

Oct. 25, 1932.

A. COMPER

1,884,577

INVALID'S BED

Filed July 17, 1931

5 Sheets-Sheet 1

FIG. 1.

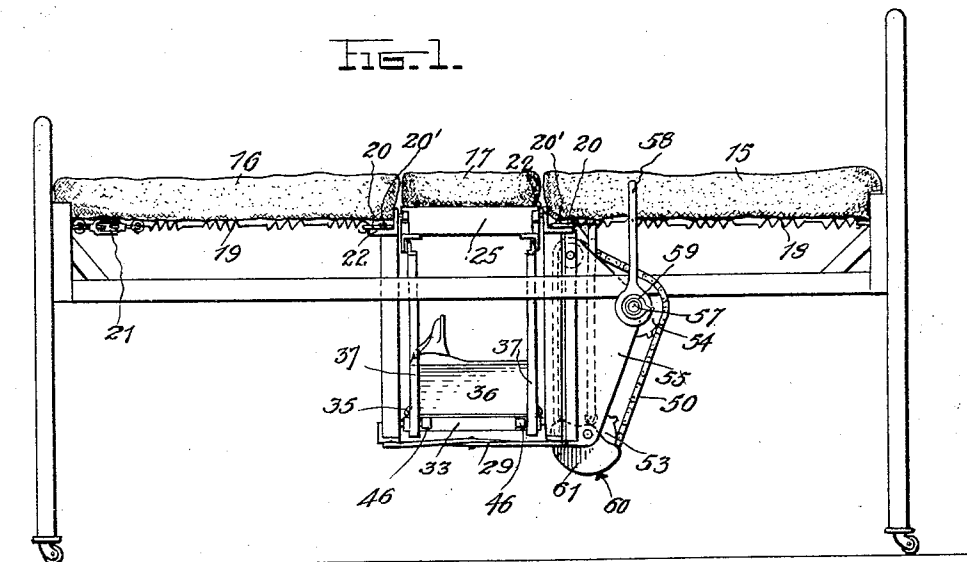
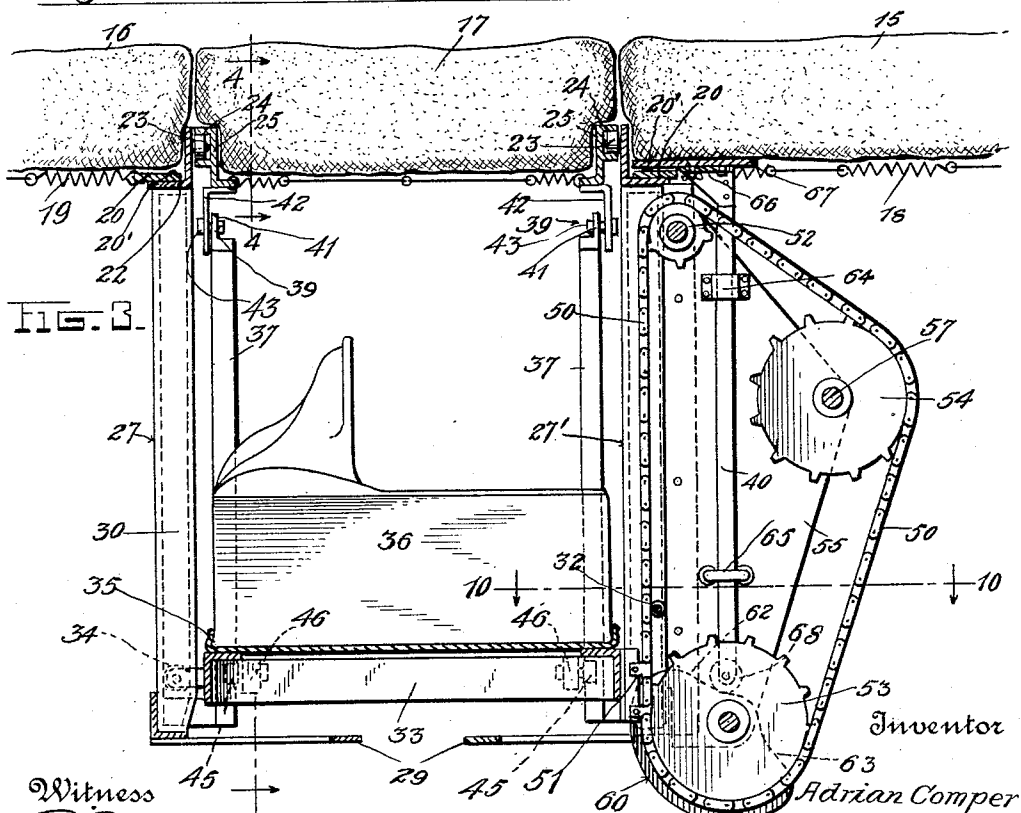


FIG. 3.



Witness  
C. Hunt. A

Inventor  
Adrian Comper  
By *A. B. Wilson & Co*  
Attorneys.

Oct. 25, 1932.

