Jan. 1, 1963 E. A. NYMAN 3,070,813

FOLDING TWO-BUNK BEDS AND THE LIKE

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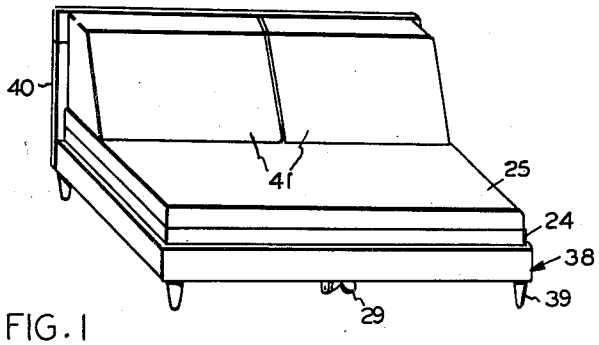


FIG. 1

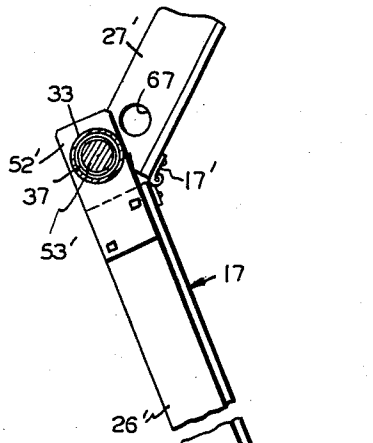


FIG. 3

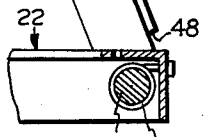
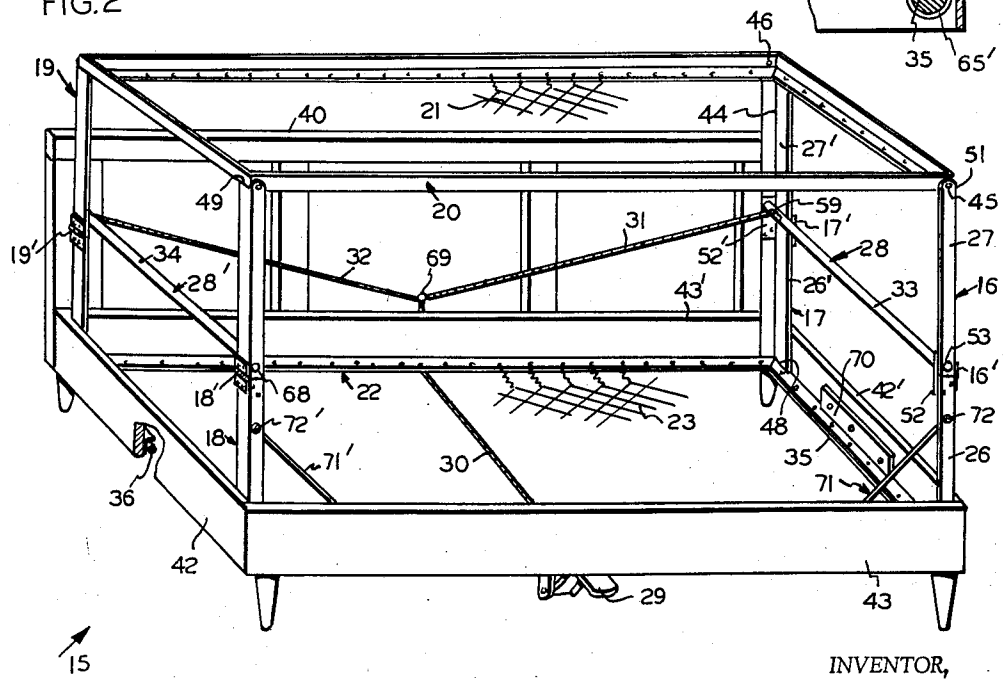


FIG. 2



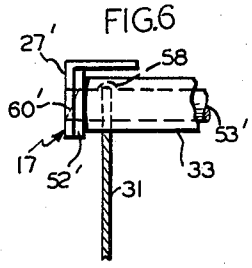
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FIG.6



