'agrafes (36-36, 36a) peuvent être ajustés de façon à permettre à ces moyens (36-36, 36a) de s'adapter à un ensemble de ressorts de matelas (20) ayant des épaisseurs et une construction différentes.

4. Appareil selon l'une quelconque des revendications 1 à 3, caractérisé en ce que des moyens (54-54, 54a, 56, 58, 60) sont prévus pour coopérer avec les ressorts de l'ensemble du matelas le long des moyens formant support (12, 18, 26, 28) pour aligner les ressorts de l'ensemble (20) avec les cadres (22, 24) au cours de l'actionnement des moyens de pose d'agrafes (36-36, 36a) et en ce que les moyens d'entraînement comportent un moteur (94) qui est relié opérativement à un chariot mobile (80) prévu avec des moyens de préhension (100 : 120) pour coopérer avec la partie arrière de l'ensemble des ressorts de matelas (20) et les cadres (22, 24) supportés sur le bord des moyens formant support (12, 18, 26, 28).

5. Appareil selon l'une quelconque des revendications 1 à 4, caractérisé en ce que les moyens d'entraînement comportent un chariot (82, 84) entraîné par un moteur monté sur le support (12) et en ce que des moyens rendant inopérants sont prévus pour commander le déplacement des moyens d'entraînement en réponse à toute interruption non programmée du mouvement de l'ensemble de ressorts de matelas (20) et des cadres (22, 24) vers les moyens de pose d'agrafes (36-36, 36a).

6. Appareil selon la revendication 5, caractérisé en ce que les moyens qui rendent inopérants comprennent une cellule photoélectrique (114) et comportent des moyens formant réflecteur montés en pivotement (106) pour désexciter la cellule photoélectrique (114) lorsque le mouvement des moyens d'entraînement est interrompu par un événement non programmé.

7. Appareil selon l'une quelconque des revendications 2 à 6, caractérisé en ce que lesdits moyens de préhension (28a, 28b, 32, 34) sont prévus pour tenir l'ensemble de ressorts de

matelas (20) et les cadres (22, 24) sur le moyen formant support (28) au cours d'un retournement.

8. Appareil selon l'une quelconque des revendications 1 à 7, caractérisé en ce que des moyens formant capteur (76, 77, 78) sont prévus pour rendre inopérants de façon séquentielle les moyens d'entraînement lorsque les moyens d'entraînement font avancer l'ensemble de ressorts de matelas (20) et les cadres (22, 24) le long des moyens formant support (12, 18, 26, 28) et pour actionner les moyens de pose d'agrafes (36-36, 36a) et le mouvement des moyens d'entraînement dans un sens qui les éloigne par rapport aux moyens de pose d'agrafes (36-36, 36a).

9. Appareil selon l'une quelconque des revendications 2 à 8, caractérisé en ce que des moyens formant vérins à air comprimé (36) sont prévus pour retourner l'ensemble de ressorts du matelas (20) et les cadres (22,24) sur les moyens formant support (28) et en ce que des moyens formant capteurs (162) sont prévus pour actionner les moyens formant vérins à air comprimé (30) et en ce que des moyens formant alimentation en agrafes (42-42, 46-46) sont connectés aux moyens de pose d'agrafes (36-36, 36a).

10. Appareil selon l'une quelconque des revendications 1 à 9, caractérisé en ce que des moyens d'arrêt susceptibles de se déplacer alternativement (140, 144) sont prévus pour coopérer avec l'extrémité menante de l'ensemble de ressorts de matelas (20) et les cadres (22, 24) avant l'actionnement des moyens de pose d'agrafes (36-36, 36a) pour établir un point de référence pour le moyen de commande, et en ce que des moyens formant capteurs sont prévus pour actionner les moyens formant arrêt, et en ce que le moyen de commande comporte un commutateur (160) pour rendre inopérants les moyens d'entraînement lorsque les agrafes ont été posées le long de toutes les bordures de l'ensemble de ressorts de matelas (20) et les cadres (22, 24).

11. Appareil selon l'une quelconque des revendications 1 à 10, caractérisé en ce que les moyens formant support (12, 18, 26, 28) comportent un élément formant châssis (12) ayant une partie s'étendant vers le haut pour maintenir l'ensemble de ressorts de matelas (20) et les cadres (22, 24) dans une position sensiblement verticale des moyens formant support (12, 18, 26, 28) et une partie de guidage (26) selon laquelle un bord de l'ensemble de ressorts de matelas (20) et les cadres (22, 24) progressent au moyen des moyens d'entraînement et en ce qu'un segment (28) de la partie de guidage (26) est monté pivotant en relation avec les moyens formant support (12, 18, 26, 28), la partie s'étendant vers le haut de l'élément formant châssis (12) ayant une surface lisse (26) pour permettre à l'ensemble de ressorts de matelas (20) et aux cadres (22, 24) de se déplacer librement le long de celle-ci.

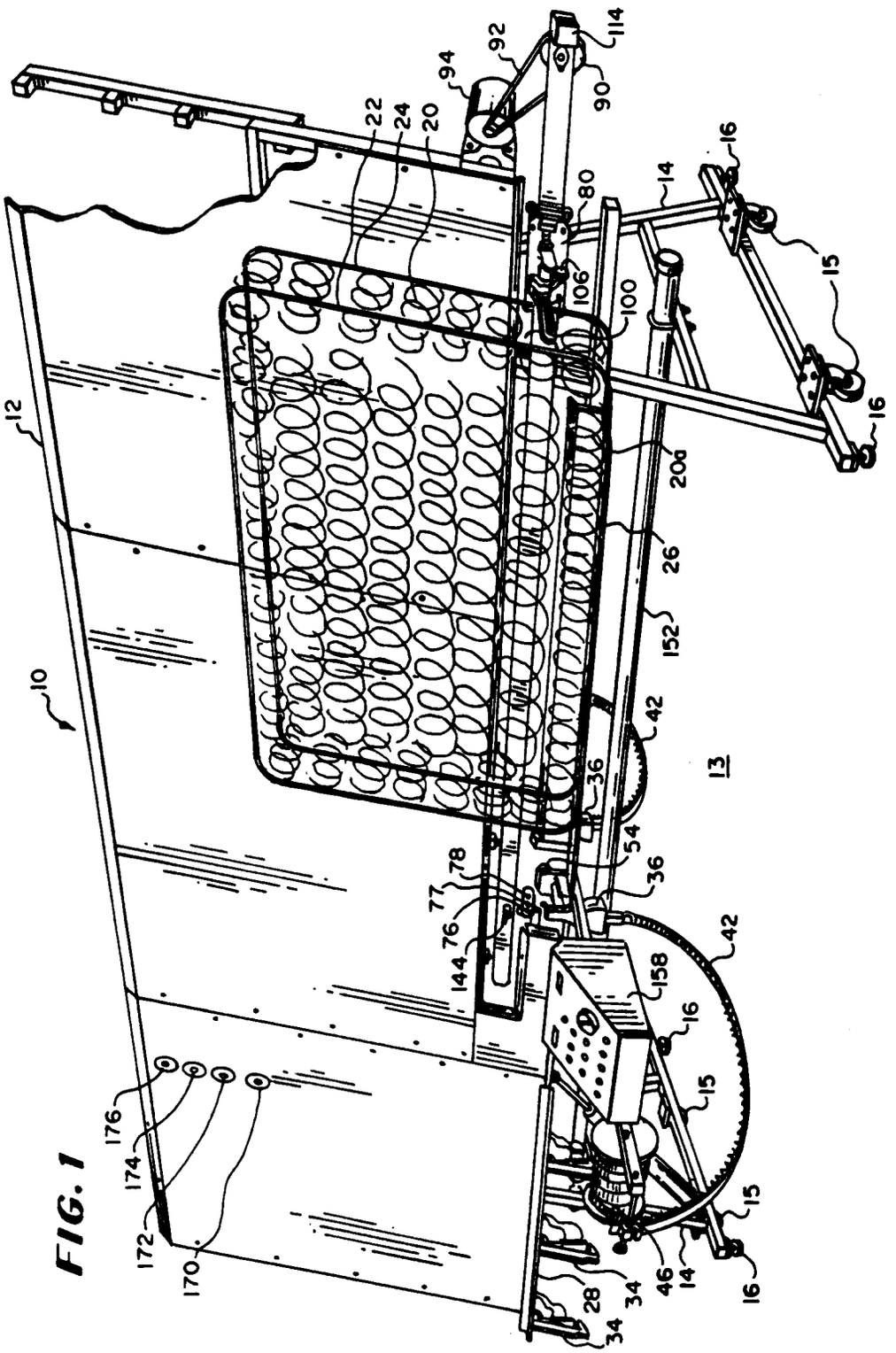
12. Appareil selon la revendication 11, caractérisé en ce que les moyens formant capteurs (170, 172, 174, 176) sont associés avec la partie s'étendant vers le haut de l'élément formant châssis (12), l'excitation des moyens capteurs (170, 172, 174, 176) dépendant des dimensions périmétriques de l'ensemble de ressorts de matelas (20) et des cadres (22, 24), et en ce que la partie s'étendant vers le haut et la partie de guidage (26) sont montées de façon réglable sur le châssis (12), et en ce que le moyen de commande comporte un ensemble de valves pneumatiques à solénoïde (154) en communication avec une source (152) d'air comprimé.

