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D. MICON

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MATTRESS TUFTING MACHINE

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Fig. 1.

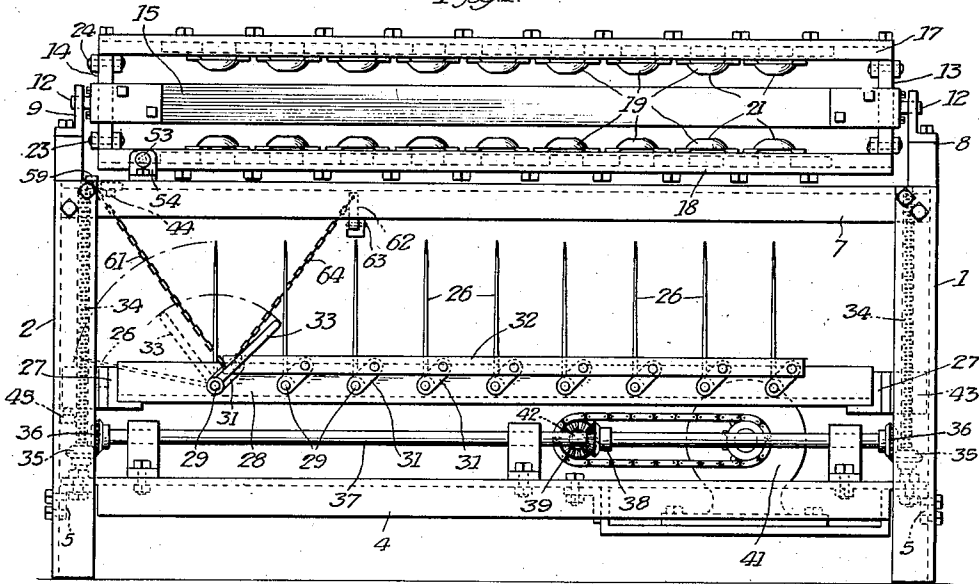


Fig. 3.

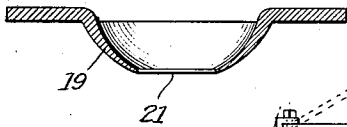
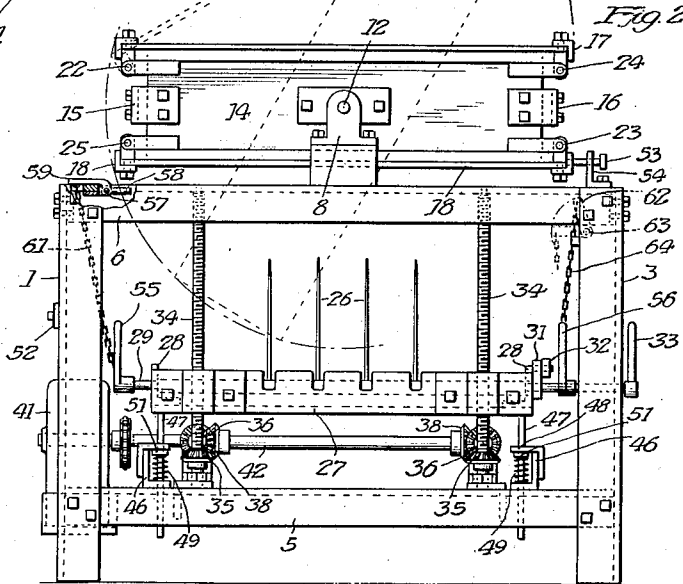


Fig. 2.



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MATTRESS TUFTING MACHINE

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6 Claims. (Cl. 112-3)

This invention pertains to improvements in apparatus for facilitating the tying of mattresses.

Heretofore mattresses have been tied for the most part entirely by hand. That is, it has been
 5 common practice for one or more operators to insert the tying or tufting elements at each tying position manually by means of a suitable long needle. Not only were such manual tying operations tedious and uneconomical but the operators
 10 have had difficulty in making the compression of the mattress uniform at all of the individual tying positions. This lack of uniformity has the disadvantage of placing extra strain upon some of the tying elements and insufficient strain upon
 15 others with detrimental effects upon maintaining of the mattress in good condition when in use. By means of this invention the tying of the mattresses is assured of uniformity at all positions and is accomplished with greater facility
 20 and at less expense. The various objects and advantages of this invention will become apparent from a perusal of the specification.

