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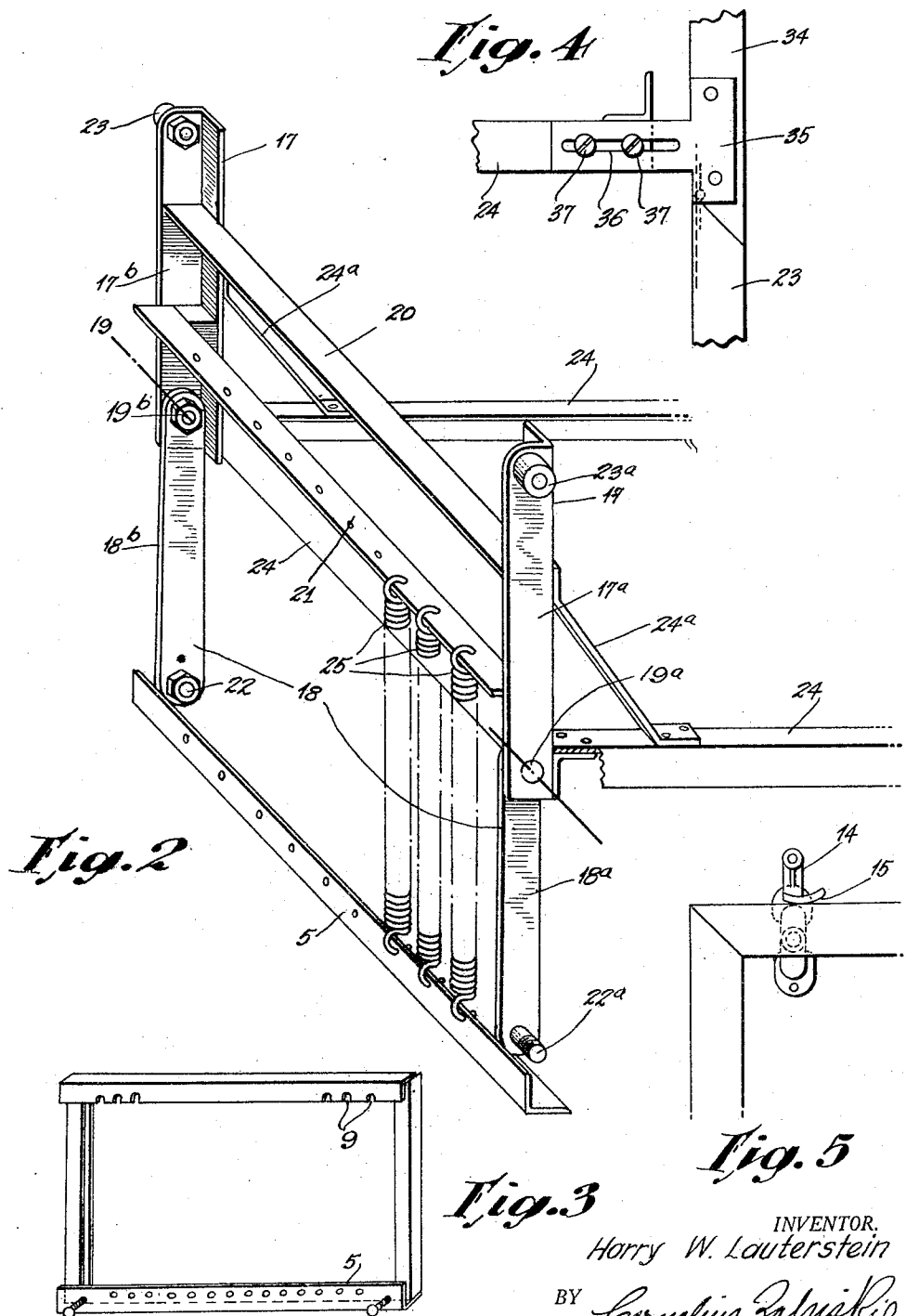
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DOOR BED

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2 Sheets--Sheet 2



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DOOR BED

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This invention relates to bed construction and more particularly to that type of bed adapted to be mounted upon a pivoted closet door whereby the bed when not in use is adapted to partake of concealed position within the closet and back of the door thereof. When it is desired to use the bed, pivotal movement is imparted to the door to bodily swing the bed out of the closet into the adjoining room, the bed being mounted upon the door in such manner that it may be tilted downwardly into horizontal position.