13. Appareil selon l'une quelconque des revendications 1 à 12, caractérisé en ce que les moyens formant support (12, 18, 26, 28) sont structurés de façon à permettre un déplacement facile d'un emplacement à un autre sur une surface de travail et comportent des roulettes (15) pour faciliter leur mouvement d'un emplacement à un autre sur la surface de travail, et en ce que les moyens de pose d'agrafes (36-36, 36a) sont montés sur les moyens formant support (12, 18, 26, 28) en vue d'un mouvement alternatif en relation avec les ressorts (20a) de l'ensemble de ressorts de matelas (20).

14. Procédé pour fixer des cadres (22, 24) sur les ressorts (20a) d'un ensemble de ressorts de matelas (20), qui consiste dans le fait : de prévoir des moyens formant support (12, 18, 26, 28) pour supporter l'ensemble de ressorts de matelas et les cadres (22, 24), de faire avancer l'ensemble de ressorts de matelas (20) et les cadres (22, 24) le long de moyens formant support (12, 18, 26, 28) vers une station de pose d'agrafes positionnée à côté des moyens formant support (12, 18, 26, 28) : d'interrompre la progression de l'ensemble de ressorts de matelas (20) et des cadres (22, 24) à l'emplacement de la station de pose d'agrafes : de réaliser l'agrafage simultané d'un en-

semble d'agrafes sur les cadres (22, 24) et les ressorts (20a) de l'ensemble de ressorts de matelas (20) selon un bord de celui-ci à l'emplacement de la station de pose d'agrafes ; de continuer la progression de l'ensemble de ressorts de matelas (20) et des cadres (22, 24) le long des moyens formant support (12, 18, 26, 28) et l'interruption de celle-ci à l'emplacement de la station de pose d'agrafes jusqu'à ce que les cadres (22, 24) soient fixés sur les ressorts (20a) de l'ensemble de ressorts de matelas (20) selon le bord de celui-ci, caractérisé en ce que les moyens de support (12, 18, 26, 28) prévus pour supporter l'ensemble de ressorts de matelas (20) et les cadres (22, 24) sur le bord correspondant sont prévus en position sensiblement verticale ; on fait avancer ledit bord de l'ensemble de ressorts de matelas (20) et les cadres (22, 24) selon les moyens formant support (12, 18, 26, 28) vers la station de pose d'agrafes ; on poursuit la progression dudit bord de l'ensemble de ressorts de matelas (20) et les cadres (22, 24) le long des moyens formant support (12, 18, 26, 28) et on fait tourner l'ensemble de ressorts de matelas (20) et les cadres (22, 24) alors qu'ils sont supportés dans une position sensiblement verticale sur les moyens formant support (12, 18, 26, 28) jusqu'à ce que les ressorts (20a) de l'ensemble de ressorts de matelas (20) et les cadres (22, 24) selon chacun de leurs autres bords aient été saisis par des agrafes à l'emplacement de la station de pose d'agrafes.

15. Procédé selon la revendication 14, caractérisé en ce que l'ensemble de ressorts de matelas (20) et les cadres (22, 24) sont tournés d'un angle d'environ 90° pour positionner chaque bord correspondant dans une relation permettant l'agrafage à l'emplacement de la station de pose d'agrafes et en ce que l'ensemble de ressorts de matelas (20) et les cadres (22, 24) progressent selon les moyens formant support (12, 18, 26, 28) selon un angle inférieur à la normale vers le plan vertical des moyens formant support (12, 18, 26, 28).


10
12
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14
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16
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24
26
28
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36
42
46
54
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92
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114
144
152
158
170
172
174
176
200

FIG. 1

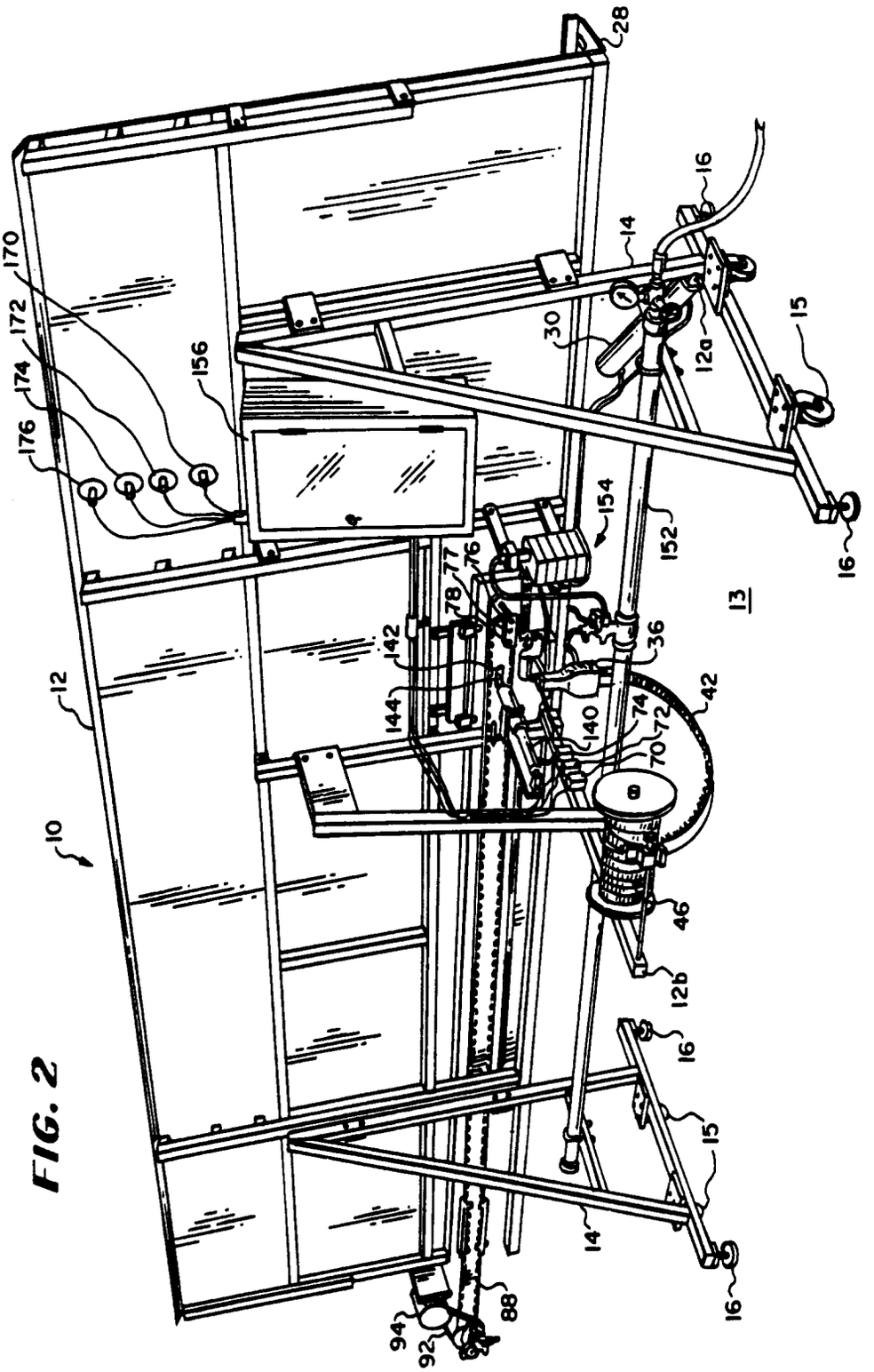

28
16
14
170
172
174
176
156
30
12a
15
154
152
16
13
78
77
76
142
36
144
140
74
72
42
12
10
70
46
12b
16
15
14
16
88
94
92