In the drawing:

Fig. 1 represents a side elevation of a mattress
 25 tying machine made in accordance with this invention,

Fig. 2 is an end elevation of the same machine, and

Fig. 3 is an enlarged cross-sectional view of
 30 one of the compression elements used in the mattress holder.

Referring now in detail to the drawing, it is observed that the frame includes four posts such as the post 1, 2 and 3, and another post, not
 35 shown, at the four corners of the frame. These posts are suitably connected by horizontal frame members 4, 5, 6 and 7, and similar connecting members not appearing in the drawing. All of these posts and members may be connected by
 40 bolts or may be welded in a manner which should at once be obvious. Mounted on the frame at the top thereof at each end are the brackets 8 and 9 which afford a support for the pivot pins 12, which serve to pivotally connect the mattress
 45 holder to the frame.

The mattress holder consists of end members 13 and 14 suitably fastened to opposing side members 15 and 16.

At the top of the holder is provided a closure
 50 member generally indicated as at 17 and at the bottom a similar closure member 18 each of which carries a plurality of cup-shaped compression members 19 one of which is shown in cross-section in Fig. 3. There will be placed on each
 55 closure member a compression member 19 op-

posite each point where the mattress is to be tied through by a tying or tufting element.

The convex shape and curvature shown in Fig. 3 for the cup-shaped compression members is intended to enable compression of the mattress
 60 material without shearing or breaking the fibers therein as might occur if a sharp cornered element were employed.

As shown in Fig. 1, these compression members are convexed inwardly toward the mattress and
 65 each is provided with a central aperture 21 through which the tying needles may pass. The closure members are each pivoted along one side thereof in any suitable manner as, for example,
 70 at 22 and at 23, and when closed may be locked in position by the use of locking pins 24 and 25. It should be understood that other devices for locking these closed members on the holders may be employed in place of the pins 24 and 25, simple
 75 locking devices being shown merely to illustrate the invention. As indicated in Fig. 2, the mattress holder may be rotated about a horizontal axis which passes through the pivot pins 12, the holder being shown in dash lines partially rotated in Fig. 2. This same figure shows that the closure
 80 members may be rotated about their pivots, as for example when a mattress is being inserted in the holder or is being removed therefrom.

In accordance with this invention it is provided that the mattress be pierced at all tying positions
 85 simultaneously by a plurality of needles, one or more being provided at each tying position. The drawing shows but one needle at each tying position, but it should be understood that a pair of needles may also be employed at each position,
 90 each pair being spaced perhaps about three-fourths of an inch apart so that instead of using a single cord passing through the mattress at each tying position, a pair of cords or a looped tape
 95 may be used.

These needles such as the needles 26 are mounted on a rack of rectangular shape comprising a pair of end members such as the end member 27 and a pair of side members such as the member 28, all of which are rigidly secured together. Ex-
 100 tending between the side members are a plurality of shafts 29 pivotally mounted in the side members, to which shafts the needles are rigidly secured and on which they are normally held in the vertical position shown in the drawing. At one
 105 end of each shaft there is provided a link 31 rigidly secured to the shaft and pivotally connected to a rocking bar 32 so that when the rocking bar is moved to the left as viewed in Fig. 1, the links 31 will cause their associated needle supporting
 110

shafts to be rotated. To one of these shafts there is also rigidly secured a handle 33 and when this handle is rotated to the dotted line position, as shown in Fig. 1, the rocking bar 32 will rotate all of the needles to an inclined position, almost horizontal so as to provide a larger amount of clearance space below the mattress holder.

The apparatus for inclining the needles, or rotating them over to a nearly horizontal position, is provided so that the needles need not be lowered in their vertical position sufficiently below the mattress holder to permit the holder to be rotated 180° in order to invert the mattress. But by inclining the needles in accordance with this invention sufficient clearance is thus provided and the total overall height of the machine may be thus held to the minimum and a lesser amount of total travel of the needles is provided.