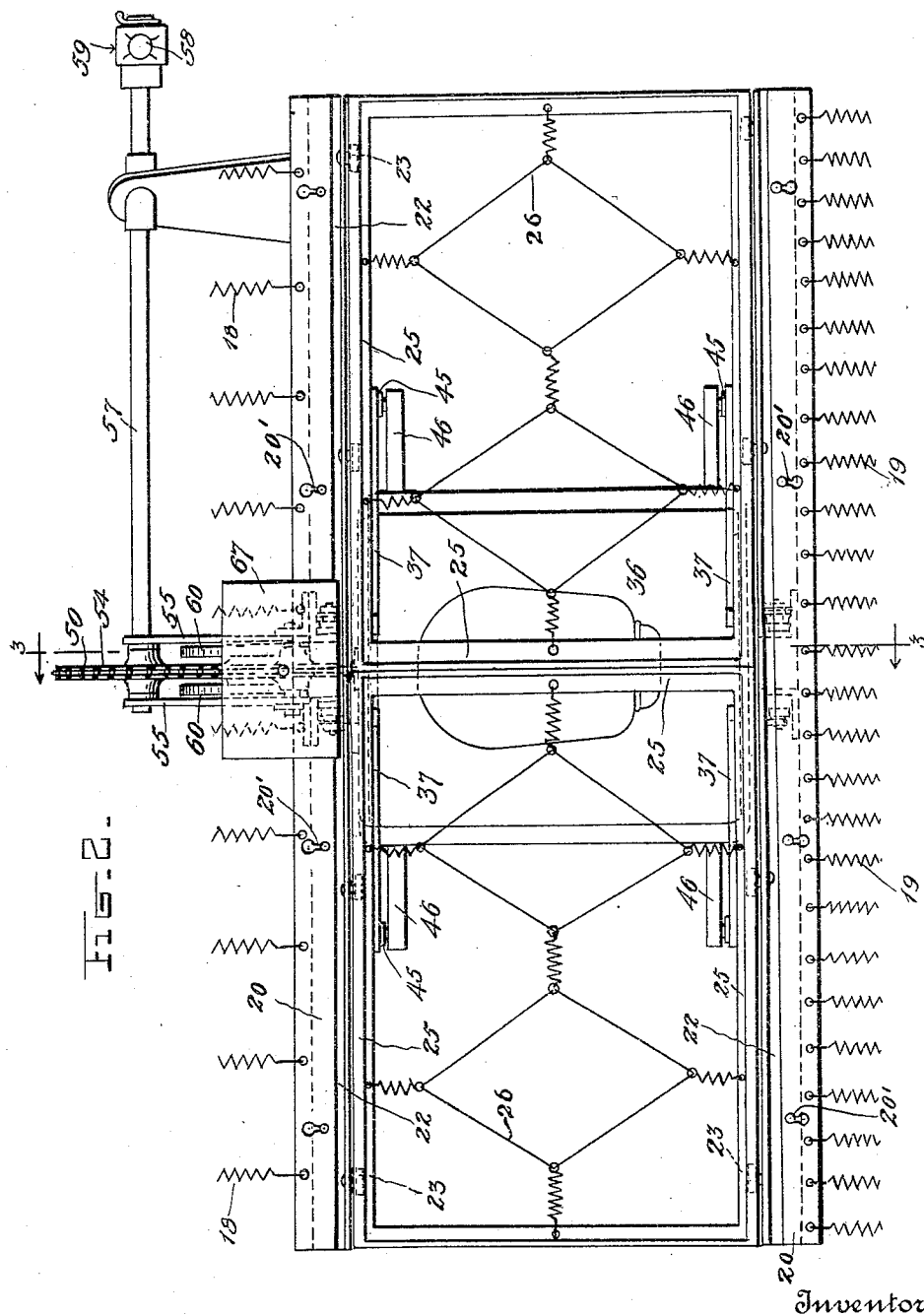
A. COMPER

1,884,577

INVALID'S BED

Filed July 17, 1931

5 Sheets-Sheet 2



Witness  
C. E. Hunt

Adrian Comper  
By *A. B. Wilson & Co.*  
Attorneys.



Oct. 25, 1932.