FIG. 2

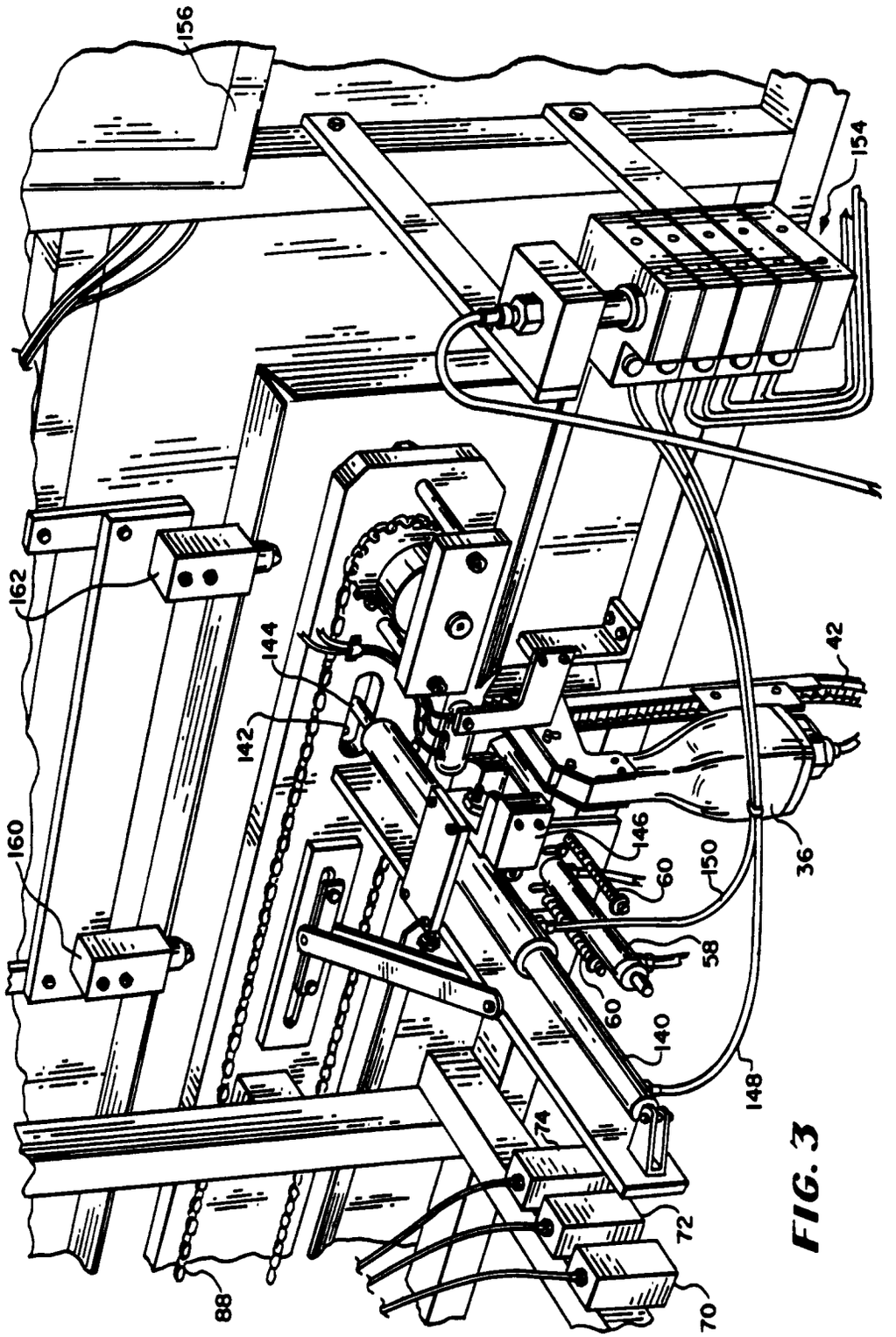


FIG. 3

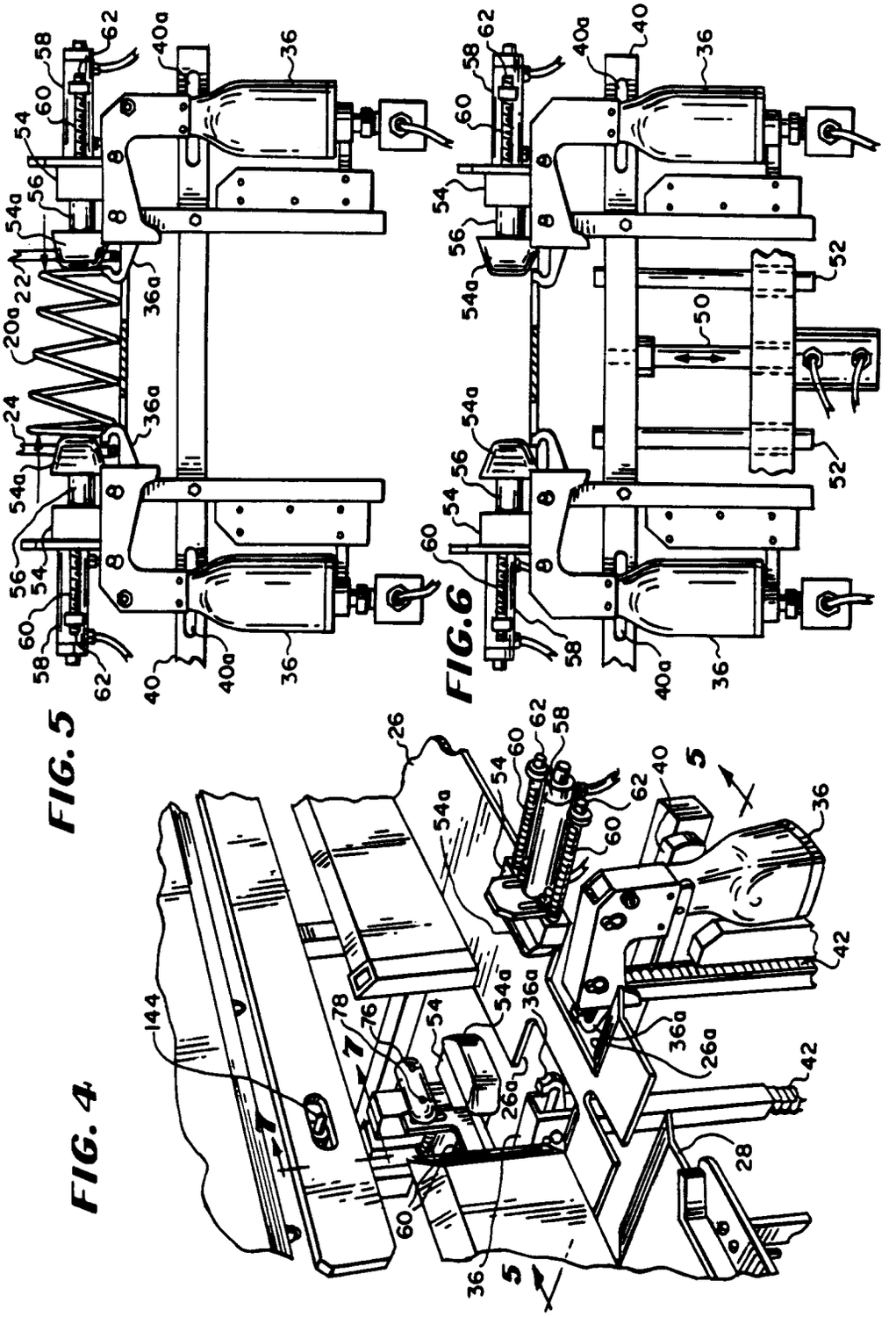


FIG. 4

FIG. 5

FIG. 6

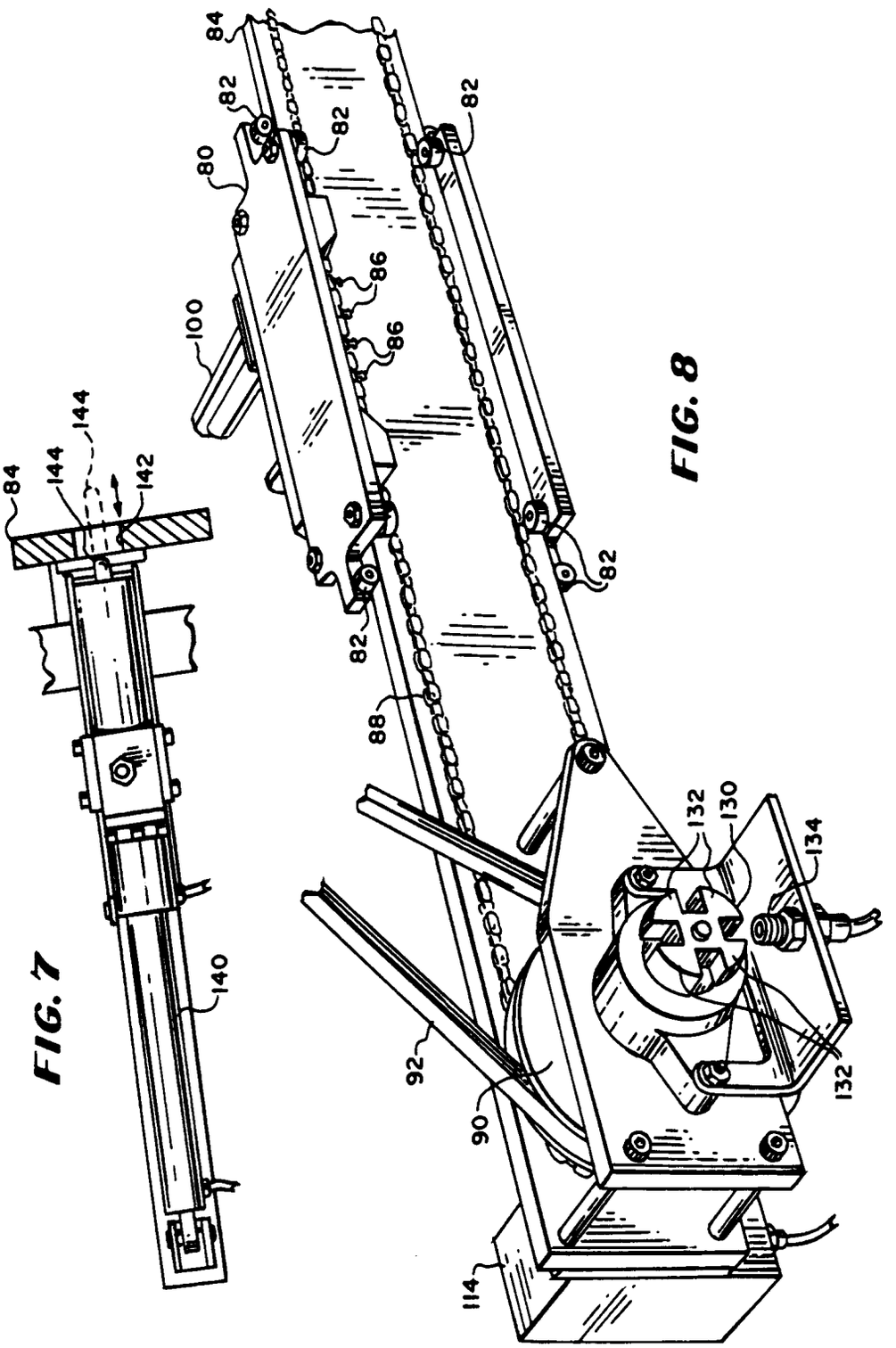

84
144
144