The apparatus for elevating the needle rack is preferably constructed as follows: Four screws such as the screw 34 are pivotally carried by the main frame. At the lower end of each screw there is affixed a bevelled gear 35 meshing with another bevelled gear 36. A shaft 37 extending longitudinally of the frame is provided with a bevelled gear 38 meshing with another bevelled gear 39, the latter being driven by a chain belt, or some other suitable belt or driving mechanism by means of a motor 41. The longitudinal shaft 37 is connected by suitable gears to drive the transverse end shafts, one of which 42 is shown in Fig. 2. As will be readily understood, all four of these screws 34 should be operated simultaneously and at the same speed so that the rack may be elevated evenly and maintained horizontally during its upward and downward movement. At the corners of the needle-carrying rack, internally threaded screw follower nuts such as the nut 43 are provided, meshing with the vertical screw shafts 34 and causing the elevation or lowering of the needle rack in accordance with the direction of revolution of the driving motor. To stop the upward travel of the needle rack when the needles have pierced the mattress and have protruded therethrough sufficiently to receive the tying elements, there is provided a limit switch 44 of usual construction, the details of which need not here be shown, as any one of various well known limit switches may be employed. A down drive limit switch 45 is also provided, each of which will be struck by a suitable part of the frame or by the nuts 43 in order to trip the switches and stop the motor. I have found it advantageous to provide resilient stop members 46 to assist in stopping the down drive of the rock shaft, these members consisting of a pin 47 extending through a bracket 48 and normally held in raised position by a spring 49 pressing against a collar 51. This resilient stop member is advantageously used because the momentum of the rack during its downward movement tends to promote excessive movement and sometimes a jamming or binding of the gear mechanism.

The electrical circuits including the connections from the limit switches to the motor and to the necessary starting switch 52 need not be shown as they can easily be supplied by anyone possessed of ordinary skill in the application of an electric motor drive to machinery of this character.

Any suitable mechanism may be employed for locking the mattress holder in horizontal position on the frame. For example, for the sake of simplicity I have indicated in Fig. 2 that a pin 53 and bracket 54 may be employed to lock the mat-

tress holder in horizontal position, the pin 53 being shoved into a suitable recess in the holder to lock it and withdrawn therefrom to permit rotation of the holder.

The device operates as follows: With the needles lowered in the full line position shown in Figs. 1 and 2, the holder closure member then on top is lifted and a mattress inserted into the holder. Both closure members are then locked, and their individual compression members 19 are thus forced into the opposite major surfaces of the mattress. The major surfaces herein referred to are the ordinary top and bottom surfaces of the usual mattress. The motor is then started and the needles are allowed to rise until stopped by the upper limit switch. At this time they have pierced the mattress through the compression member aperture 21 and extend upwardly high enough above the top of the mattress and the top set of closure members 19 so that the attendants may pass tying elements through eyes of the needle. These tying elements may be cords, tapes or other suitable elements commonly employed for tying or tufting of mattresses. When all of the needles have been supplied with tying elements and a suitable tuft or button is placed on the end of the element which is to be left on the top of the mattress, the motor is again started and the needles withdrawn through the mattress, pulling with them their individual tying cords.

The lower ends of the cords are then manually disengaged from the needles or may be short enough so that they will disengage themselves. The operator then grasps the handle 33 and pulls the needles over to the inclined lower position. He may allow the rotation of the mattress holder to automatically lay down and subsequently raise the needles, as is more fully described hereinafter. He then unlocks the mattress holder, turns it through an angle of 180° and locks it again. This leaves the cord ends protruding from the top of the mattress. One or more operators may then attach tufts or buttons to these ends and pull them snugly against the mattress in the bottom of each cup-shaped compression member and the tying of the mattress is then completed. As the cup-shaped compression members mounted on the top and bottom of the mattress holder have already supplied a uniform compression to the mattress at all tying points, the attendants need only to secure the tufting elements or buttons snugly in place and need not exert any manual force to further compress the mattress. The closure member then on top may be unlocked and opened, and the mattress removed therefrom.