Numerous bed constructions have been heretofore suggested for use in this environment, but such structures have, in the main, been extremely complicated. They embody a large number of moving parts, many of which are extremely heavy and impose undue weight upon the door and its mounting. Other constructions of the type specified have a pronounced tendency toward lifting or upward tilting of the bed, particularly when weight is applied to the bed near the head end thereof.

The primary object of this invention is to provide a bed construction of the character described which will obviate the detrimental features of prior constructions, and I have discovered that this object may be accomplished through a novel adaptation of toggle principles. For example, it is a well known physical phenomenon that when a toggle is on dead center, all parts thereof are in a state of balance or equilibrium and no amount of force applied along the line of dead center will cause a flexing or collapsing of the toggle. The elements of the toggle must be moved out of alinement, i. e., out of the line of dead center, before such a force will be effective to collapse or flex the toggle. I have found that this phenomenon is peculiarly adapted for employment in bed constructions and may be there availed of to solve problems which have long vexed this art.

Thus, according to this invention, I provide two toggle elements placed one above the other and pivoted to one another to form the elbow of the toggle. The free end of the lower element I secure for pivotal move-

ment on a fixed horizontal axis and free end of the upper element, I provide with rollers adapted to work in vertical guides. For convenience in mounting the structure on a door, these slides are formed in a rectangular supporting frame. The side bars of the frame are of channel section and form the slides and the lower element is pivoted to these side bars near the bottom of frame. Coil springs are interposed between the bottom bar of the frame and a portion of the upper element above the elbow of the toggle and these springs are so disposed as to exert tension in substantially the plane of dead center of the toggle so that they are effective to flex or collapse the toggle only when the toggle elements are moved out of alinement. The bed frame is rectangular and is secured to the upper element adjacent the elbow of the toggle. With this arrangement an unusually simple construction is produced, one wherein there is not the slightest tendency of the bed to lift from horizontal position, no matter where weight is applied to the bed.

Another object of the invention is to provide simple and efficient means for controlling pivotal movement of the legs at the foot end of the bed whereby proper positioning of these legs is assured when the bed is brought into horizontal position while pivotal movement of the legs into a compacted position is provided for when the bed is tilted into upstanding position.

Another important practical feature of this invention resides in the means for mounting the supporting frame on the door. According to the preferred form of this invention, the frame is suspended from its upper portion upon brackets mounted on the door and adapted to engage said brackets at varying distances apart to suit individual requirements of installation. Locking means is provided for precluding inadvertent disengagement of the frame from these brackets and as the frame hangs from the brackets, it is spaced from the door at its lower edge by adjustable means which permits of proper regulation of the position of the bed even though the door be improperly hung. This arrangement greatly facilitates the installa-

tion of the bed of this invention and permits it to be more expeditiously installed with less care in the placement of the parts than has heretofore been the case.

5 Features of the invention, other than those specified, will be apparent from the herein-after detailed description and claim, when read in conjunction with the accompanying drawings.

10 The accompanying drawings illustrate one practical embodiment of the invention, but the construction therein shown is to be understood as illustrative, only, and not as defining the limits of the invention.

15 Figure 1 is a side view of bed construction embodying the present invention, certain portions of the bed and the door being shown in section in the interest of clearness. In this view, the horizontal position is indicated in full lines. The folded position is indicated in dot and dash lines, and an intermediate position is indicated in dotted lines.

20 Figure 2 is a perspective view showing a portion of the bed frame with associated toggle and coacting counterbalancing springs. In this view, the supporting frame and the means for mounting the same on the door is omitted in the interest of clearness.

30 Figure 3 is a perspective view of the supporting frame alone.

Figure 4 is a fragmental side elevation of the foot end of the bed showing the manner in which the bed frame may be shortened or elongated.

35 Figure 5 is a front view of a portion of the supporting frame showing the one supporting bracket associated therewith and the means for locking the frame against detachment from the supporting bracket.

40 Referring to the drawings, 1 designates a door of any conventional form mounted for pivotal movement on a vertical axis which may be intermediate the lateral edges of the door or at or beyond either of these edges depending upon installation requirements.