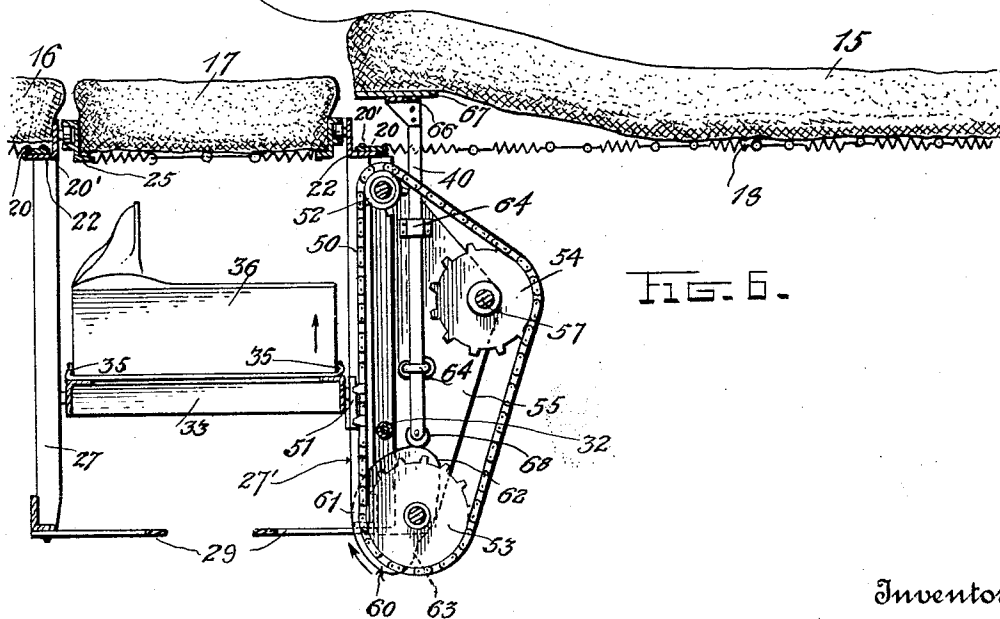
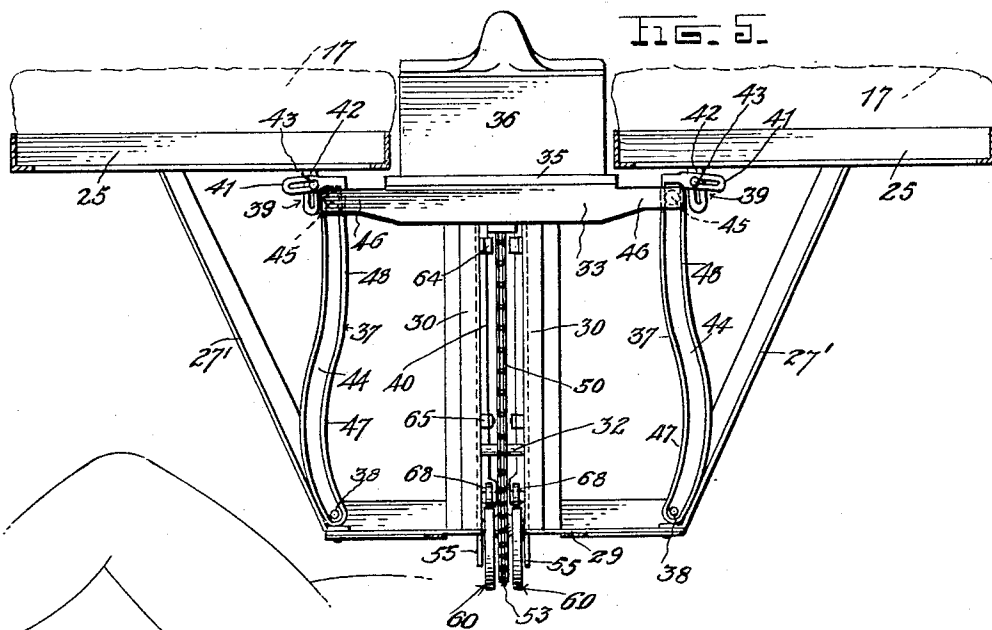
A. COMPER

1,884,577

INVALID'S BED

Filed July 17, 1931

5 Sheets-Sheet 4



Inventor

Adrian Comper.

Witness

*E. Hunt*

By *H. B. Wilson & Co.*

Attorneys.

Oct. 25, 1932.