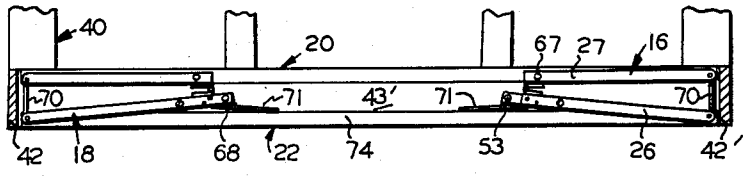


FIG.4

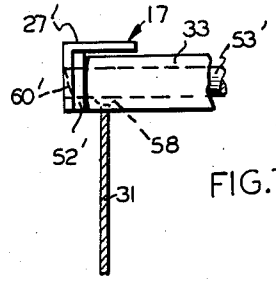


FIG.7

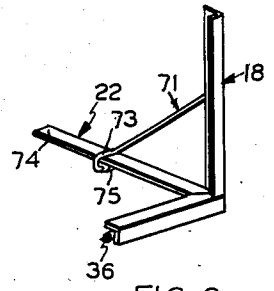


FIG.8

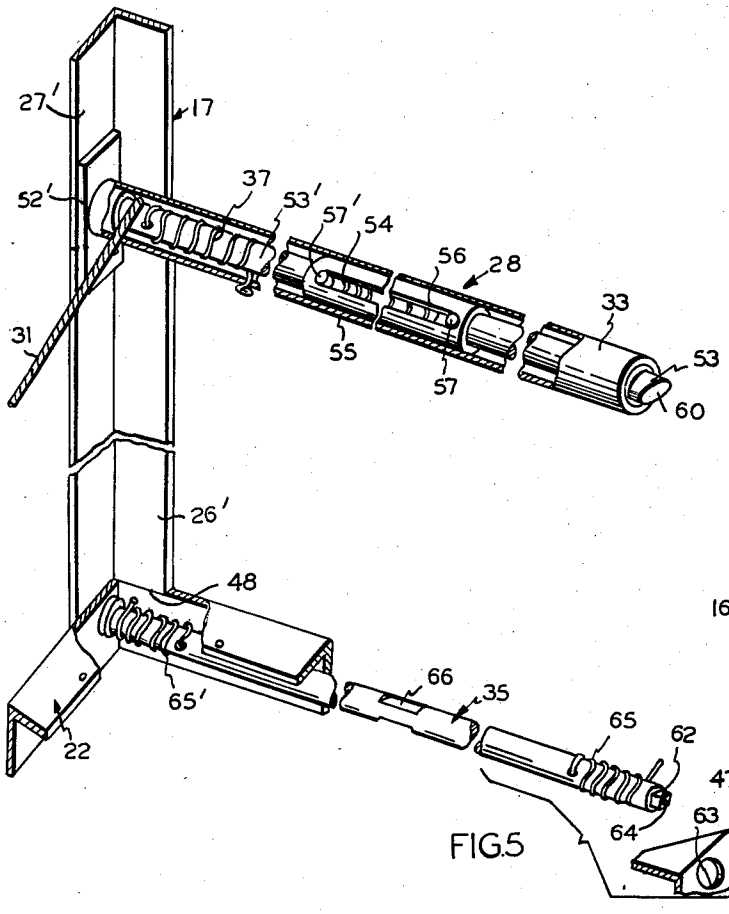


FIG.5

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FOLDING TWO-BUNK BEDS AND THE LIKE

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The present invention relates to a bed, cot or the like, having two bunks, one directly over the other and more particularly to the type in which the upper one can be superposed onto the lower one by folding frame parts which connect them.

A practical framework may be of angle iron comprising four corner posts whose distal ends are linked respectively to the corners of a lower and an upper rectangular mattress-supporting frame; each post being a foldable brace consisting of a pair of hinged links offering stop shoulders to limit the angular shift of the links and frames. In extended condition, each corner brace must be locked against folding in order to have a rigid two-bunk bed structure. Heretofore, it has been suggested that there be separately manipulated locking bolts and nuts at the hinge region of each folding brace. This would mean that every time the bed is to be extended or collapsed, you have to go to each corner of the bed to lock or unlock the hinge and there would have to be access thereto. It can be readily understood that under such conditions, setting up the bed to be a two-bunk structure or to collapse it to present only one bunk as a regular bed, would be more than a one-man job, requiring the bed to be moved from its place and besides would be time consuming.