142
140

FIG. 7

84
82
82
82
80
86
86
100
82
82
88
132
130
134
92
90
132
114

FIG. 8

FIG. 9

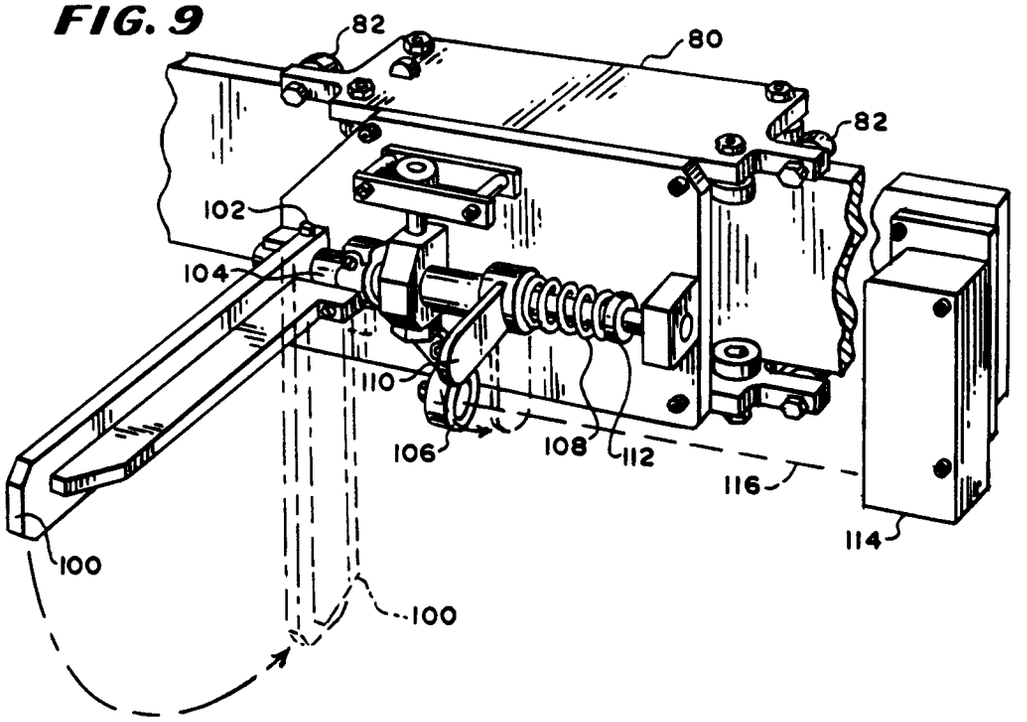
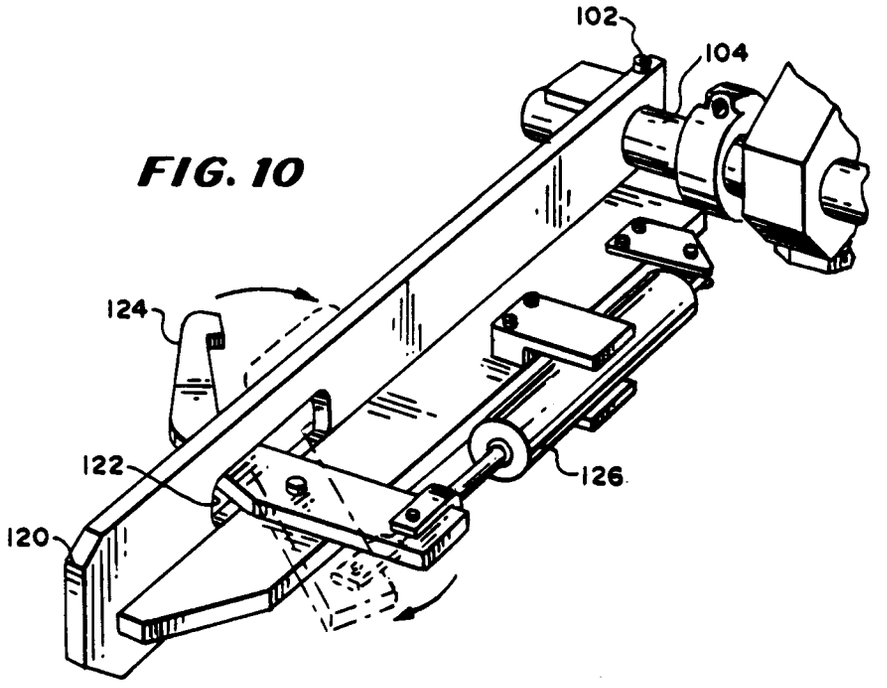