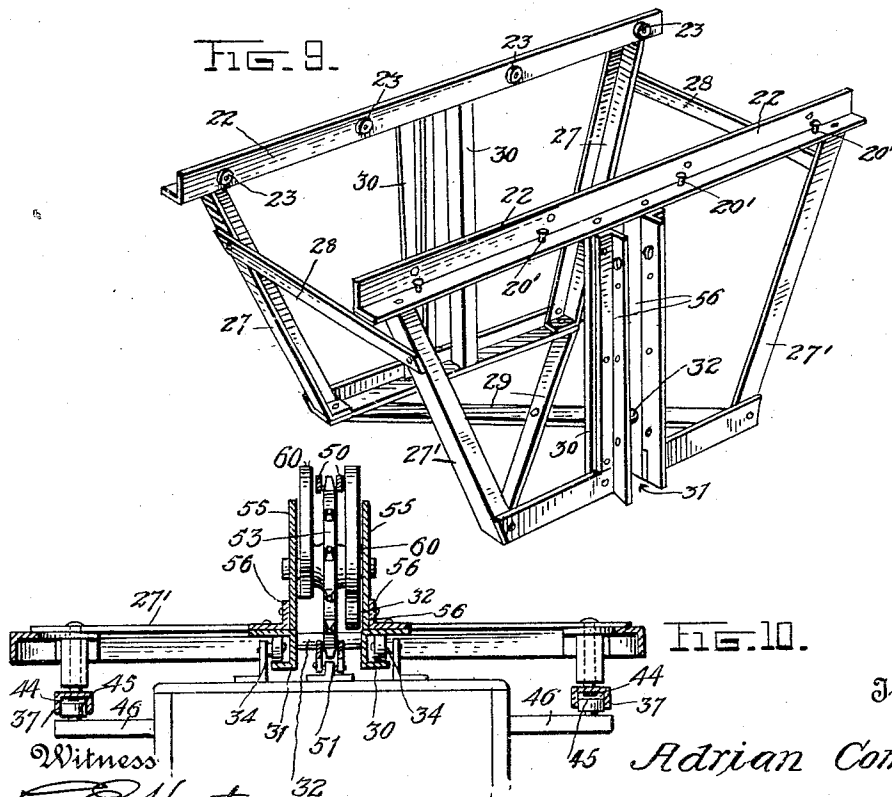
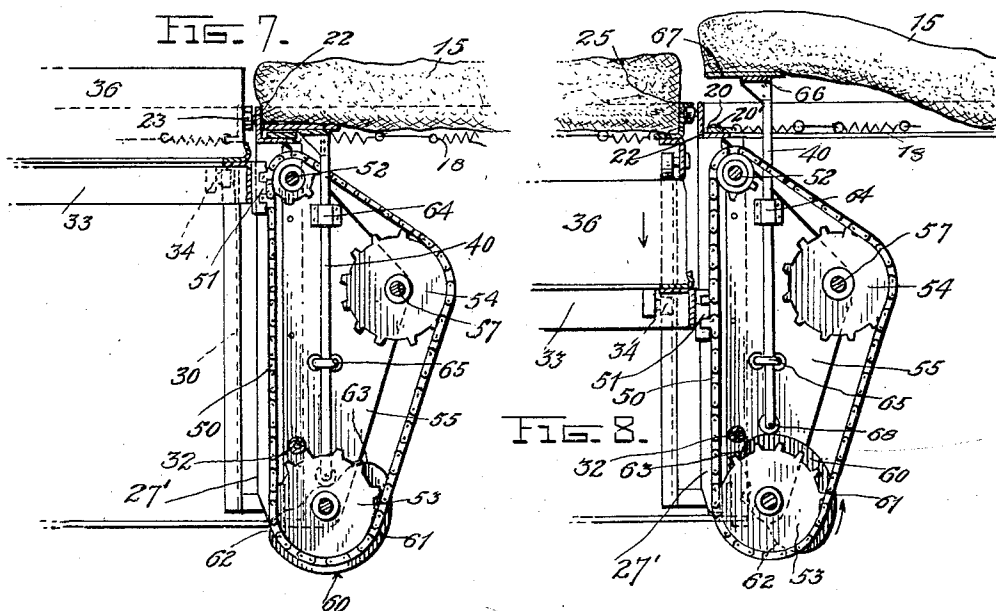
A. COMPER

1,884,577

INVALID'S BED

Filed July 17, 1931

5 Sheets-Sheet 5



Inventor

Adrian Comper.

By *A. Blumson & Co.*  
Attorneys.

# UNITED STATES PATENT OFFICE

ADRIAN COMPER, OF LONDON, ENGLAND, ASSIGNOR TO HOSPITAL APPLIANCES, INC., OF  
PITTSFIELD, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

## INVALID'S BED

Application filed July 17, 1931. Serial No. 551,488.

The invention relates to the so-called invalids' or hospital beds of the general type shown in the following U. S. patents issued to Joseph E. Fazakerley:—1,203,721 of November 7, 1916; 1,257,072 of February 19, 1918, and 1,545,415 of July 7, 1925.

The Fazakerley structures have each embodied a mattress formed of a head section, a foot section and two laterally shiftable hip-supporting sections, together with means for separating said hip-supporting sections and elevating a commode between them, and with such structures, two difficulties have been encountered. First, the outward sliding of the hip sections and later the inward sliding thereof with the patient's hips resting thereon, have given a great deal of discomfort to the patient. Second, as soon as lowering of the commode has started, the hip sections of the mattress have started to close, thereby giving insufficient room between said sections to facilitate after-cleaning of the patient.

It is the aim of the present invention to provide a generally improved and simplified construction in which the above mentioned difficulties are effectively overcome, and in attaining this end, further aims are to provide unique means for vertically off-setting the head and hip-supporting sections of the mattress to free the patient's hips from contact with said hip sections when the latter are to be moved inwardly or outwardly; to provide unique means whereby movement of the commode elevator actuates the shiftable supports for the hip-supporting mattress sections, embodying provision for delaying inward sliding of said shiftable supports until the commode elevator has dropped sufficiently to readily allow after-cleaning of the patient; to provide a novel jack structure for lifting a section of the mattress, and to provide a generally advantageous construction.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, description being accomplished by reference to the accompanying drawings.

Fig. 1 is a side elevation of a bed embodying the present improvements.

Fig. 2 is an enlarged top plan view of

the central portion of the bed, (mattress omitted).

Fig. 3 is a vertical sectional view on line 3—3 of Fig. 2.

Fig. 4 is a vertical sectional view on line 4—4 of Fig. 3, showing in full lines the normal position of the swingable arms which outwardly shift the supports for the hip sections of the mattress, and illustrating in dotted lines a position to which said arms swing idly while the above-named jack is functioning, to lift the inner end of the mattress head section.

Fig. 5 is a view similar to Fig. 4 but showing the hip sections of the mattress separated and the commode elevated between them.

Fig. 6 is a view similar to Fig. 3 but illustrating the manner in which the patient's hips are freed from contact with the shiftable hip-supporting sections of the mattress before shifting of the latter, and this view shows the commode partially elevated.

Fig. 7 is a view similar to Fig. 6 but showing the commode completely elevated and the head and hip sections of the mattress restored to flush relation with each other.

