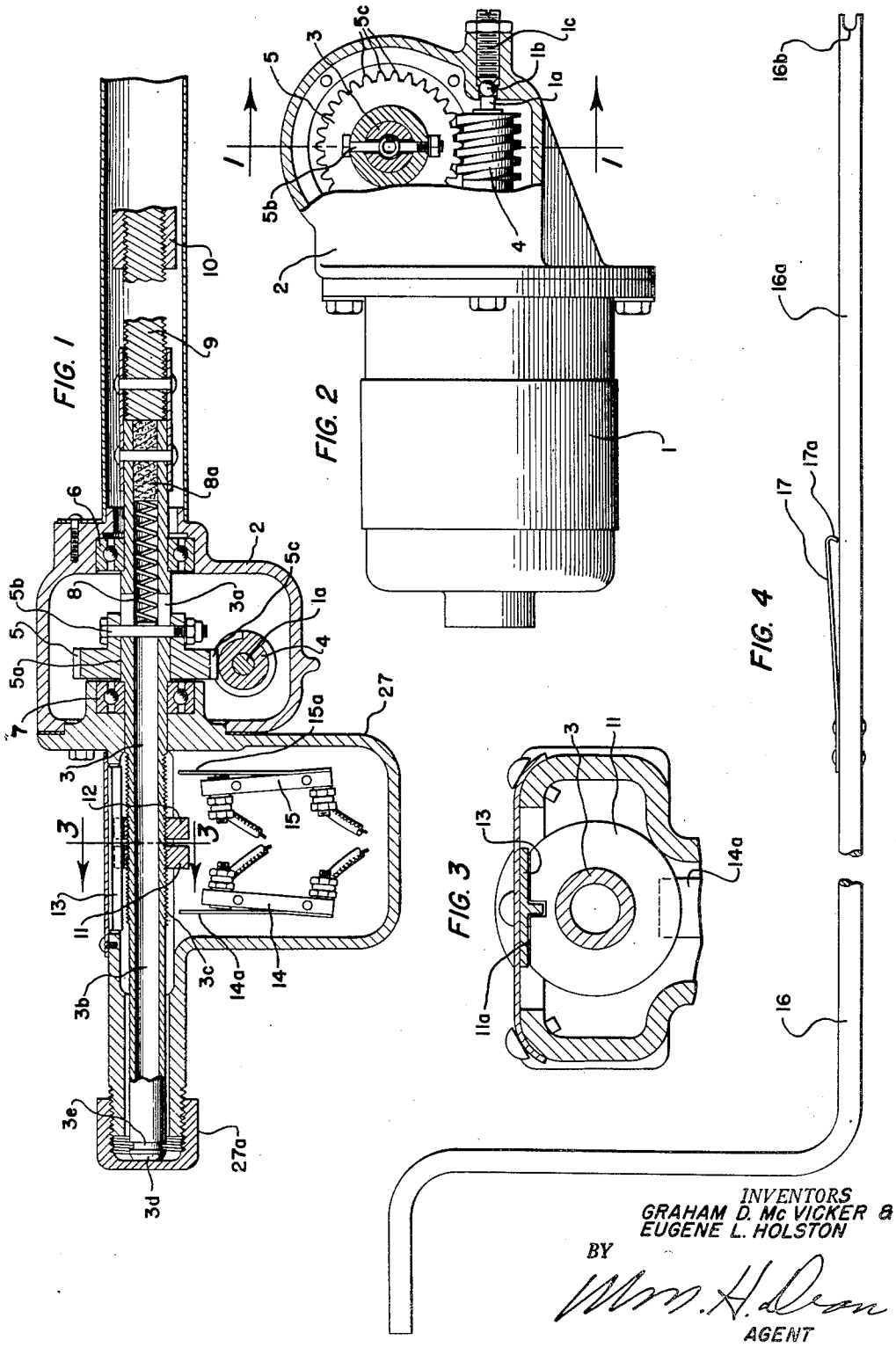
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HAND OR POWER OPERATED MECHANISM

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HAND OR POWER OPERATED MECHANISM