82
80
82
102
104
110
106
108
112
116
114
100
100

FIG. 10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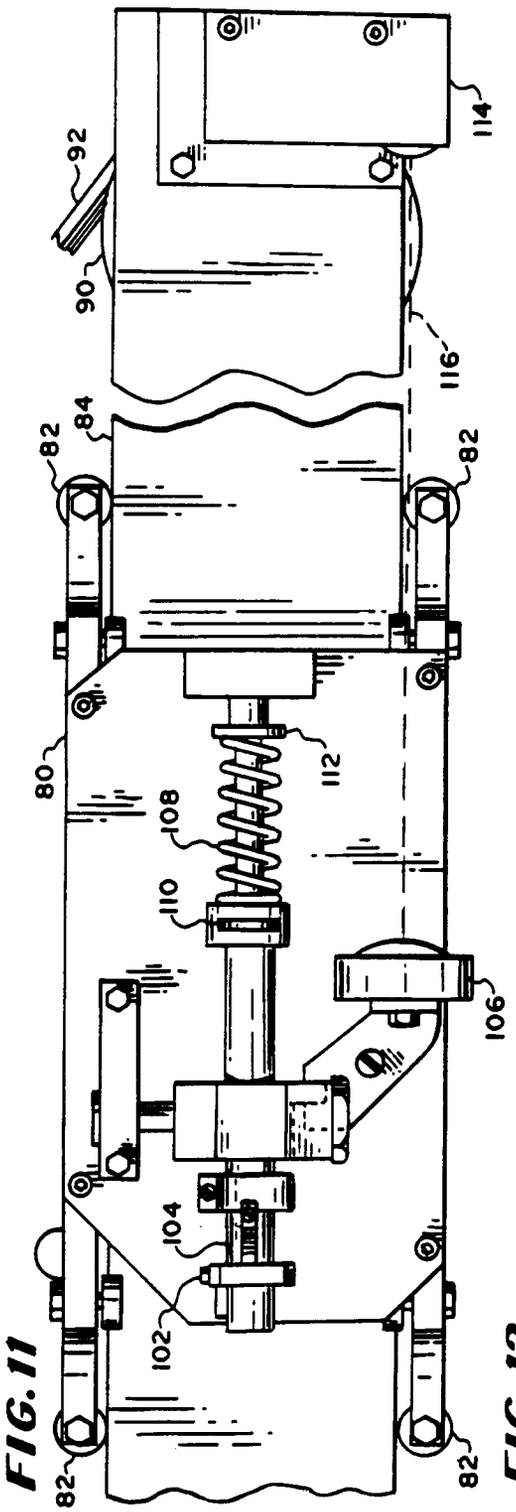
104
124
122
126
120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90
114
116
84
82
80
112
108
110
106
104
102