Fig. 8 is a view similar to Figs. 6 and 7 but illustrating the manner in which the patient's hips are held above the shiftable mattress sections while the latter are being closed after use of the commode, and this view shows the commode and its elevator in the act of descent.

Fig. 9 is a perspective view showing the major portion of the frame structure which carries the shiftable supports for the hip sections of the mattress, the commode elevator, and operating means for said supports and elevator.

Fig. 10 is a detail horizontal sectional view on line 10—10 of Fig. 3.

Fig. 11 is a disassembled perspective view showing portions of the jack structure.

Only one form of construction has been herein disclosed, and while such construction will be rather specifically described, it is to be understood at the outset, that within the scope of the invention as claimed, numerous variations may be made.

The construction disclosed embodies a hand lever and a reversible ratchet connection be-

tween this lever and a shaft which constitutes a main actuator for the various movable parts, but it is to be understood that other suitable provision, for instance, an electric drive, could well be employed for said shaft. Then too, the mattress sections may be of any known or preferred construction, the same is true of the linkage or springs which support them, and the improved structure wherein resides the present invention, may either be built into a complete bed at the factory, or may form part of a mattress-supporting spring structure bodily applicable to known bed frames, in place of the conventional mattress-supporting springs.

The improved bed embodies a mattress composed of a rectangular head section 15, a rectangular foot section 16, and two laterally shiftable hip-supporting sections 17, said sections all normally lying in such co-operative relation as to provide the equivalent of an unbroken mattress. Spring supports 18 and 19 are provided for the mattress sections 15 and 16, the remote ends of said spring supports being anchored in any preferred manner while their inner ends have releasable connections with a central transverse frame structure which carries all movable parts, the connections between said spring supports 18 and 19 and said frame structure, being readily disengageable when turn-buckles 21 embodied in one or the other of said sections (or in both) are loosened. In the present showing, the inner ends of the spring supports 18 and 19 are secured to flat bars 20 and the latter have quick-detachable pin and slot connections 20' with the frame structure.

The above-mentioned frame structure embodies two parallel transverse bars 22 carrying rollers 23 which engage channeled tracks 24 of two rectangular frames 25, said frames carrying spring supports 26 for the hip sections 17 of the mattress. Secured to and depending from the bars 22, are two substantially U-shaped sub-frames 27 and 27' which are tied together near their upper ends by bars or the like 28 and are similarly tied at their lower ends by cross braces 29 or other preferred means. Each of these sub-frames 27 and 27' embodies two vertical channel-shaped tracks 30 having their channels disposed outwardly away from each other, and between the lower ends of these tracks of the frame 27', a gap 31 exists to accommodate a sprocket wheel hereinafter described. Weakening of the frame by this gap, is counteracted by an appropriate stay 32 secured between the tracks 30 of the frame 27', near the lower ends of said tracks, said stay preferably consisting of a conventional bolt and sleeve.

A commode elevator 33 is disposed between the sub-frames 27 and 27', said elevator having bracket-carried rollers 34 engaging the tracks 30. The elevator 33 is provided with

an upstanding flange 35 or with other desired means for holding a commode or bed pan 36, in such manner that it may be readily removed.

Pivoted to the inner sides of the frames 27 and 27', two to each frame, are four laterally swingable arms 37 which are best seen in Figs. 3, 4 and 5. The pivots 38 for these arms are at the lower ends of the latter, and connecting means 39 are provided between the upper ends of said arms and the shiftable supporting frames 25 of the hip sections 17 of the mattress. Slidably-engaged connecting means are employed between the commode elevator 33 and the arms 37, said slidably-engaged connecting means being operative to effect swinging of said arms to spread the frames 25 and the mattress sections 17 when said elevator is raised, and to effect inward return of said frames and mattress sections upon lowering of said elevator. In the present showing, the connecting means 39 embody provision for allowing lost-motion of the arms 37 to the dotted line position shown in Fig. 4, before said arms will outwardly shift the frames 25, and while this lost-motion is taking place, a jack 40 hereinafter described, raises the inner end of the head section 15 of the mattress, as seen in Fig. 6, so as to free the patient's hips from contact with the mattress sections 17, thereby insuring that the outward sliding of the latter shall not give discomfort to the patient.

The lost-motion connecting means 39, in the construction herein disclosed, embody overlapped lugs 41 and 42 on the arms 37 and the frames 25 respectively, and pin and slot connections 43 between said lugs.

