June 28, 1966 C. W. WISE Re. 26,044

DRIVE MEANS FOR A WHEELED VEHICLE

Original Filed Nov. 19, 1959 4 Sheets-Sheet 1

Fig. 1.

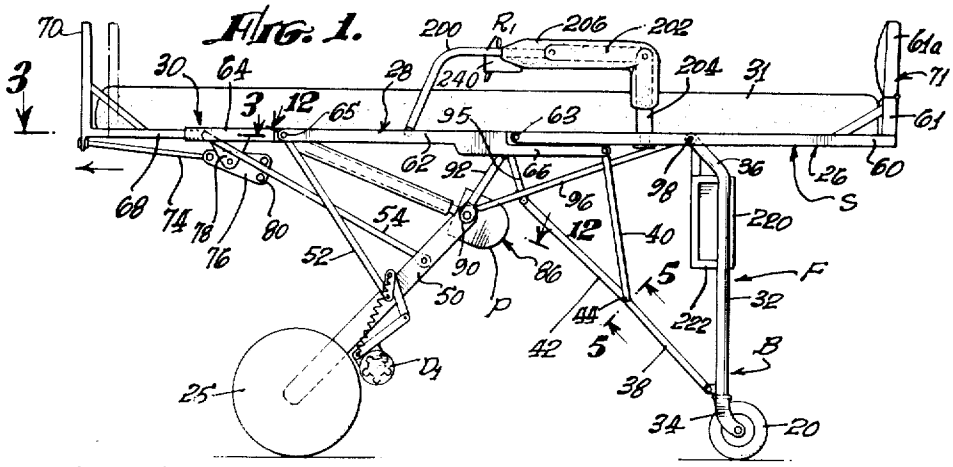


Fig. 3.

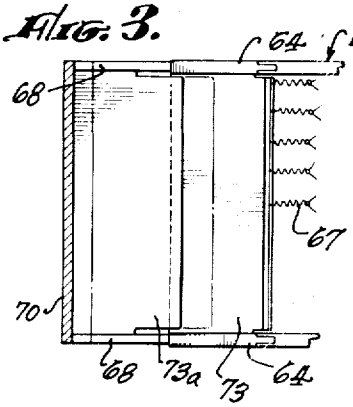


Fig. 4.

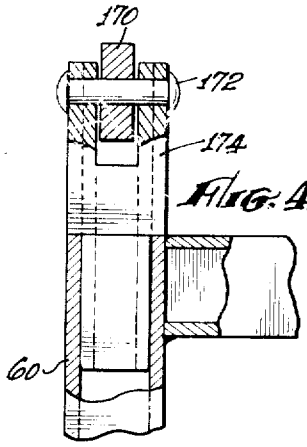


Fig. 5.

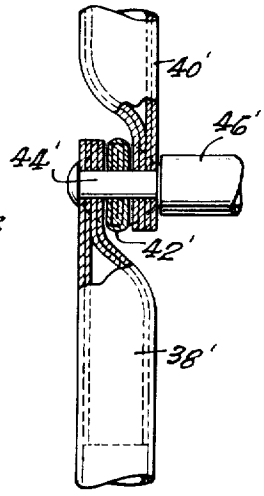
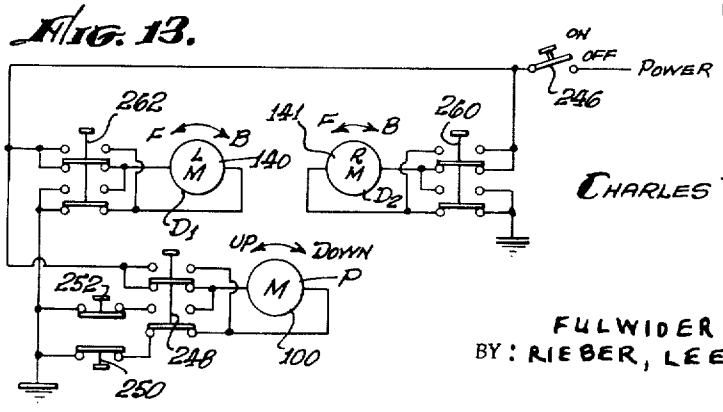


Fig. 13.