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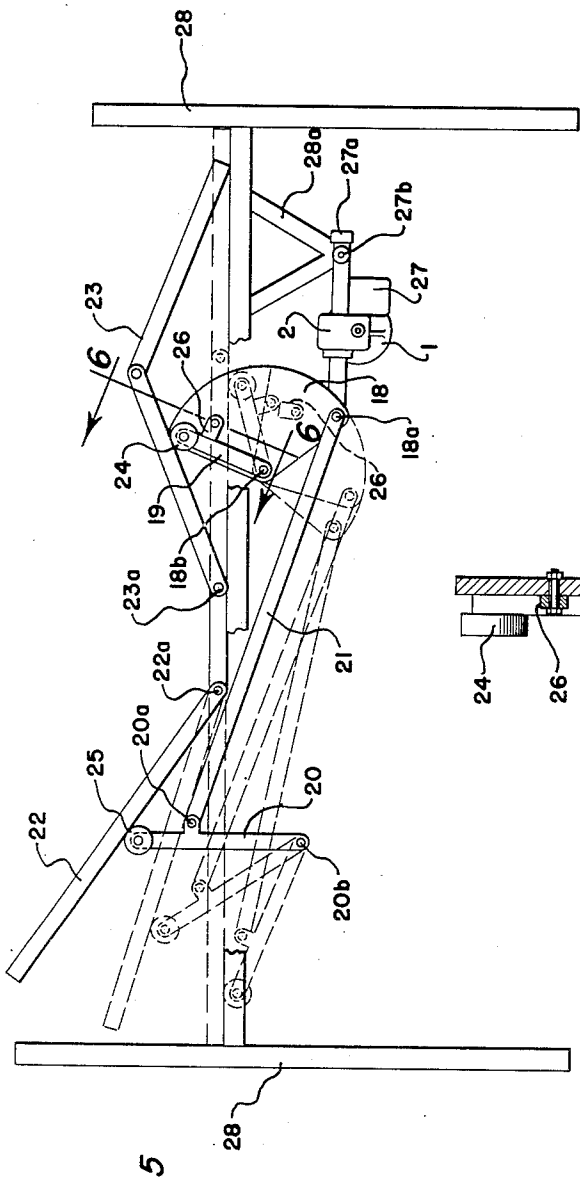


FIG. 5

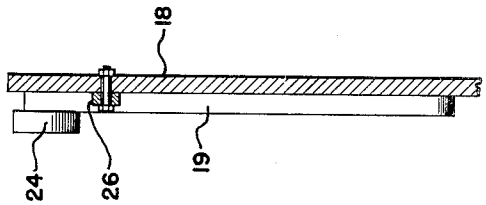


FIG. 6

INVENTORS
GRAHAM D. McVICKER &
EUGENE L. HOLSTON

BY

Wm. H. Dean

AGENT

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HAND OR POWER-OPERATED MECHANISM

Graham D. McVicker and Eugene L. Holston,
San Diego, Calif.

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1 Claim. (Cl. 74—625)

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Our invention relates to a power-operated adjustable bed, and the objects of our invention are:

First, to provide a power-operated adjustable bed of this class having motorized actuating means, provided with operating gears disengagable from each other by a manual operating handle, whereby very simple and positive clutch means is provided for the release of the motor from the bed actuating screw when a power failure occurs.

Second, to provide a power-operated adjustable bed of this class in which the actuating mechanism is provided with novel limit switch means for preventing the motor thereof from actuating the head and foot sections of the bed beyond a certain position.

Third, to provide a power-operated adjustable bed of this class having novel actuating linkage which permits the partial raising of the bed head section before the foot section is raised.

Fourth, to provide a power-operated adjustable bed of this class in which only a single operating motor is required for operating both head and foot sections of the adjustable bed.

Fifth, to provide a power-operated adjustable bed of this class having manual crank means provided with simple detent mechanism which automatically holds the gear clutch disengaged during the manual operation of the handle.

Sixth, to provide a power-operated adjustable bed of this class having novel limit switch stop adjusting mechanism for controlling the electric motor of said power-operated adjustable bed, and

Seventh, to provide a power-operated adjustable bed of this class which is very simple and economical of construction, efficient in operation, and which will not readily deteriorate or get out of order.

With these and other objects in view, as will appear hereinafter, our invention consists of certain novel features of construction, combination and arrangement of parts and portions as will be hereinafter described in detail and particularly set forth in the appended claim, reference being had to the accompanying drawings and to the characters of reference thereon, forming a part of this application in which Fig. 1 is a longitudinal sectional view of the power-operating mechanism of our power-operated adjustable bed showing parts and portions in elevation to facilitate the illustration. Fig. 2 is an end view of the actuating mechanism as shown in Fig. 1, showing portions thereof broken away and in section to amplify the illustration. Fig. 3 is an enlarged fragmentary sectional view taken from the line

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3—3 of Fig. 1. Fig. 4 is a fragmentary side elevational view of the manual operating crank shown on enlarged scale. Fig. 5 is a side elevational view of our power-operated adjustable bed showing by dashed lines varying positions of parts and portions thereof and Fig. 6 is an enlarged fragmentary sectional view taken from the line 6—6 of Fig. 5.