The slidably engaged connecting means between the commode elevator 33 and the arm 37, are preferably established by providing the arms with longitudinal channels 44, the elevator 33 being provided with rollers 45 carried by brackets 46, said rollers (or other shoes if desired) being slidably received in said channels 44. Normally, the arms 37 converge upwardly as shown in Fig. 4, and each of these arms is provided with an outwardly bowed lower end portion 47 and with a straight upper end portion 48. Upon ascent of the elevator 33, the rollers 45 and curved arm portions 47 co-act to initially swing said arms outwardly as shown by the dotted lines in Fig. 4, there being no movement of the frames 25 during such initial swinging of the arms, due to the lost-motion connecting means 39. During this interval, the jack 40 comes into play as seen in Fig. 6, raising the patient's hips clear of the mattress sections 17. Now, upon further ascent of the elevator 33, the rollers 45 effect outward swinging of the arms 37 to the position shown Fig. 5, thereby outwardly shifting the supporting frames 25 and the mattress sections 17 carried thereby. By the time the rollers 45 reach the lower ends

of the straight arm portions 48, the frames 25 have been completely separated, and during the remaining ascent of the elevator 33, the commode 36 moves into position between the four mattress sections. By the time this has taken place, the jack 40 again functions to lower the patient upon the commode 36, by restoring the mattress section 15 into flush relation with the other mattress sections. After use of the commode, the initial descent of the elevator 33 effects no swinging of the arms 37, due to the fact that their straight portions 48 are then vertical as seen in Fig. 5, and during such initial elevator descent, the jack 40 functions to again elevate the mattress section 15. The elevator 30 and commode 36 drop sufficiently during this "initial descent" to allow ample room for after-cleaning the patient, and when this has been accomplished and the elevator 33 is restored to its final lowered position, the rollers 45 and arms 37 co-act in returning the supports 25 and the mattress sections 17, and when these operations have been completed, the jack 40 again lowers the mattress section 15 into flush relation with the other mattress sections. The commode 36 may then be readily removed from the elevator, emptied, sterilized and returned in readiness for further use.

An endless chain 50 is mounted upon the sub-frame 27' and at 51 is connected with the elevator 33 for raising and lowering the latter. This chain is trained around an upper sprocket 52, a lower sprocket 53 and an intermediate sprocket 54. All of these sprockets may well be carried by bracket plates 55 secured to vertical bars 56 embodied in the construction of the frame 27'. Sprocket 54 is secured upon an operating shaft 57 which may be provided with any desired driving means. In the present showing, a hand lever 58 and an appropriate reversible ratchet 59, are employed for rotating the shaft 57 in either direction.

Rotatable bodily with the sprocket 53, is a cam 60 having an edge 61 concentric with the sprocket 53, and two cam portions 62 and 63 which merge into the ends of said edge 61 and extend into close relation with the cam axis. The cam 60 constitutes an actuator for the jack 40, said jack comprising twin shanks slidable in upper and lower guides 64 and 65 on the plates 55, an arched saddle plate 66 connecting the upper ends of said shanks, and a horizontal plate 67 preferably having a quick-detachable connection with said saddle plate 66, said plate 67 underlying the end of the mattress section 15 toward the shiftable sections 17.

The lower ends of the jack shanks preferably carry rollers 68 engaging two duplicate sections in which the cam 60 is formed, said sections being preferably at opposite sides of the sprocket 53.

### Operation

The various movable parts stand normally as seen in Figs. 1, 2, 3 and 4, the frames 25 and the mattress sections 17 being at the limit of their inward movement with the latter in flush relation with the mattress sections 15 and 16, the commode elevator 33 being at the limit of its downward movement, the arms 37 being in their inwardly swung positions, the jack 40 being lowered and the cam 60 set with its cam portion 62 associated with the jack as seen in Fig. 3. When it is now desired to elevate the commode 36 for use, the ratchet lever 58 is operated to drive the chain 50 in the direction indicated by the arrow in Fig. 3, thereby starting the elevator 33 on its ascent. Movement of the chain 50 of course drives the cam 60 and hence during the initial ascent of the elevator 33, the cam portion 62 raises the jack 40 to the position shown in Fig. 6, thereby elevating the mattress section 15 and freeing the patient's hips from contact with the shiftable mattress sections 17. During this initial ascent of the elevator 33, the arms 37 merely swing idly, due to the lost motion connections 39 with the frames 25, until the cam 60 has effected raising of the mattress section 15. By the time such raising of this mattress section has taken place however, the lost-motion connections 39 have reached the limit of their lost-motion and they then start to shift the frames 25 outwardly, said frames carrying with them the mattress sections 17. When the arms 37 have been outwardly swung so that their straight upper ends 48 are vertical, the continued ascent of the elevator 33 will not further shift the frames 25, and as the parts continue to move, the commode 35 is elevated between the sections 17 and the jack 40 is lowered by the cam portion 63 (Fig. 7), thereby again lowering the mattress section 15 into flush relation with the other sections and lowering the patient onto the commode 36. While the commode is elevated and in use, the various parts occupy the positions shown in Figs. 5 and 7. After use of the commode, the ratchet 59 is reversed and the lever 58 is used to drive the chain 50 and the cam 60 in the direction indicated by the arrow in Fig. 8. As soon as the parts start to move, the cam portion 63 raises the jack 40, thereby raising the mattress section 15 as shown in Fig. 9. While this has been taking place, the elevator 33 has descended somewhat without moving the arms 37, the rollers 45 having traveled only along the straight parallel upper ends 48 of said arms. By thus elevating the patient and dropping the commode 36 without effecting any inward movement of the shiftable mattress sections 17, ample space is allowed for after-cleaning of the patient. When such cleaning has been effected, the hand lever 58 is further operated to effect return of the parts to normal. As the elevator 33 further descends, it effects in-

ward swinging of the arms 37 while the jack 40 still holds the mattress section 15 elevated. After the arms 37 have entirely closed or inwardly slid the mattress sections 17 however, the jack 40 again lowers the mattress section 15 so that all of the sections of the mattress again lie in flush relation. The various parts now again assume the relation shown in Fig. 3, and the commode 36 may be conveniently slid from the elevator for emptying and sterilizing, said commode being of course returned and placed upon the elevator in readiness for further use.