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FIG. 2.

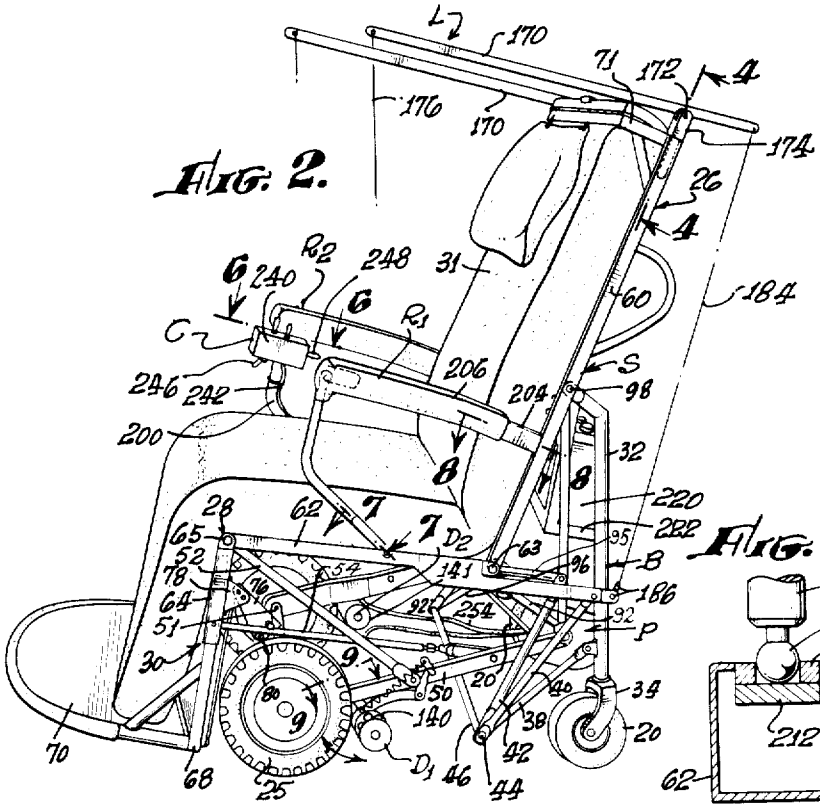


FIG. 7.

FIG. 11.

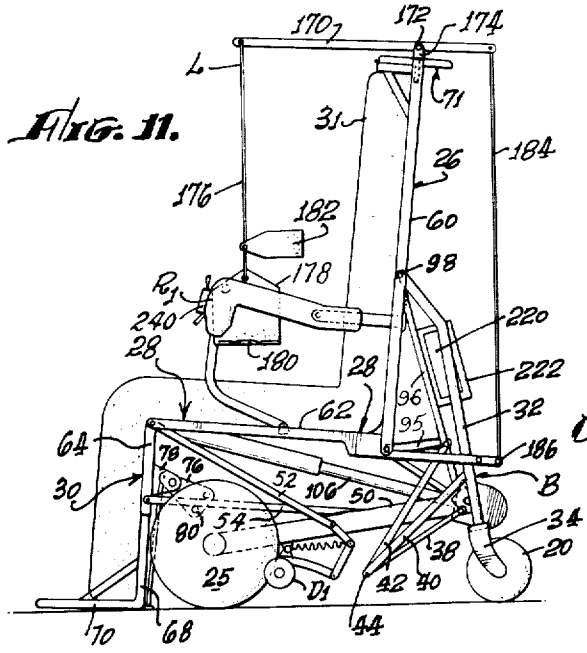
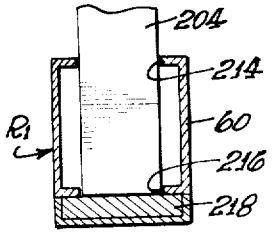


FIG. 8.