Similar characters of reference refer to similar parts and portions throughout the several views of the drawing.

As shown in Fig. 1 of the drawings, we have provided a main operating shaft 3 which is a hollow shaft, having the screw 9 fixed in connection with one end thereof. This hollow shaft is shouldered intermediate the two bearings 6 and 7 which are radial load bearings and also take longitudinal thrust of the shaft 3. A worm wheel 5 provided with a central bore 5*a* is slidably mounted longitudinally of the outer side of the shaft 3; extending through the hub of this worm wheel 5 is the bolt 5*b* and this bolt projects through slots 3*a* in the sidewall of the hollow shaft 3, thus the bolt 5*b* is slidable together with the worm wheel 5 longitudinally of the shaft 3 and the spring 8 engages the bolt 5*b* internally of the bore 3*b* of the shaft 3. The opposite end of this spring 8 is abutted to the plug 8*a* in the shaft 3, all as shown best in Fig. 1 of the drawings. The motor 1 as shown in Fig. 2 of the drawings is provided with shaft 1*a* on which is fixed the worm 4. This worm 4 on the shaft 1*a* is disposed transversely of the shaft 3 and the teeth 5*c* of the worm wheel 5 mesh with the helical form of the worm 4 at its periphery. It will be noted that longitudinal movement of the worm wheel 5 on the shaft 3 causes disengagement of the teeth 5*c* from the peripheral helical form of the worm 4. The outboard end of the shaft 1*a* of the motor 1 is supported by a ball-bearing 1*b* retained by the adjusting set screw 1*c* screw-threaded in the gear box 2 as shown in Fig. 2 of the drawings. The shaft 10 is an internally screw-threaded hollow shaft engaging the external screw threads of the shaft 9, and is arranged to be extended or retracted by the rotation of said shaft 9 in connection with the shaft 3. This shaft 3 is provided with an externally screw-threaded portion 3*c* on the outer side of which the limit switch stops 11 and 12 are screw-threaded. These stops 11 and 12 are substantially disc-shaped having flat portions 11*a* at one side engaged by the stop guide 13 secured in the normally upper side of the casing 27. This stop guide 13 prevents turning of the limit switch stops 11

and 12 so that they are moved longitudinally of the axis of the shaft 3 by reason of their screw-threaded relation relatively to the shaft 3 and it will be here noted that the initial setting of these limit switch stops 11 and 12 may be made by removing the stop guide 13 and rotating the limit switch stops 11 and 12 to the desired spaced relation with the contacts 14a and 15a of the switches 14 and 15 which control the motor 1. The shaft 3 is provided with an open-end 3d around which is provided an annular groove 3e adapted to be engaged by the clip end 17a of the detent 17 which is a plate spring member fixed on the outer side of the shank 16a of the manual operating handle 16, which is a crank-shaped handle at one end provided with a bolt-engaging notched portion 16b at its opposite end arranged to engage the bolt 5b in connection with the worm wheel 5 as shown in Fig. 1 of the drawings. It will be noted that the end of the casing 27 is provided with a cap 27a arranged to cover the open end 3d of the shaft 3. As shown in Fig. 5 of the drawings, the casing 27 is pivotally mounted by means of trunnions 27b to a bracket 28a of the bed frame 28. The shaft 10 is pivotally connected to the bell crank 18 by means of the pin 18a which is also a common pivotal mounting for one end of the link 21 which is connected at its opposite end by a pin 20a extending through the lever 20 intermediate its ends. This lever 20 is stationarily mounted by means of the pin 20b to the bed frame 28. The bell crank 18 is a quadrant-shaped member having a stop 26 thereon adapted to engage the lever 19 which is pivoted on the pin 18b extending through the bell crank 18. This pin 18b provides a stationary pivotal mounting for the bell crank 18 and the lever 19 and ultimately to the bed frame 26. The extending end of the lever 19 is provided with the roller 24 engageable with the foot section 23 of the bed which is mounted to the bed frame 26 by means of the pin 23a. The head section 22 is engaged by the roller 25 on the end of the lever 20 and this head section 22 is pivotally mounted to the bed frame 28 by means of the pin 22a. It will be noted that the stop 26 engages the lever 19 and forces the same into engagement with the foot section 23 after a certain amount of movement of the bell crank 18 has taken place in which case the head section 22 of the bed is slightly elevated before the foot section 23 rises from the horizontal frame of the bed frame 28.