45 2 indicates a supporting frame which in accordance with this invention is adapted to be rigidly supported on the door. The frame is best shown in Figs. 1 and 3. It is of rectangular contour. The upper horizontal cross bar 3 of the frame is of channel cross section and the same is true of the vertical side bars 4. The bottom cross bar 5, however, is of angle cross section and the parts

50 3, 4 and 5 are riveted, welded or otherwise connected together to form a rugged, rigid assembly. Affixed to the upper cross bar 3 is an angle bar 6, which may be welded, riveted or otherwise permanently secured thereto in such manner that the horizontal flange 7 of this angle bar will be affixed to the frame, while the vertical flange 8 will be spaced from the frame, as shown in Figures 1 and 3. The lower edge of the flange

55 8 is notched at intervals as shown at 9 for reasons presently to be explained. The frame 2 is adapted to be suspended upon brackets 10. Any number of such brackets may be used, but two are found sufficient under ordinary conditions. Each bracket 10 is permanently secured to the door and is provided at its outer end with a stud having a reduced shank 11 terminating in an enlarged head 12. The frame is adapted to be supported on the studs with one notch 9 engaging the stud of one bracket, so as to preclude edgewise movement of the frame on the bracket.

70 Each bracket is furthermore provided with an upstanding arm 13 carrying thereon a latch 14 having a cam face 15 to engage with the upper surface of the flange 7 and thus lock the frame against lifting off of the bracket studs. It will be noted in this connection particularly from Figure 5 that the latch is so formed that it gravitates into locking position and will tend to tighten under vibration.

80 Associated with the bottom bar 5 are spacing screws 16 which thread into the vertical flange of said bar and serve to properly space the lower portion of the frame from the door. When installing the construction, the screws are adjusted to cause the frame 2 to hang vertically, even though the door may be im-

90 properly hung. It will be noted that the arrangement for mounting the frame is unusually simple for a bed of this character and the various notches 9 which I have described permit of proper location of the bed with respect to doors of widely varying width and character. That nice placement of brackets, supporting posts and similar adjuncts which has invariably been necessary on all prior constructions of the character under consideration is wholly eliminated by the mounting of this invention.

100 In Fig. 2, it will be noted that there is therein illustrated a toggle. This toggle embodies an upper element 17 and a lower element 18. These elements may be constructed in any suitable way, as by casting or otherwise, but are shown as built up structurally of bars and angle sections. As shown, the upper toggle element 17 comprises the bars 17a and 17b rigidly spaced by angle bars 20 and 21 while the lower toggle element 18 comprises the bars 18a and 18b. The upper and lower toggle elements are pivoted to one another at their elbow, as indicated at 19a and 19b, to articulate on an elbow axis 19. The lower free end of the lower toggle element is pivoted to the frame 2 by bolts 22 and 22a which pass through these bars and are firmly anchored to the lower ends of the side bars 4 of said frame. The upper free end of the upper toggle element 17 carries rollers 23 and 23a and these rollers extend into the channel section of

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the side bars 4 and are guided therein for vertical movement as the toggle is flexed.

The bed frame is made up of the angle bars 24, all arranged in the same horizontal plane as shown in Fig. 2, and riveted together in lap joints at the corners. After the toggle elements are constructed and assembled as described to form a complete structural entity, the bed frame, assembled as stated, is brought into the position shown in Fig. 2 and riveted to the upper toggle element to rigidly mount the bed frame on this element adjacent the elbow of the toggle. In order that the mounting of the bed frame on the toggle may be sufficiently rigid and strong to withstand operating stresses, braces 24a also preferably are utilized to secure the bed frame to the toggle. There is thus established a fixed and predetermined relation between the bed frame and the upper toggle element and they are adapted for movement together during tilting operations of the bed as hereinafter more fully described.

By virtue of this fixed relation, it will appear that when the toggle is flexed, the bed frame will partake of the movements of the upper element of the toggle. When in normal position for use, the bed frame is horizontal as shown in Fig. 2 and in full lines in Fig. 1. It is to be noted that when the bed frame is in this position, toggle elements 17 and 18 are in alignment, i. e., on dead centers. However, when it is desired to move the bed into vertical position, this is accomplished by lifting the foot end thereof and thereby bringing about a flexing of the toggle as indicated in dotted lines in Fig. 1. To counterbalance this operation in order that the bed may be raised without undue physical exertion, a series of coil springs 25 are arranged between the bar 21 of the upper toggle element 17 and the bar 5 of the frame 2. Three of these springs are shown in Fig. 2, but it will of course be understood that any number of such springs may be employed as may be necessary to properly counterbalance the structure.

Particular attention is called to the fact that when the bed frame is in horizontal position, the toggle is on dead center and that consequently the tension of the springs will not tend to cause flexing of the toggle. However, as soon as the bed commences to tilt upwardly, under manual impulse, so as to throw the toggle elements off of dead center or out of alignment, the tension of the springs immediately comes into play and serves to draw downwardly the upper terminal of the toggle. This results in a counterbalancing action on the bed frame and facilitates its movement into the vertical position indicated in dot and dash lines in Fig. 1.