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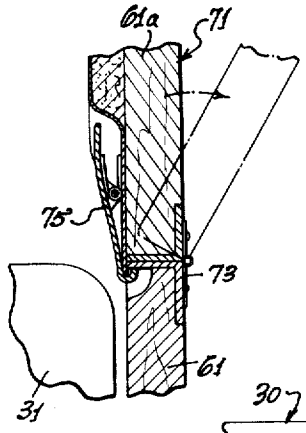
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DRIVE MEANS FOR A WHEELED VEHICLE

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FIG. 10.



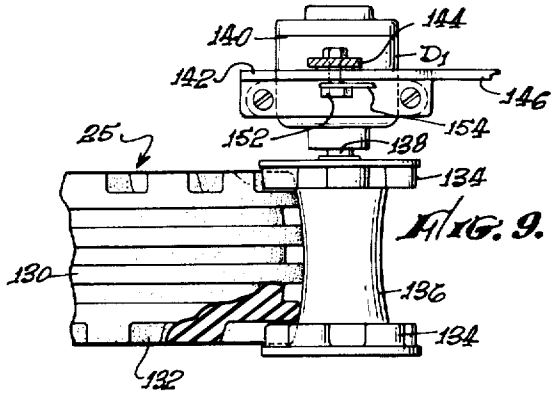


FIG. 9.

FIG. 12.

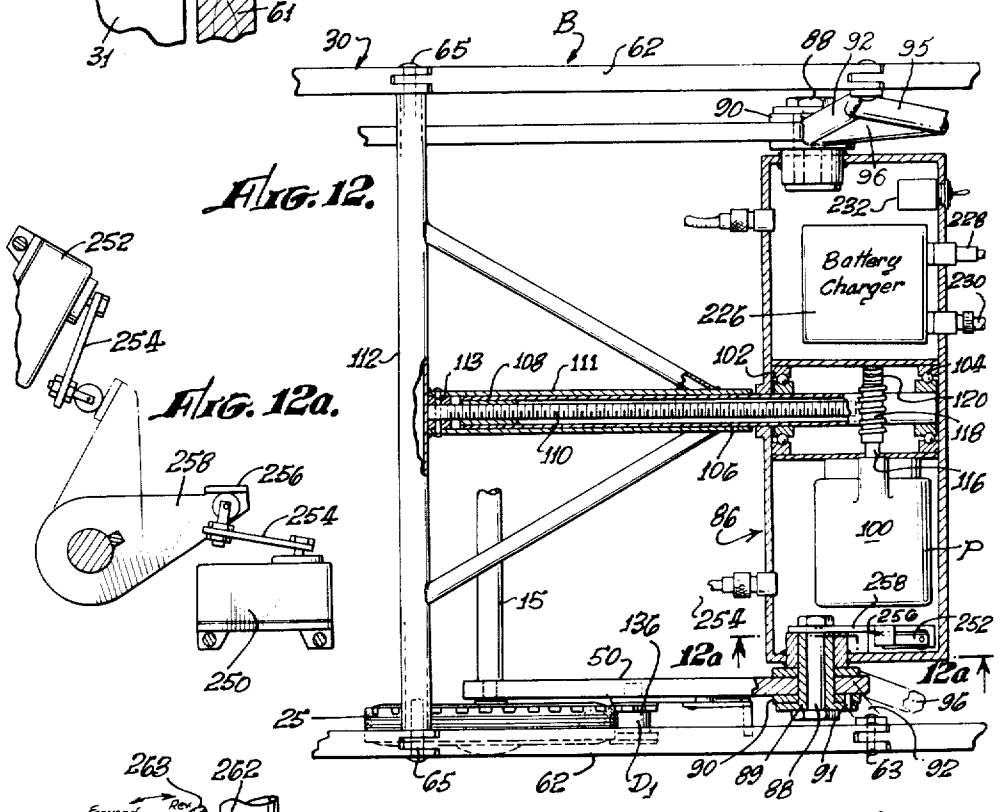
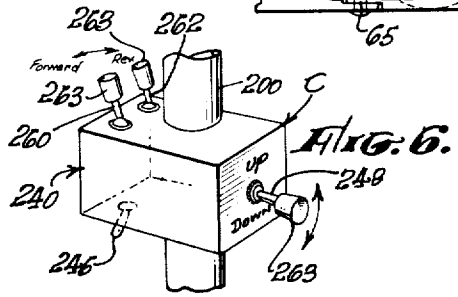


FIG. 12a.