Whenever desired, the entire central frame structure may be disconnected from the remainder of the bed, for instance for thorough sterilizing, repainting, etc. When such detachment of the frame structure is to be effected, loosening of the turn buckles 20 will allow easy disconnection of the strips or bars 20, from the frame structure, the latter being then shiftable as a single unit from the remainder of the bed. When this frame structure is re-positioned and the bars or the like 20 again connected with it, tightening of the turn-buckles 21 will again tension the spring supports 18 and 19 to provide for proper support of the mattress.

Attention is again invited to the fact that within the scope of the invention as claimed, numerous variations may be made, and it will be obvious that either friction or an appropriate brake (not shown) may be employed to hold the movable parts when the elevator 33 is in its entirely raised position or the position which it occupies while cleaning the patient.

I claim:—

1. In an invalid's bed, a mattress having a head section, a foot section and laterally shiftable hip sections; supports for said mattress sections embodying shiftable supporting means for said hip sections, and means for raising the portion of said head section toward said hip sections to free the patient's hips from said hip sections while separating the latter, and for again lowering said portion of said head section while said hip sections are separated.

2. In an invalid's bed, a mattress having a head section, a foot section and two laterally shiftable hip sections; supports for said mattress sections embodying shiftable supporting means for said hip sections, and means for vertically offsetting said head section and said hip sections to free the patient's hips from said hip sections while the latter are being separated and for readjusting said head and hip sections into flush relation while said hip sections are separated.

3. In an invalid's bed, a mattress having a head section, a foot section and two laterally shiftable hip sections; supports for said mattress sections embodying shiftable supporting means for said hip sections, and

means for vertically offsetting said head section and said hip sections to free the patient's hips from said hip sections while the latter are being separated, for then re-adjusting said head and hip sections into flush relation, for later again vertically offsetting said hip and head sections while the former are being shifted back together, and for finally again restoring said hip and head sections into flush relation.

4. In an invalid's bed, a mattress having a head section, a foot section and two laterally shiftable hip sections; supports for said mattress sections embodying shiftable supporting means for said hip sections, and raising means for the end of said head section adjacent said hip sections, whereby said end of said head section may be raised to cause the patient's hips to clear said hip sections when the latter are to be moved.

5. In an invalid's bed, a mattress having a head section, a foot section and two laterally shiftable hip sections; supports for said mattress sections embodying shiftable supporting means for said hip sections, a plate under the end of said head section adjacent said hip sections, and means for raising and lowering said plate, whereby said end of said head section may be raised to free the patient's hips from said hip sections when the latter are to be moved.

6. In an invalid's bed, a mattress having a head section, a foot section and two laterally shiftable hip sections; supports for said mattress sections embodying shiftable supporting means for said hip sections, a plate under the end of said head section toward said hip sections, a vertically guided shank whose upper end carries said plate, and means for raising and lowering said shank, whereby said end of said head section may be raised to free the patient's hips from said hip sections when the latter are to be moved.

7. In an invalid's bed, a mattress having a head section, a foot section, and two laterally shiftable hip sections; supports for said mattress sections embodying shiftable supporting means for said hip sections, means for vertically offsetting said head section and said hip sections to free the patient's hips from said hip sections, means for shifting said hip sections away from each other, and means for successively operating said offsetting means and said shifting means.

8. In an invalid's bed, a mattress having a head section, a foot section, and two laterally shiftable hip sections; supports for said mattress sections embodying shiftable supporting means for said hip sections, means for vertically offsetting said head section and said hip sections to free the patient's hips from said hip sections, means for shifting said hip sections apart, normally lowered commode elevating means positioned to lift a commode between said hip

sections when the latter are separated, and operating means for first effecting said offsetting of mattress sections, for then shifting said hip sections apart and for elevating the commode between the separated sections.

9. In an invalid's bed, a mattress having a head section, a foot section, and two laterally shiftable hip sections; supports for said mattress sections embodying shiftable supporting means for said hip sections, means for vertically offsetting said head section and said hip sections to free the patient's hips from said hip sections, means for shifting said hip sections apart, normally lowered commode elevating means positioned to lift a commode between said hip sections when the latter are separated, and operating means for first effecting said offsetting of mattress sections, for then shifting said hip sections apart and elevating the commode between them, and for then re-adjusting said hip and head sections into flush relation with each other.

10. In an invalid's bed, a mattress having a head section, a foot section, and two laterally shiftable hip sections; supports for said mattress sections embodying shiftable supporting means for said hip sections, means for vertically offsetting said head section and said hip sections to free the patient's hips from said hip sections, means for shifting said hip sections apart, normally lowered commode elevating means positioned to lift a commode between said hip sections when the latter are separated, and operating means for first effecting said offsetting of mattress sections, for then shifting said hip sections apart and elevating the commode between them, for then re-adjusting said hip and head sections into flush relation, for later lowering the commode, again vertically offsetting said hip and head sections and closing said hip sections, and for again restoring said hip and head sections to flush relation.