It is therefore the principal object of this invention to provide a novel and improved convertible two-bunk bed structure of the character mentioned, affording full control of all its locking means at a single accessible point which may be a pedal at the front of the structure.

Another object thereof is to provide a novel and improved folding two-bunk bed structure of the nature set forth, which when extended will be automatically locked to be rigid and then to collapse, all hinge locking means will be simultaneously opened by a single manual manipulation which as stated, may be by pushing down on a pedal.

A further object of this invention is to provide in such folding structure, a means to aid its extension.

Still a further object of the present invention is to provide a novel and improved convertible two-bunk bed structure of the kind set forth, having the attributes mentioned and which is simple and compact in construction, easy to work, reasonable in cost and efficient in carrying out the purposes for which it is designed.

Other objects and advantages will become apparent as this disclosure proceeds.

For the practice of this invention, one form it may assume is to have an angle iron framework as heretofore mentioned, the links of whose folding braces present stops to engage the mattress-supporting frames when said braces are in extended condition; each pair of links being associated by a hinge in position to allow only inward fold, meaning that the braces at the head end of the bed, fold towards the foot end and those at the foot end of the bed, fold only towards the head end. Each brace has a plate on one of its links which overlaps the other link when the brace is extended. The braces at the foot end of the bed have their plates connected by a straight tubular member housing two latch bolts free for independent longitudinal movement but associated to turn together and spring-biased to move apart and further spring-biased to return to a normal rest position after being turned therefrom and released. Each latch bolt is adapted to enter through aligned holes in the overlapped

parts of a brace when the latter is in extended condition, thereby locking the hinge of the brace to maintain such condition. An accessible pedal arranged for pulling cable means to turn the latch bolts a half turn when in locking position, to afford their retraction into the housing whereupon the hinges are unlocked and the braces are freed to be folded to collapse the bed structure. To aid the unfolding of the braces when it is desired to have a two-bunk bed, shaft rods biased by torsion springs are provided to effect a turning action on the lower links of the braces; the strength of such spring action being insufficient to cause any automatic opening of the braces.

In the accompanying drawings forming part of this specification, similar characters of reference indicate corresponding parts in all the views.

FIG. 1 is a pictorial view showing a preferred embodiment of this invention in collapsed condition including removable pillow so it serves as a lounge, studio couch or single bed.

FIG. 2 is a perspective view showing the bed structure in use condition as a two-bunk bed, ready to place the mattresses on the indicated bed springs which are only fragmentarily shown in order to attain clarity of illustration.

FIG. 3 is a fragmentary section of the right, rear corner upper bunk supporting brace as seen in FIG. 2, showing one of the corner posts or braces in partially folded condition.

FIG. 4 is a front view showing the framework of the bed structure in collapsed condition.

FIG. 5 is a fragmentary "exploded" perspective view which is partly in section, showing the framework in extended condition.

FIG. 6 is a fragmentary top plan view showing a latch in locking position.

FIG. 7 is like FIG. 6, but here the latch has been given a half turn by pressing down on the pedal whereupon the brace is foldable.

FIG. 8 is a fragmentary perspective view showing an auxiliary bracing member in use position.

The FIGS. 2, 4, 6–8 are drawn to one scale in respect to which FIG. 1 is of reduced size and the FIGS. 3 and 5 are of enlarged size.

In the drawings, the numeral **15** designates a two-bunk bed structure having the upright corner members designated generally as **16**, **17**, **18** and **19**, which support at their top ends, the mattress-carrying frame **20** spanned by as uitable woven wire or cloth fabric **21** and at their bottom ends, a like frame **22** spanned by a similar fabric **23**; both such frames being rectangular and a bit larger than the mattresses **24**, **25** therefor respectively. Each upright member comprises two links as **26**, **27** which are joined by a hinge **16'**, thereby forming a foldable brace. The other hinges are indicated by the numerals **17'**, **18'** and **19'** respectively. All connections of said braces to the frames **20** and **22** are pivotal. All of said pivotal and hinge connections and pivotal connections are about parallel axes. All braces fold inwardly only, that is, the braces **16**, **17** are foldable towards the braces **18**, **19** and the latter towards the former. Of course, all corresponding hinge and pivotal connections of the braces **16** and **17** are in alignment respectively and likewise is the condition for the braces **18** and **19**.