It is of pronounced practical importance that the greatest counterbalancing effect of the springs is effective when the weight of

the bed is the greatest. This occurs just after the bed starts to rise, and the weight becomes less as the angle between the bed frame and the vertical decreases. Manifestly, the tension of the springs decreases in like manner, so that as the bed approaches and reaches its vertical position, the tension of the springs is at the minimum. This obviates sudden shocks which would be caused if the springs were under high tension at the completion of the lifting movement of the bed. However, by arranging the toggle to partake of dead center relation when the bed is fully down, all tendency of the bed to lift is overcome, no matter where weight is applied to the bed.

It will of course be understood that when the bed is in its up-lifted position, it is adapted to be moved with the door into and out of the closet as is common with prior constructions.

The bed frame of the present invention may be provided with rigid legs at its foot end, but in order to adapt the bed for relatively shallow closets, legs 26 are preferably pivoted as indicated at 27. To each of these legs is pivoted a link 28, in which is included an adjusting and cushioning device shown in Fig. 1. This device comprises a sleeve 29 which is provided with a perforation. One end of the link extends into this sleeve and has a number of perforations which may be brought into registration with the perforation in the sleeve and a pin passed through to firmly fix the sleeve to that end of the link. The other end of the link 28 extends loosely into the sleeve and between the two ends of the link is interposed a spring 30. The free end of the link is secured by means of the pivotal connection 31 as shown to a push rod 32 which extends through cross bars 33 of the bed frame to the head end thereof and is adapted to bear against the front edge of the lower toggle elements.

As the bed is raised, the lower toggle element withdraws from the end of each push rod and allows the legs 26 to fold downwardly as shown in dotted lines in Fig. 1. However, as the bed is lowered, the push rod is forced by such lower toggle element in a direction toward the foot of the bed and in so doing returns the legs to vertical alignment with the foot board as the bed reaches its horizontal position. The spring 30 is to provide a cushioning action for this operation. The structure is unusually simple and is practically out of sight when the bed is made up. Note also that the greater portion of the length of the push rod is supported, so that there is little if any tendency for bending, such as would occur if the push rod extended for the full length of the bed without support.

The bed frame is of rigid rectangular form and the foot board may be rigidly secured

thereto in accordance with common practice. The present invention, however, provides for an adjustable foot board so that tall persons may rest more comfortably in the bed. This construction is illustrated in Fig. 4. Here the foot board is designated 34 and is provided at each side with attaching plates 35 which are longitudinally slotted as shown at 36. Screws 37 pass through the slot of each plate and thread into the side rails of the bed frame. These screws when loosened permit of adjustment of the foot board with reference to the bed frame and when tightened serve to lock the parts in adjustment. The legs 26 may be mounted directly on the frame, but a more æsthetic construction results when they are mounted on the foot board as shown. The perforations permit of adjustment in the link 28 and serve to compensate for variations in bed length when the foot board is adjusted as described.

The structure which I have hereinbefore described is unusually simple for an arrangement of the character under consideration. It is economical to manufacture and the parts are of such simple construction that they may be made rugged and durable without being unduly heavy.

The bed is particularly intended for use as a door bed and has been described in this environment. I wish it understood, however, that instead of mounting the bed on a door it may be mounted upon a jamb or upon a close wall by appropriate brackets of any suitable character, either for bodily pivotal movement with respect thereto or with the supporting frame secured against pivotal movement with respect to the building in which it is installed.

The drawings show the invention in its preferred practical form, but the invention is to be understood as fully commensurate with the appended claims.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

In a bed, the combination of a supporting frame adapted to be mounted in upright position and comprising a rectangular frame, the upright side bars of which are formed with guideways, a toggle embodying vertically straight link elements adapted to be in vertical alinement when the toggle is on dead centers, the lower terminal of the lower link element being mounted near the lower ends of said side bars for pivotal movement on a fixed axis guiding members carried by the upper end of the upper link element and extending into the guideways of said side bars, a bed rectangular frame rigidly secured at its head end to the upper link element of the toggle and extending at right angles therefrom to partake of a horizontal position when the toggle is on dead centers, and springs, one

end of each of which is secured to the upper portion of the toggle and the other end of each of which is secured to the cross bar at the base of the supporting frame.

In testimony whereof I have signed the foregoing specification.

HARRY W. LAUTERSTEIN.

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