FIG. 6.



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DRIVE MEANS FOR A WHEELED VEHICLE

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FIG. 14.

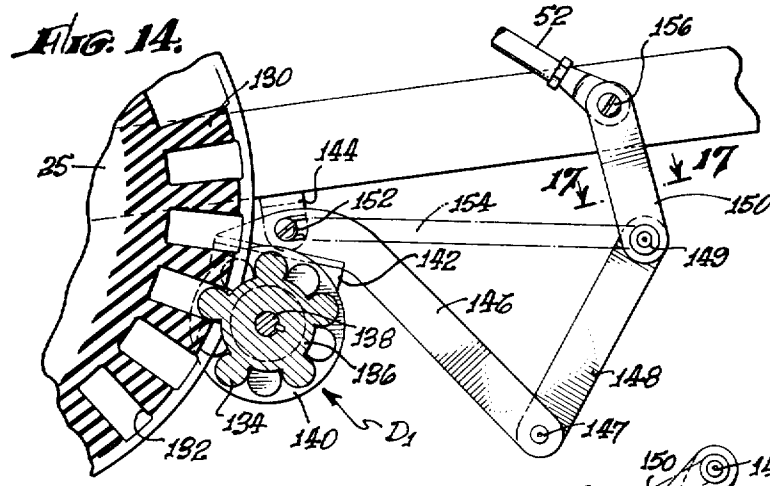


FIG. 15.

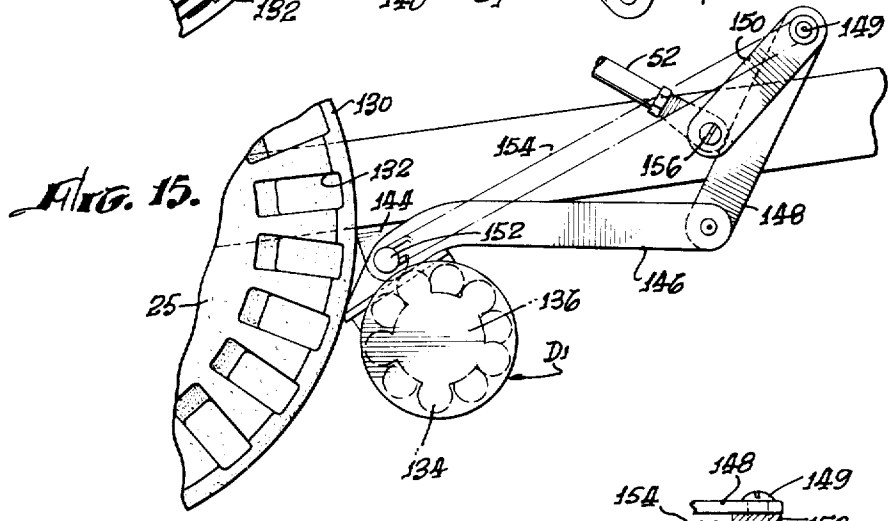


FIG. 17.

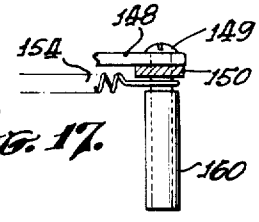
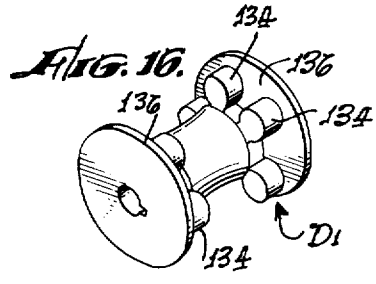


FIG. 16.