In erected use condition as shown in FIG. 2, said braces are maintained extended because of the action of latch mechanisms indicated generally by the numerals **28** and **28'** respectively. Said braces are foldable so that the bed structure may be collapsed as in FIG. 3, upon pressing on the pedal **29** to pull the cables **30**, **31**, **32** to shift the latches contained in the tubular housings **33** and **34**. To aid the commencement of unfolding, the

rod shafts 35 and 36 are provided in the assembly to exert a turning force to the lower links of the braces occasioned by torsion springs as 37.

The article of furniture may have a wooden base frame indicated generally by the numeral 38 which may include corner legs 39 and include a back wooden frame 40 for the pillows 41 to rest against. The lower frame 22 may be rigidly secured to the base frame ends 42, 42' so that there is sufficient clearance between the frame 22 and each of the front and rear base frame parts 43, 43' to permit the folding of the braces 16, 17, 18 and 19.

When a brace is extended, its upper link's lower edge rests on its lower link's upper edge as do the links 26 and 27 in FIG. 2. Thus, such contacting edges act as a stop means allowing the brace to fold inwardly only. All braces being of angle iron, they are positioned when in extended condition, so as to determine the angles of a rectangle respectively, that is all the inner corners of all the corner braces are inside the bed structure as is the corner indicated at 44. All upper links are of equal length and so are all the lower ones, but it is preferred that they all be of equal length to facilitate manufacture and so that their pivotal connections as indicated at 45, 46 for instance, shall all be at the corners of the frames 20, 22. The hinges 16', 17' are outside along one side end of the bed structure and the hinges 18', 19' are outside and along the other side end of the bed structure 15. At each distal end of each of said folding braces, there is a cut-out in one wall or flange to offer a stop edge as 47 to rest against the adjacent mattress-supporting frame as at 48 and 49. Each such cut-out leaves an extending ear or lug in the other wall or flange of the angle-iron form, as 50 on a lower link and 51 on an upper link.

The association of the folding braces 16, 17 with the latching mechanism 28 and the shaft rod 35 being identical with the construction involving the folding braces 18, 19, the latching mechanism 28' and the rod shaft 36, the description of the structure at the right hand portion of FIG. 2 will suffice for the like structure at the left in said view.

On the opposite walls or flanges of corresponding links of the braces 16, 17, here shown on the lower links 26, 26', there is secured a plate on each. Such plates indicated by the numerals 52, 52', extend upwardly when the braces are extended as in FIG. 2, to overlap the associated upper links 27, 27' respectively. In such overlapping portions there are aligned holes therethrough in which slidably and rotatably fit spring latch bolts, one bolt 53 through the holes in the plate 52 and the link 27 and the other through the holes in the plate 52' and the link 27'. These spring latches or bolts 53, 53' are slidable and rotatable in their tubular housing 33 and have a tensed compression spring 54 between them tending to move them apart. The inner ends of said bolts 53, 53' are slidably fitted within a sleeve 55 which houses said spring 54. This sleeve has a lengthwise slot 56 whose ends are closed, to serve as a track and stop means for the pins 57, 57' which are fixed to and extend laterally from the bolts respectively. The bolt 53' is biased by a torsion spring 37, if the bolt is turned from its normal rest position, which is when it is in locking position as shown in FIG. 6. That is, its locking position is said normal rest position. The cable 31 is anchored to the bolt 53' at 58 and extends through a lengthwise slot 59 in the housing 33. The ends of the tubular housing 33 are suitably secured to the opposite plates 52, 52' as for instance by welding, so that said tube is communicative with the holes through which the latch bolts extend. The sleeve 55 is rotatably fitted in said tube 33. It is evident that when said sleeve is turned in said tube by a turning movement of the bolt 53', the bolt 53 will also turn with said bolt 53'. In normal at rest, locking position of said latching apparatus 28, the spring 37 is untensed, and the sloped faces 60 and 60' of the respective latching bolts, which faces are always in the maximum convergent relation possible, are in such position that the braces 16 and 17 are locked against folding.