The foregoing statement of operation includes manual laying down and restoring of the needles, but if desired and preferred the needles may be inclined and restored automatically. For this purpose, I have provided on one of the shafts 29 not only the manual handle 33 but two other rigidly mounted levers 55 and 56. These two levers are mounted in the same plane with the handle 33, and in the normal condition of this machine between piercing operations the three handles will occupy the same inclined position as the handle 33 has in Fig. 1. A laying down trip lever pivoted at 57 and having arms 58 and 59 is connected by means of a chain 61 to the lever 55. It will be perceived from reference to Figs. 1 and 2 that when the mattress holder is rotated, the edge of the holder will strike the arm 58, rotating it downwardly about its pivot and causing the chain 61 to pull the lever 55 toward the left as viewed in

Fig. 1 until this lever coincides in its inclination approximately with the dotted line position of lever 33. This rotation will have laid down the needles until they occupy the nearly horizontal

5 position indicated in dotted lines in Fig. 1. To restore the needles to their vertical position I provide a restoring lever 62 pivoted at 63 and connected by means of the chain 64 to the arm 56. When the needles are laid down, either automatically or by use of the manual levers 33, the chain 10 64 will have pulled the lever 62 down to the horizontal position shown in dotted lines for that lever. When the mattress holder is completing its 180° rotation its edge will strike lever 56 and raise it to the dotted line position indicated in 15 Fig. 2. This will pull the chain 64 upwardly and restore the lever 56 to a position where it lies in the same plane with the manual lever 33 as shown in full line in Fig. 1. This restores the needles 20 to their vertical position. By using this automatic laying down and restoring apparatus, I make it impossible for the needles to become injured as might occur if the manual laying down of the needles only were provided and if the operator should forget to lay the needles down manually before rotating the mattress holder. 25

Mattresses may be tied or tufted through the use of this invention in a small fraction of the time previously required for tying them wholly 30 by hand, and when completed they are tied with uniform pressure at all tying points.

It should be understood that the machine may be constructed so that the mattress is normally held vertically on its edge and so that the needles 35 move horizontally, but the form of the invention here shown is preferred as it seems at present to lend itself best to economical operation.

It should be further understood that the invention is susceptible to considerable variation and that it may be embodied in forms different 40 from the present disclosure, without however departing from the spirit or scope of the invention as expressed in the claims which follow.

Having shown and described my invention, I 45 claim:

1. A mattress tying machine comprising a frame and a mattress holder mounted thereon for movement about a horizontal axis, means including a plurality of needles for piercing the 50 mattress from below simultaneously at all tying positions, means for withdrawing said needles simultaneously, the axis of said holder being close enough to the top of said needles when the latter are in vertical but withdrawn position so that the needles prevent rotation of the 55 mattress holder about said axis, and means for inclining the needles simultaneously to lower their points sufficiently to permit of rotation of said holder about said axis.

2. In a mattress tying machine, a rotatable holder for holding the mattress during the tying operations, a plurality of needles positioned below the holder, and means for elevating said needles 80 simultaneously for piercing said mattress, said needles being normally held in vertically extending position, and means for inclining said needles to provide additional clearance for rotating movement of said holder.

3. In a mattress tying machine, a frame, a mattress holder mounted thereon for rotation about a horizontal axis, a rack carrying a plurality of needles normally vertically extending and sufficient in number to pierce the mattress 85 simultaneously at all of the mattress tying positions, means including an electric motor for elevating and lowering the rack, and limit switches for stopping said motor at the upper and lower limits of travel of said rack. 90

4. A mattress tying machine comprising a 95 frame, a mattress holder mounted for rotation thereon, means for compressing a major surface of the mattress simultaneously at all tying positions on said surface, means including needles for piercing the mattress simultaneously through 100 said compression means, means for withdrawing said needles simultaneously from the mattress, and means for lowering the points of the needles to provide additional clearance for the rotation of said holder without moving said withdrawing 105 means.

5. In a mattress tying machine, a frame and a mattress holder mounted thereon for rotation about a horizontal axis, a rack carrying a plurality of needles and means for raising and lowering 110 said needles for pulling tying elements through the mattress, the points of said needles normally being too close to the underside of said holder to permit rotation of the latter, and means actuated by the rotation of said holder for laying 115 the needles down to provide sufficient clearance for said rotation.

6. In a mattress tying machine, a frame and a mattress holder mounted thereon for rotation about a horizontal axis, a rack carrying a plurality of needles and means for raising and lowering 120 said needles for pulling tying elements through the mattress, the points of said needles normally being too close to the underside of said holder to permit rotation of the latter, and 125 means actuated by the rotation of said holder for laying the needles down to provide sufficient clearance for said rotation and arranged to restore said needles to vertical position after rotation of the holder past the area occupied by the 130 needles.

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