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26,044

DRIVE MEANS FOR A WHEELED VEHICLE

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Original No. 3,112,001, dated Nov. 26, 1963, Ser. No. 221,220, Sept. 4, 1962, which is a division of Ser. No. 854,152, Nov. 19, 1959, now Patent No. 3,094,713, dated June 25, 1963. Application for reissue Oct. 12, 1965, Ser. No. 497,601

4 Claims. (Cl. 180—74)

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This is a division of my application Serial No. 854,152, filed November 19, 1959, now Patent No. 3,094,713.

The present invention relates generally to *a drive means for a wheeled vehicle* [an invalid's bed] and more particularly to *a drive means for* an invalid's bed which is adapted to support a patient in various reclining positions between a supine and a sitting position.

The difficulties involved in handling partially or completely paralyzed bed-ridden patients, especially patients having a heavy body structure, are well known. With existing invalid handling equipment it is generally necessary to employ several nurses in order to attend to the invalid's needs.

It is a major object of the present invention to provide a foldable invalid's bed which permits a single nurse to readily manipulate an invalid so as to attend to his every need.

It is another object of the invention to provide a foldable invalid's bed which is capable of supporting an invalid in various reclining positions and is power-driven between such positions. Although various forms of invalid beds have been heretofore-proposed which have been capable of supporting a patient in various reclining positions, such beds must generally be manipulated between positions by a nurse rather than the patient himself. Thus, where a nurse is not constantly in attendance, the invalid must wait until the nurse becomes available.

A further object is to provide a power-driven invalid's bed of the aforedescribed nature which may be controlled by the invalid himself.

Yet a further object is to provide a foldable invalid's bed incorporating an integral patient lift adapted to automatically raise the invalid off the bed's mattress as the parts of the bed are removed from a position to support the patient in a supine condition to a position wherein he will be supported in a seated condition. With the patient raised free of the mattress the linen may be readily changed. Additionally, a portable commode may be inserted and removed from underneath the patient.

Another object is to provide an invalid's bed of the aforedescribed nature which is provided with completely self-contained driving means controllable by the patient thereby permitting the patient complete freedom of movement from place to place.

Another object is to provide an invalid's bed of the aforedescribed nature having a foot rest that is automatically retracted to clear the floor as the bed is moved from a bed-defining position to a chair defining position whereby a bed of maximum length for a given height is provided.

Yet another object is to provide a unique driving arrangement for the traction wheels of *a wheeled vehicle such as* a power-driven patient-operated bed.

A still further object is to provide an invalid's bed having a novel removable arm rest and guard rail arrangement.

It is yet a further object of this invention to provide an

invalid's bed of the aforedescribed nature which is simple in design and rugged of construction.

An additional object is to provide an invalid's bed which is compact in size and comparatively light in weight whereby it may be easily moved from one location to another. Thus, the invalid may join others in various activities such as dining, watching television, etc.

A particular object of the invention is to provide a foldable invalid's bed which is usable as a conventional wheel chair when arranged in its chair-defining position. When so arranged, the invalid may maneuver the device exactly as he would a conventional wheel chair.

These and other objects and advantages of the present invention will become apparent from the following detailed description, when taken in conjunction with the appended drawings, wherein:

FIGURE 1 is a side elevational view of a preferred form of invalid bed embodying the present invention, said bed being arranged in a bed-defining position to support the invalid in a supine condition;

FIGURE 2 is a perspective view showing said bed arranged in a chair-defining position to support the invalid in a seated condition;

FIGURE 3 is a fragmentary horizontal sectional view taken on line **3—3** of FIGURE 1;

FIGURE 4 is a fragmentary sectional view in enlarged scale taken on line **4—4** of FIGURE 2;

FIGURE 5 is a fragmentary sectional view in enlarged scale taken on line **5—5** of FIGURE 1, but showing a modified form of link connection;