The lower ends of the links 26, 26', each have a square hole as 61 to engage the square terminals as 62 of the rod shaft 35 which is rotatably supported through the front and rear lengths of the bottom frame 22 in holes as 63 therefore provided. The threaded hole 64 is for receiving a screw (not shown) to maintain the assembly; such screw being headed and passing through the hole 61 preparatory to such assembly. Torsion springs 65, 65' are about the shaft rod 35, secured one end to such rod and the other to the lower bed frame 22. To fix the initial stress of such springs 65, 65', the rod 35 may have a flattened part 66 so you can turn it with a wrench as may be required before the assembly of said rod shaft with the brace members.

When the bed structure is in extended condition as shown in FIG. 2, all the latches are in locking position. Referring to the latch bolt 53', it would be through the hole 67 in the link 27'. The latch bolt 53 is through the hole for it in the link 27. Likewise, the latching mechanism 28' has its latch bolts in engagement with the upper links of the folding braces 18 and 19; its front latch bolt being shown at 68. The cables 30, 31, 32 which are joined at 69, are taut. The face 60' of the rear latch bolt 53' of the latching mechanism 28 and the like face of the rear latch bolt of the latching mechanism 28', are in convergent relation in a direction rearwardly. Those of their front latch bolts, are in convergent relation forwardly. The action of each is to lock the brace it is associated with and maintain it in extended condition. The stop means as provided at 48 and 49, help maintain the rigidity of the bed structure. Of course, for use, the mattress 24 is on the bed spring 21 and the mattress 25 is on the bed spring 23.

To collapse the bed structure 15 to the condition shown in FIG. 4, the lower mattress is placed on top of the upper mattress to give more weight to make the unit easier to close. The spring-biased pedal 29 is stepped on to bring it downward. The resulting pull on the cable system will cause all the latch bolts to turn a half-turn, those in 28 counterclockwise and those in 28', clockwise. For example, the latch bolt 53' will have turned from its position shown in FIG. 6 to that shown in FIG. 7. Now the braces 16, 17, 18, 19 are free to be folded by a continued pull-in by the cable and then a downward pull on the front member of the upper frame 20. At the commencement of fold of said braces, the latches will leave the upper links of said braces because they will be cammed and moved inwardly of their housings 33 and 34 respectively. During all this, the springs as 37 and 54 will be stressed. Pedal movement scope shall be sufficient to maintain the cable system taut until the latch bolts have moved to unlocking position and the braces folded a bit as for instance shown in FIG. 3. When the upper frame 20 has come to rest on the fixed spacers 70, the folded structure can then have the mattress 25 and the pillows 41 set thereon as shown in FIG. 1.

It is to be noted that when the bed structure had been folded to an extent that the latch bars are off the upper links of the folding braces 16, 17, 18, 19 and thereafter, the cables are loose. Such loosening and positioning causes the stressed springs as 37 and 54 to unstress, thereby restoring the latch bars to their initial rest positions by turning them back and pushing them out, as they were initially positioned in their respective housings.

It is also to be noted that in collapsing the bed structure 15, that the springs 65, 65' become stressed. The strength of these springs which are on both of the rod shafts 35 and 36, shall in aggregate be less than would

accomplish any automatic unfolding of the braces 16, 17, 18, 19, even with the mattresses off.

To extend the bed structure back to its condition shown in FIG. 2, merely lift the upper frame 20. All the latch bars of the latching mechanisms 28 and 28' have their sloping surfaces in such position that they will automatically be cammed to enter the holes as 67 in the upper links of said braces respectively.

Front stays or braces 71, 71' may be provided for security, pivoted to the lower links of the folding braces 16, 18 at 72, 72' respectively. The lower end of each such auxiliary stay may be formed as a goose-neck 73 which in use position as shown in FIG. 8, rests on and straddles the front angle iron member 74 of the lower frame 22 and its free distal end removably engaged in a socket in the element 75 which is fixed to said frame 22 on a surface of its inner dihedral angle. In use, the mattress 25 covers said goose-neck of both said stays 71, 71' which serves to avoid their accidental removal from their sockets respectively.

Of importance to note is that all the latch bolts of the mechanisms 28, 28' are controllable from the front of the bed by the pedal 29 and that the stays 71, 71' are also at the front of the bed, so that to set up the bed into extended condition and to bring it back to collapsed condition, the person doing so is always only in front of the bed structure 15.