The operation of our power-operated adjustable bed is substantially as follows:

When the motor 1 is electrically energized by closing an electrical circuit in connection therewith the worm 4 rotates in mesh with the worm wheel 5 on the shaft 3 causing rotative movement of the shaft 3. The force of rotation transmitted by the worm wheel 5 to the bolt 5b is transmitted by the bolt 5b to the shaft 3. The externally screw-threaded shaft 9 operating in the internally screw-threaded shaft 10 causes extension or retraction of said shaft 10 which causes pivotal movement of the bell crank 18 about the axis of the pin 18b on which it is mounted. When the head and foot sections of the bed are to be raised progressive operation of the levers 20 and 19 cause the head section to be elevated first, after which the stop 26 engages the lever 19 and forces the same into engagement with the foot rest section 23, which subsequently raises the same. It will be noted that a lever 20 may be positioned on each side of the bed and a bell crank 18, together with a link 21 may also be positioned on each side

of the bed in connection with the shaft 18b to equalize the pressure of elevation of the head and foot sections 22 and 23. During rotative movement of the shaft 3 in the extension or the retraction of the head and foot rest portions of the bed the limit switch stops 11 and 12 traverse the shaft 3 longitudinally thereof and alternately engage the resilient arms 14a and 15a of the limit switches 14 and 15 for opening the same and breaking the circuit to the motor 1 for preventing the same from forcing the head and footrest portions 22 and 23 beyond a certain desired position. The stop guide 13 prevents rotation of the limit switch stops 11 and 12, except for the purposes of adjustment at which time the guide 13 is removed and the stops 11 and 12 may be adjusted longitudinally of the shaft 3 as desired. In the event the electrical power fails and it is desired to elevate the head and foot sections 22 and 23 of our power-operated adjustable bed manually, the cap 27a is removed from casing 27, exposing the open end 3d of the shaft 3. The manual operating handle 16 at its end portion 16b is inserted in the open end of the shaft 3 and forced inwardly until the notched portion 16b engages the bolt 5b; the handle 16 is further forced inwardly until the spring 8 is compressed and the detent clip 17a engages the annular groove 3e in the outer side of the shaft 3 at its extending end. When the detent clip 17a is engaged in the annular groove 3e, the notched portion 16b maintains the teeth 5c of the worm wheel 5 out of a mesh with the externally helical form of the worm 4, permitting the shaft 3 to operate independently of the motor 1. The manual operating handle 16 being crank-shaped is rotated about the axis of the shaft 3, carrying with it the worm wheel 5 and the shaft 3 together with the externally screw-threaded shaft 9 on which the internally screw-threaded shaft 10 traverses. The mechanical clutch provided by the worm 4 and worm wheel 5 is a very simple and very positive clutch mechanism, easily operated by the manual operating handle 16. The worm wheel 5 moving longitudinally of its axis slides out of mesh very readily from the helical form at the periphery of the worm 4. When the spring clip detent 17 is released from the annular groove 3e in the shaft 3 the spring 8 forces the manual operating handle 16 outwardly of the shaft 3, and causes engagement of the teeth 5c of the worm wheel 5 with the external helical form of the worm 4, whereupon motorized operation of our power-operated adjustable bed may be resumed.

Though we have shown and described a particular construction, combination and arrangement of parts and portions, we do not wish to be limited to this particular construction, combination and arrangement, but desire to include in the scope of our invention the construction, combination and arrangement substantially as set forth in the appended claim.

Having thus described our invention what we claim as new and desire to secure by Letters Patent is:

In a power-operated adjustable bed, a rotatable hollow shaft, a worm operatively supported axially transverse to said shaft, power means for driving said worm, a worm wheel mounted on said shaft for movement longitudinally thereof and adapted to engage with and disengage from said worm, means for holding said worm wheel against rotative displacement relative to said shaft, said means comprising a bolt in connection with said worm wheel, said hollow shaft having

slotted side walls through which said bolt extends, spring means supported within said hollow shaft exerting its bias upon said bolt for positioning said worm wheel on said shaft for engagement with said worm, a pair of limit switches in spaced relationship to one another for controlling the operation of said power means, limit switch stop members externally screw-threaded on said main rotatable shaft for movement longitudinally thereof, guide means arranged to prevent rotation of said limit switch stop members on said shaft, said limit switch stop members adapted to engage said limit switches individually on rotation of said shaft a certain number of revolutions, the particular limit switch engaged dependent on the direction of rotation of the shaft, and a manual operating handle insertable in said hollow shaft and engageable with said bolt for moving said worm wheel laterally of the axis of said worm against the bias of said spring means to disengage said worm wheel from said worm.

GRAHAM D. McVICKER.
EUGENE L. HOLSTON.

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