FIGURE 6 is a perspective view generally on line **6—6** of FIGURE 2;

FIGURE 7 is a vertical sectional view in enlarged scale taken on line **7—7** of FIGURE 2;

FIGURE 8 is a sectional view in enlarged scale taken on line **8—8** of FIGURE 2;

FIGURE 9 is a perspective view in enlarged scale taken on line **9—9** of FIGURE 2;

FIGURE 10 is a fragmentary vertical sectional view showing a headrest member of said bed;

FIGURE 11 is a side elevational view showing the parts of said bed arranged in an unloading position and equipped with a sling for lifting the invalid from the bed;

FIGURE 12 is a sectional view in enlarged scale taken on line **12—12** of FIGURE 1;

FIGURE 12a is a fragmentary side view showing an electric limit switch arrangement utilized with said bed;

FIGURE 13 is an electrical circuit utilized with said bed;

FIGURE 14 is a fragmentary vertical sectional view in enlarged scale showing a clutch mechanism utilized with said bed and arranged in a driving position;

FIGURE 15 is a view similar to FIGURE 14 but showing said clutch mechanism disengaged;

FIGURE 16 is a perspective view of an element of said clutch mechanism; and

FIGURE 17 is a fragmentary sectional view taken on line **17—17** of FIGURE 14.

GENERAL ARRANGEMENT

Referring to the drawings and particularly FIGURE 1 thereof, the preferred form of invalid bed embodying the present invention includes a base member B and a foldable body-supporting member S. The base member B is formed with a rear ground-engaging means, such as a pair of rear wheels **20**. The base member B includes a fixed portion and a longitudinally movable portion. The longitudinally movable portion is provided with front ground-engaging means, such as a pair of front or traction wheels **25**. The body-supporting member S includes a back portion **26**, a buttock portion **28** and a leg portion **30**. The front and rear ends of the buttock portion **28**

are respectively pivotally interconnected to the rear end of the leg portion **30** and the front end of the back portion **26**. Power-operated means P are interposed between the base member B and the body-supporting member S. Additional power-operated means D1 and D2 are provided on the base B for engagement with the front or traction wheels **25**. The power-operated means P and D1, D2 are adapted to be controlled by the invalid. Control means C for these power-operated means are provided within easy reach of an invalid resting upon the mattress **31** of the body-supporting member S. The power-operated means P is adapted to move the body-supporting member S from a bed-defining position of FIGURE 1 wherein it will support an invalid in a supine condition to a chair-defining position of FIGURE 2 wherein it will support the invalid in a seated condition and to an unloading position shown in FIGURE 11. The invalid bed embodying the present invention also incorporates a patient lift L, shown particularly in FIGURE 11. This patient lift L is adapted to lift the invalid off the mattress **31** of the body-supporting member S when the bed is in its unloading position.

THE BASE MEMBER B

More particularly, the fixed portion of base member B includes a pair of parallel, vertically extending columns **32**. The lower ends of these columns **32** are pivotally attached to the casters **34** of the aforementioned rear wheels **20**. The integral upper portion of these side elements **32** extend generally forwardly as indicated at **36**. The lower portions of these side elements **32** are pivotally connected to the rear ends of a first pair of link elements **38**. The front ends of each of these link elements **38** are pivotally secured to a second pair of link elements **40** and a third pair of link elements **42**. As indicated in FIGURE 2, the link elements **38**, **40** and **42** on each side of the base B are pivotally interconnected by means of pivot pins **44** that are integrally formed at opposite ends of a horizontally extending crossbrace **46**. Preferably, the side elements **32** and the links **38**, **40** and **42** are of tubular metallic construction. The upper ends of the links **40** and **42** are pivotally connected to the body-supporting member S in a manner to be hereinafter described. In FIGURE 5 there is shown a modified form of link connection wherein like parts bear primed reference numerals.