11. In an invalid's bed, a mattress embodying a head section, a foot section, and laterally shiftable hip sections; supporting means for said sections embodying a frame carrying shiftable supports for said hip sections, a commode elevator mounted on said frame, operating connections between said elevator and said shiftable supports for separating the latter upon ascent of said elevator, a jack mounted on said frame and engaging the end of said head section toward said shiftable sections, and means for raising said jack and said elevator, said operating connections embodying provision for delaying separation of said shiftable supports and the hip sections carried thereby until said jack has raised said end of said head section.

12. In an invalid's bed, a mattress embodying a head section, a foot section, and laterally shiftable hip sections; supporting means for said mattress sections embodying a frame carrying shiftable supports for said hip sec-

tions, a commode elevator mounted on said frame, laterally swingable arms pivoted at their lower ends to said frame, connecting means between the upper ends of said arms and said shiftable supports, slidably engaged connecting means between said elevator and said arms for outwardly swinging the arms to separate said shiftable supports and the mattress sections carried thereby, a jack mounted on said frame and engaged with the end of said head section toward said shiftable sections, and means for raising said jack and said elevator, at least one of the aforesaid connecting means embodying provision for delaying separation of said shiftable frames and the hip sections carried thereby until said jack has raised said end of said head section.

13. In an invalid's bed, a mattress embodying a head section, a foot section, and laterally shiftable hip sections; supporting means for said mattress sections embodying a frame carrying shiftable supports for said hip sections, a commode elevator mounted on said frame, laterally swingable arms pivoted at their lower ends to said frame, lost-motion connecting means between the upper ends of said arms and said shiftable supports, slidably engaged connecting means between said elevator and said arms for outwardly swinging the arms to separate said shiftable supports and the mattress sections carried thereby, a jack mounted on said frame and engaged with the end of said head section toward said shiftable sections, and means for raising said jack and said elevator, said lost-motion connecting means allowing sufficient idle swinging of said arms to allow said jack to raise said end of said head section of the mattress before said arms separate said shiftable supports and said hip sections of the mattress.

14. In an invalid's bed, a mattress embodying a head section, a foot section, and laterally shiftable hip sections; supporting means for said sections embodying a frame carrying shiftable supports for said hip sections, a commode elevator mounted on said frame, operating connections between said elevator and said shiftable supports for separating the latter upon ascent of said elevator, a jack mounted on said frame and engaging the end of said head section toward said shiftable sections, an endless chain mounted on said frame and connected with said elevator for raising the latter, a driving shaft for said chain mounted on said frame, and a cam on said shaft for raising said jack, said operating connections embodying provision for delaying separation of said shiftable supports and the hip sections carried thereby until said cam has raised said jack to raise said end of said head section.

15. In an invalid's bed, a mattress embodying a head section, a foot section, and later-

ally shiftable hip sections; supporting means for said mattress sections embodying a frame carrying shiftable supports for said hip sections, a commode elevator mounted on said frame, laterally swingable arms pivoted at their lower ends to said frame, connecting means between the upper ends of said arms and said shiftable supports, slidably engaged connecting means between said elevator and said arms for outwardly swinging the arms to separate said shiftable supports and the mattress sections carried thereby, a jack mounted on said frame and engaged with the end of said head section toward said shiftable sections, an endless chain mounted on said frame and connected with said elevator for raising the latter, a driving shaft for said chain mounted on said frame, and a cam on said shaft for raising said jack, at least one of said connecting means embodying provision for delaying separation of said shiftable supports and the hip sections carried thereby until said cam has raised said jack to raise said end of said head section.

16. In an invalid's bed, two laterally shiftable hip-supporting mattress sections having shiftable supports, a frame under said supports upon which the latter are mounted, a commode elevator mounted on said frame, means for raising said elevator, laterally swingable arms pivoted at their lower ends to said frame and connected at their upper ends with said shiftable supports, and slidably engaged means on said arms and elevator whereby ascent of the latter swings said arms to separate said shiftable supports and said mattress sections.

17. In an invalid's bed, two laterally shiftable hip-supporting mattress sections having shiftable supports, a frame under said supports upon which the latter are mounted, a commode elevator mounted on said frame, means for raising said elevator, laterally swingable arms pivoted at their lower ends to said frame and connected at their upper ends with said shiftable supports, said arms normally converging upwardly and having longitudinal tracks, and shoes carried by said elevator and engaging said tracks for outwardly swinging said arms to separate said supports and said mattress sections when said elevator is raised.

18. A structure as specified in claim 17; said tracks having portions which stand substantially vertical and parallel when said shiftable supports and mattress sections are separated, whereby the commode elevator may be initially lowered before said shiftable supports and mattress sections start to close, thereby giving ample room for after-cleaning the patient.

19. In an invalid's bed, two laterally shiftable hip-supporting mattress sections having shiftable supports, a commode elevator under said supports, and means for outwardly

shifting said supports and raising said elevator, said means embodying provision for allowing initial descent of the elevator before said supports start inwardly from their outwardly shiftable positions, thereby giving ample room for after-cleaning the patient.

In testimony whereof I affix my signature.

ADRIAN COMPER.