FIG. 11

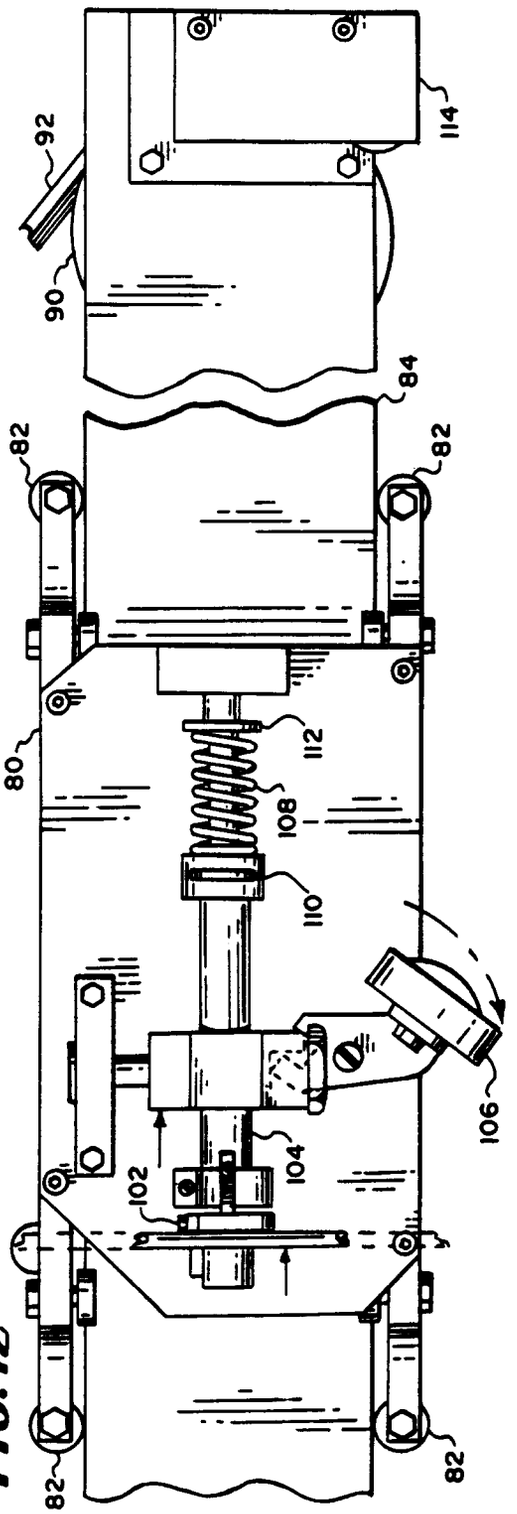

92
90
114
84
82
80
112
108
110
106
104
102

FIG. 12

FIG. 13

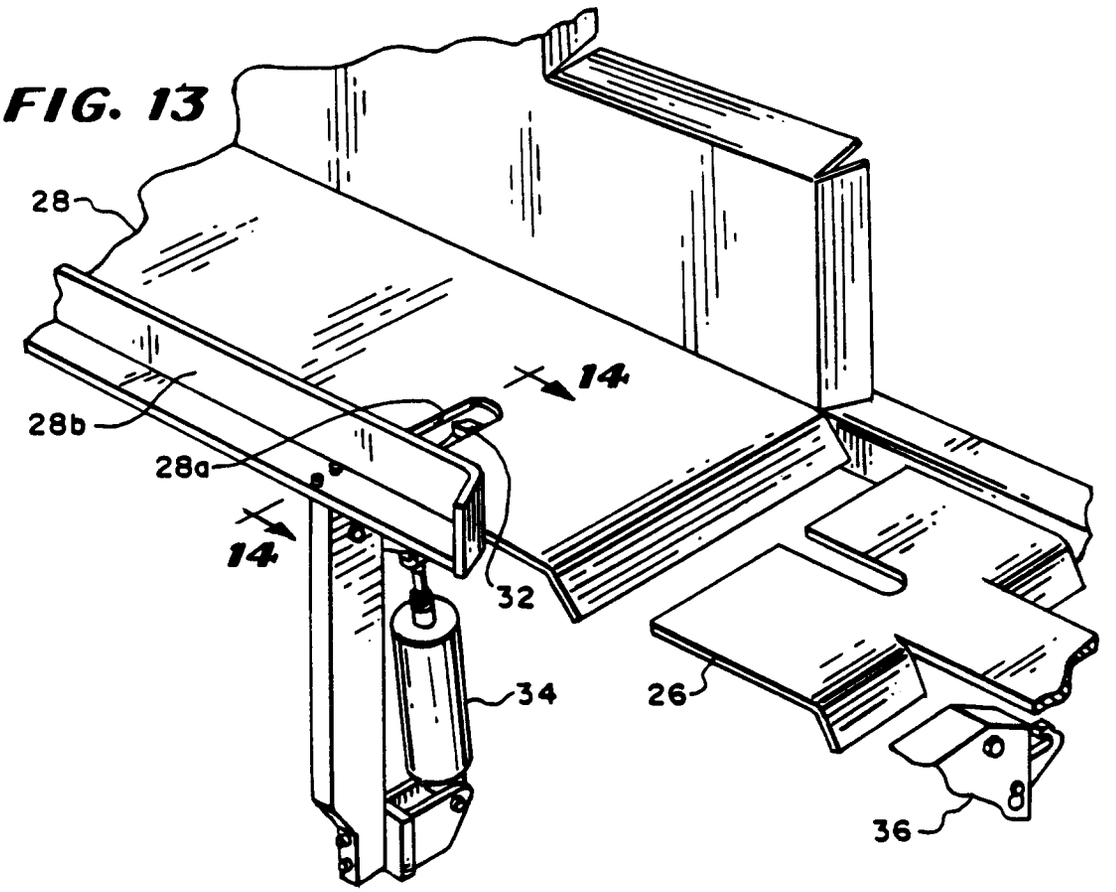


FIG. 14

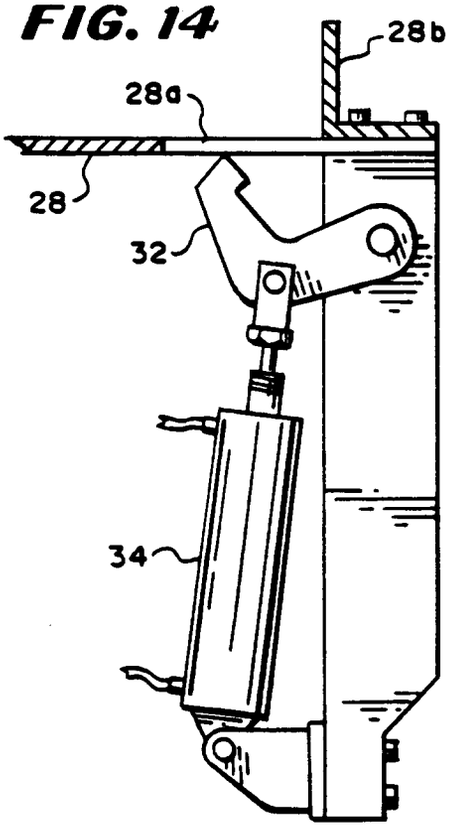
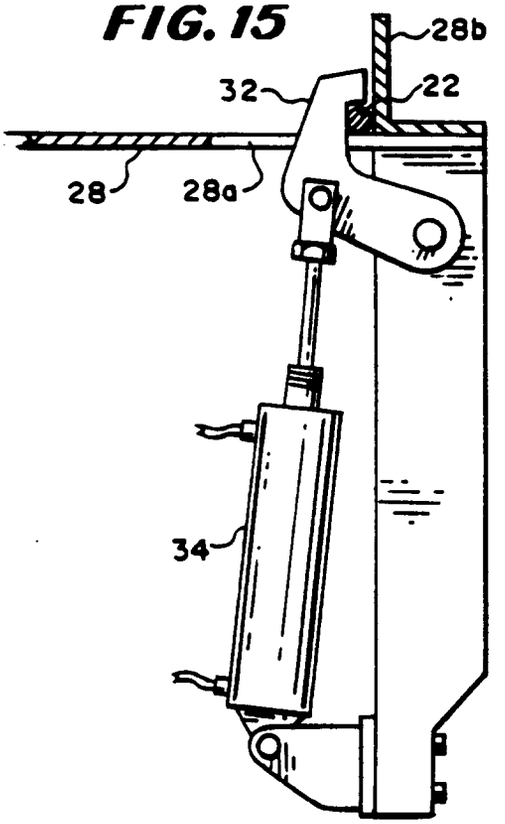
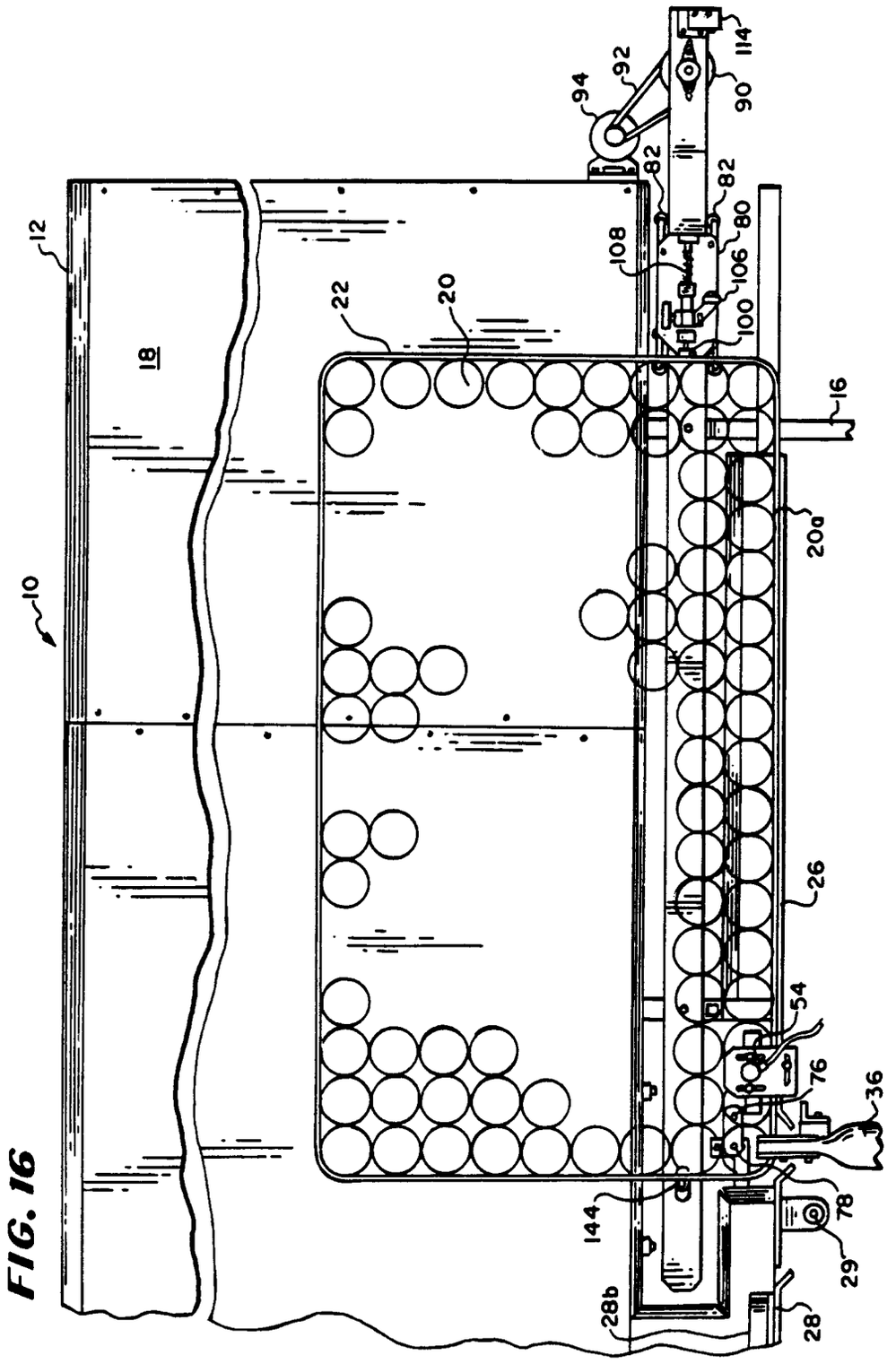


FIG. 15




12
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22
20
108
82
82
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100
94
92
114
90
16
20a
26
54
76
36
78
144
29
28b
28