This invention is capable of numerous forms and various applications without departing from the essential features herein disclosed. It is therefore intended and desired that the embodiment shown herein shall be deemed merely illustrative and not restrictive and that the patent shall cover all patentable novelty herein set forth; reference being had to the following claims rather than to the specific description herein to indicate the scope of this invention.

I claim:

1. In a collapsible two-bunk bed of the character described, a lower member adapted to support a mattress, an upper member adapted to support a mattress, directly above said lower member, opposite first and second and opposite third and fourth foldable braces, each brace comprising a pair of hingedly connected links pivotally connected at their ends to said lower and upper members at marginal regions of said members, co-operative stop means on said links and members holding said braces in extended condition and allowing the first and second braces to be folded only in a direction towards the third and fourth braces respectively and the third and fourth braces to be folded only in a direction towards the first and second braces respectively; corresponding links, one of each brace, having an element extending therefrom respectively at the hinge region connecting the two links of each brace, each of said elements overlapping the other links of said braces respectively; a hole being provided in each of said elements and in each link they overlap; those of said holes which are in the first and second brace structures being in alignment and those of said holes which are in the third and fourth braces being in alignment, a first tubular housing spanning the first and second braces and secured at its ends to said braces respectively whereby the interior of said first tubular housing is communicative with the holes in the first and second braces, first and second latch bolts rotatably and slidably fitted in said first tubular housing; said first latch bolt extending through and slidably and rotatably fitted in the aligned holes in the first brace; said second latch bolt extending through and slidably and rotatably fitted in the aligned holes in the second brace structure, means associating the first and second latch bolts whereby they are free to slide independently but to rotate together, a spring means biasing said first and second latch bolts to move apart in said first tubular housing, a second tubular housing spanning the third and fourth braces and secured at its ends to said braces respectively whereby the interior of said second tubular housing is communicative with the holes in the third and fourth braces, third and fourth latch bolts rotatably and slidably fitted in said second tubular housing; said third latch bolt extending through and slidably and rotatably fitted in the aligned holes in the third brace structure; said fourth latch bolt extending through and slidably and rotatably fitted in the aligned holes in the fourth brace structure, means associating the third and fourth latch bolts whereby they are free to slide independently but to rotate together, another spring means biasing said third and fourth latch bolts to move apart in said second tubular housing; the second and fourth braces being opposite each other, cable means attached to the second and fourth latch bolts whereby when said cable is pulled, it will turn said second and fourth latch bolts each a half turn whereupon the first and third latch bolts will also be so turned and means for pulling said cable, located at an accessible part of the bed; the face of each brace-engaging end of each latch bolt being angular to the axis of the bolt it is on; said faces of the first and second latch bolts being divergent in the direction towards the second tubular housing and said faces of the third and fourth latch bolts being divergent in the direction towards the first tubular housing and when said cable is pulled to turn the latch bolts, said faces of the first and second latch bolts are convergent in the direction towards the second tubular housing and said faces of the third and fourth latch bolts are convergent in the direction towards the first tubular housing whereupon all the latch bolts are automatically shiftable inwardly in their housings when the braces are moved to collapse and torsion spring means in each of said housing adapted to become stressed when the latch bolts are turned upon pulling the cable, acting to return all the latch bolts to their initial positions respectively when the cable is released.

2. A bed structure as defined in claim 1, wherein the accessible means to pull the cable is a pedal swingably mounted below said bottom member; said pedal being mid-way between the first and third braces.

3. A bed structure as defined in claim 1, wherein the means for making a pair of latch bolts in a housing turn together and leaving them free for independent sliding movement, comprises a tubular element within the associated tubular housing and axially rotatably fitted therein; each of the associated latch bolts in said housing extending into said tubular element and slidable therein; said tubular element having a lengthwise slot through its wall and pins extending laterally, one from each of said latches associated with said tubular element; said pins extending into said slot and slidably fitted for lateral movement therealong; the spring biasing the latch bolts, being a compression coil spring within said tubular element, positioned between and in contact with said latch bolts.

4. A bed structure as defined in claim 1, wherein each tubular housing has a lengthwise slot to permit the cables attached to the respective bolts, to move laterally along said slots respectively while the bolts are moving along their respective housings.

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