FIG. 16

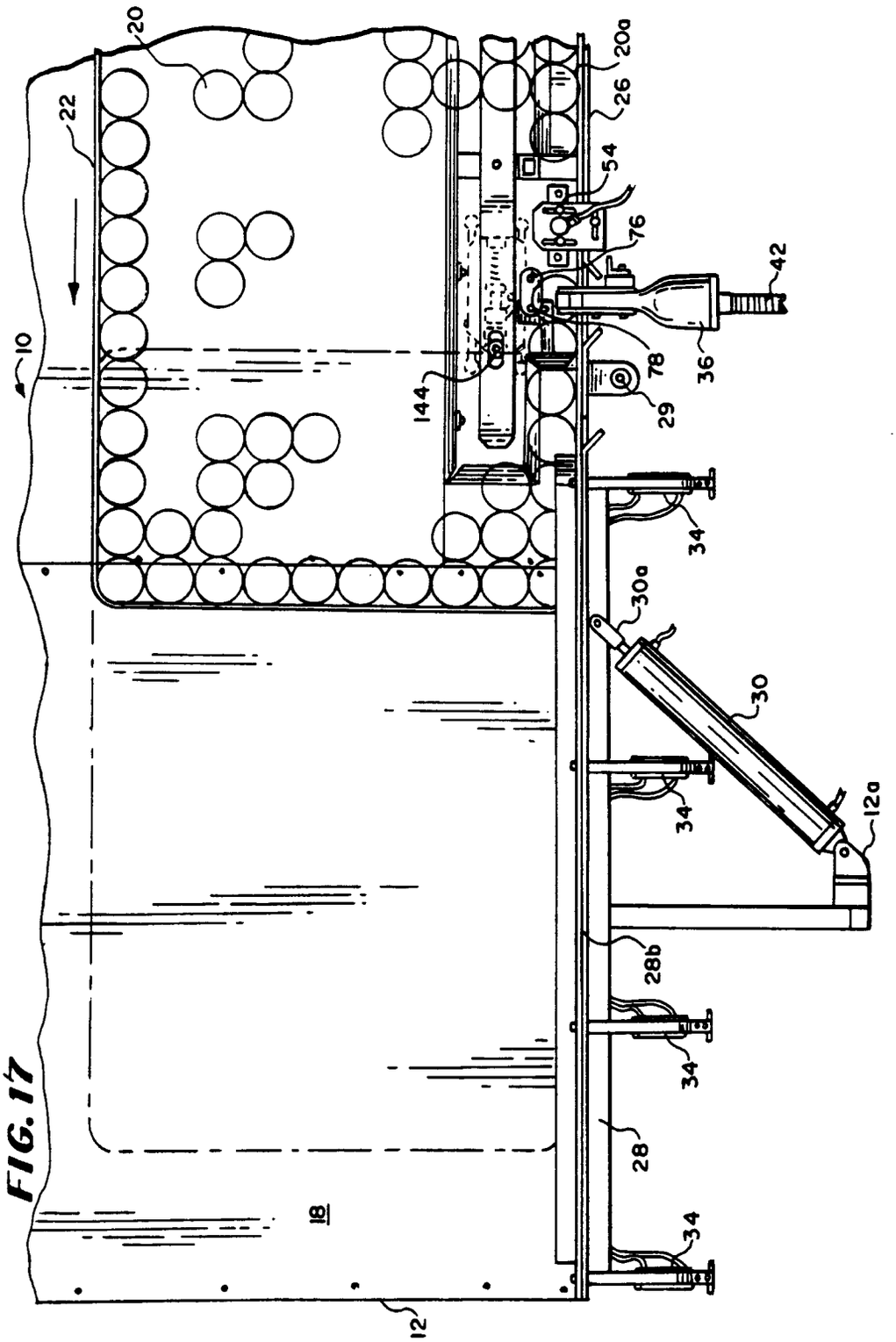
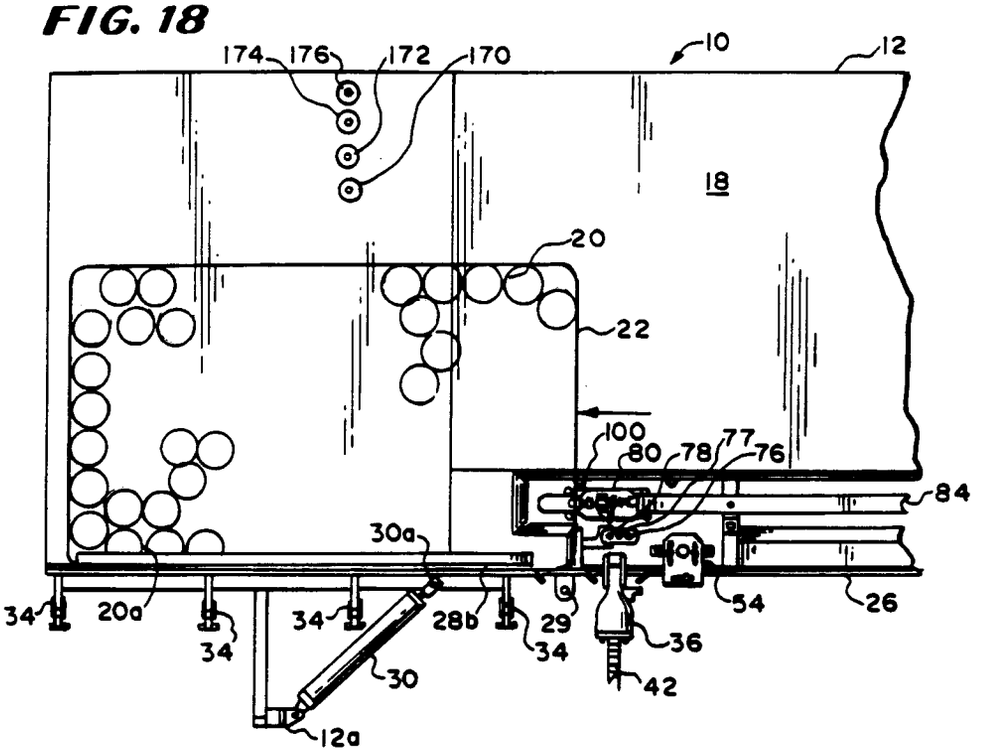


FIG. 17

FIG. 18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100
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76
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30a
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20a
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28b
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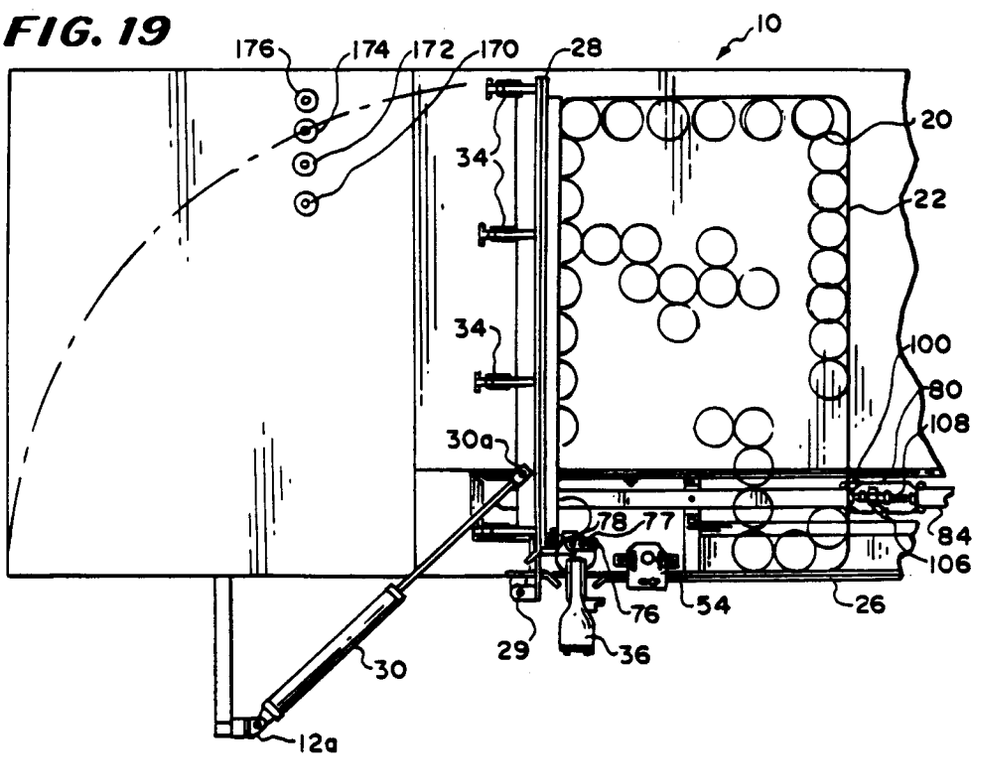
36
54
26
30
42
12a

FIG. 19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174
172
170
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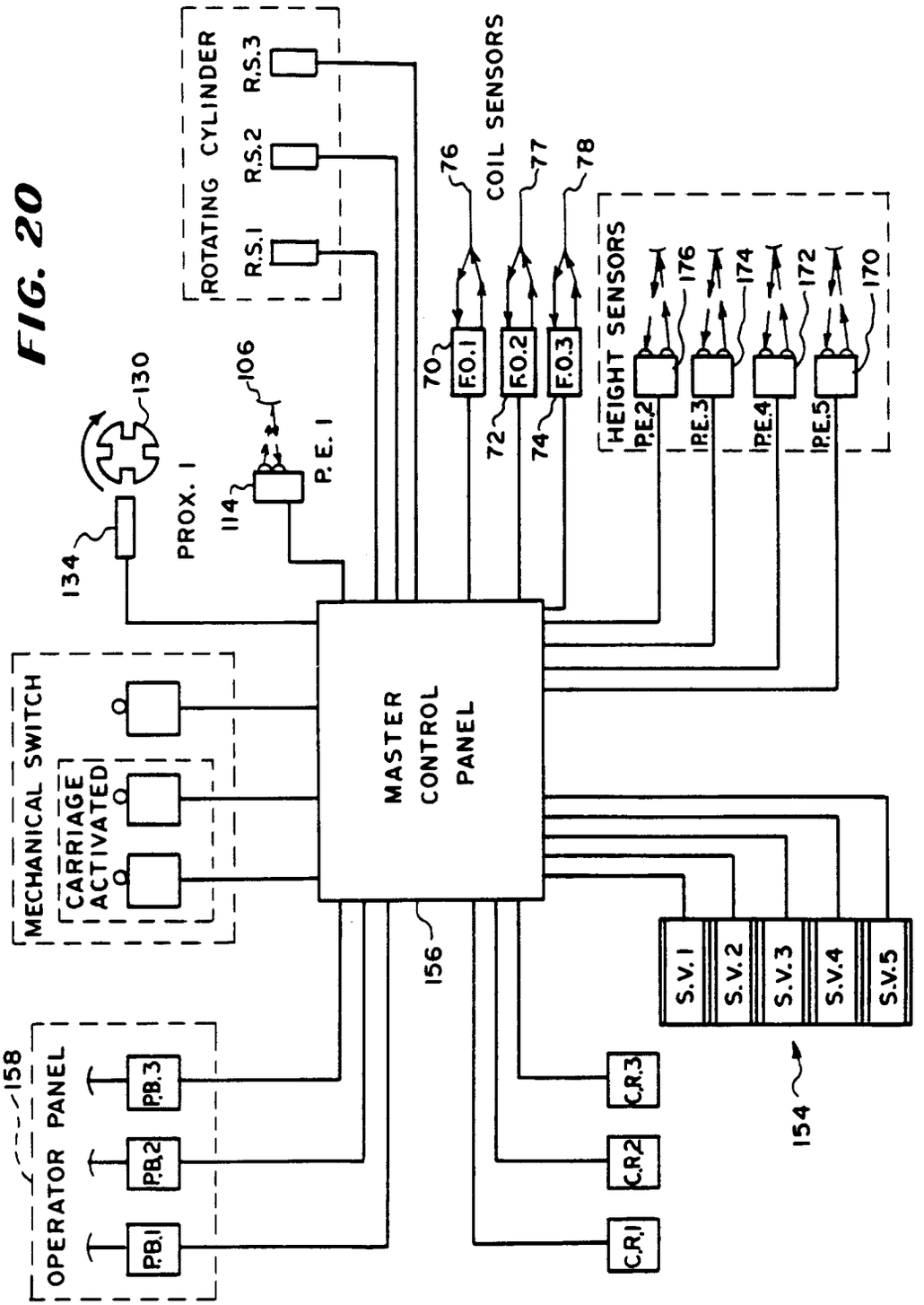
12a

FIG. 20


ROTATING CYLINDER
R.S.1
R.S.2
R.S.3
COIL SENSORS
76
77
78
70
72
74
F.O.1
F.O.2
F.O.3
HEIGHT SENSORS
P.E.2
P.E.3
P.E.4
P.E.5
176
174
172
170
106
130
PROX. 1
P.E. 1
114
134
MECHANICAL SWITCH
CARRIAGE ACTIVATED
MASTER CONTROL PANEL
156
158
OPERATOR PANEL
P.B.1
P.B.2
P.B.3
C.R.1
C.R.2
C.R.3
S.V.1
S.V.2
S.V.3
S.V.4
S.V.5
154

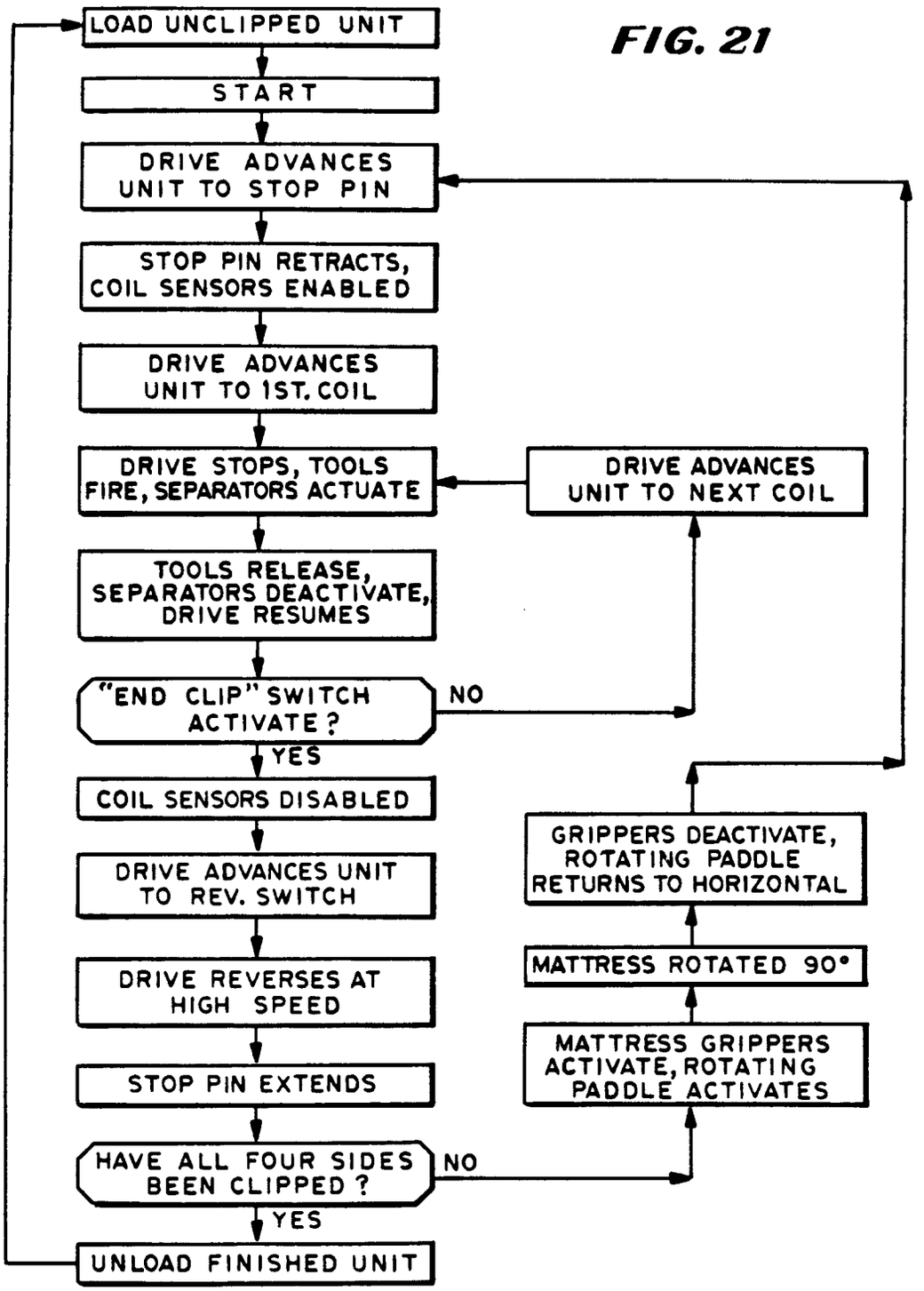

LOAD UNCLIPPED UNIT
START
DRIVE ADVANCES UNIT TO STOP PIN
STOP PIN RETRACTS, COIL SENSORS ENABLED
DRIVE ADVANCES UNIT TO 1ST. COIL
DRIVE STOPS, TOOLS FIRE, SEPARATORS ACTUATE
DRIVE ADVANCES UNIT TO NEXT COIL
TOOLS RELEASE, SEPARATORS DEACTIVATE, DRIVE RESUMES
"END CLIP" SWITCH ACTIVATE ?
NO
YES
COIL SENSORS DISABLED
DRIVE ADVANCES UNIT TO REV. SWITCH
DRIVE REVERSES AT HIGH SPEED
STOP PIN EXTENDS
HAVE ALL FOUR SIDES BEEN CLIPPED ?
NO
YES
UNLOAD FINISHED UNIT
GRIPPERS DEACTIVATE, ROTATING PADDLE RETURNS TO HORIZONTAL
MATTRESS ROTATED 90°
MATTRESS GRIPPERS ACTIVATE, ROTATING PADDLE ACTIVATES

FIG. 21