The base B also includes a pair of parallel, elongated struts **50**, the lower ends of which rotatably support a transverse axle **51** for the traction wheels **25**. The intermediate portions of the struts **50** are pivotally connected to a first pair of links **52** and a second pair of links **54**. The opposite ends of the links **52** and **54** are pivotally connected to the body-supporting member S in a manner to be described hereinafter. The struts **50** also support the aforementioned driving means D1 and D2 for the traction wheels **25**.

THE BODY-SUPPORTING MEMBER S

The body-supporting member S includes three longitudinally aligned pairs of rail elements, designated **60**, **62** and **64** which define the sides of the back **26**, buttock **28** and leg **30** portions, respectively. The front ends of the back rail elements **60** are pivotally connected to the intermediate portion of the buttock rail elements **62** by pins **63**. The buttock rail elements **62** each includes a horizontal extension **66** disposed at a lower elevation than and underlying the front portion of the back rail elements **60**. The front ends of the buttock rail elements **62** are pivotally connected to the rear ends of the leg rails **64** by pins **65**. Conventional mattress supporting springs **67** extend between the aforedescribed rail elements, as indicated in FIGURE 3.

As indicated in FIGURES 1 and 3, the front portion of the leg portion **30** is longitudinally extendable relative to the front portion of leg rails **64**. Thus, the front portions of the rails are of open-ended tubular construction so as to telescopically slidably receive extensions **68**. The front ends of these extensions **68** extend upwardly, relative to FIGURE 1, so as to support a foot rest **70**. A headboard, generally designated **71**, is supported at the rear end of the back rails **60** in a manner to be fully described hereinafter. The foot rest **70** is longitudinally movable between its solid and dotted outline positions of FIGURE 1 by means of a tension rod **74**. The front end of this tension rod **74** is affixed to the underside of the foot rest **70**. The rear end of the tension rod **74** is affixed to a bell crank plate **76**. The intermediate portion of this plate is pivotally connected to a lug **78** that depends from the underside of one side of the front portions of the leg rails **64**. The rear portion of the bell crank plate **76** is formed with a pair of actuating pins **80**. These actuating pins are disposed on either side of one of the aforementioned links **54** and are butted by said link during movement of the bed from its position of FIGURE 1 to its position of FIGURE 2 so as to effect automatic retraction of the foot rest **70** relative to the body-supporting member S in a manner to be more fully described hereinafter. Preferably, the leg rails **64** are interconnected by sliding panels **73** and **73a** rather than springs **67**, the panel **73a** extending between extensions **68**, as shown in FIGURE 3.

The aforementioned power-operated means P is disposed in a transversely extending power housing, generally designated **86**. As indicated in FIGURE 12, the opposite ends of the power housing **86** carry pivot bolts **88** that rotatably extend through bushings **89**. The latter each extends through a pair of aligned bores formed in bifurcations **90**. The bifurcations **90** are locked to bushings **89** by pins **91**. The upper portion of each of these bifurcations is rigidly affixed as by welding to a short link **92**, the upper end of which is connected to the pivot pin **63** that interconnects the front ends of the back rails **60** with the intermediate portions of the buttock rails **62**, as indicated in FIGURE 1. The bushings **89** rotatably extend through the upper ends of the aforementioned struts **50**. The bifurcations **90** are also each rigidly affixed to an actuating link **96**, the rear end of which is connected to the pivot pin **98** that secures the upper ends of the columns **32** to the intermediate portion of the back rails **60**. A rigid link **95** has its opposite ends rigidly affixed as by welding to the upper end of link **92** and the intermediate portion of link **96** to retain links **92** and **96** against relative movement. In the interest of clarity the links **92** and **96** are shown in plan view at the upper portion of FIGURE 12 from a point slightly above the line **12—12** of FIGURE 1. The lower portion of FIGURE 12, however, shows these elements as seen from line **12—12** of FIGURE 1. The upper end of each link **92** is pivotally connected to the intermediate portion of link **96**.

Referring to FIGURE 10, the rear ends of the back rails **60** are connected with the lower portion **61** of the headboard **71**. The upper end of the latter is pivotally connected to the upper portion **61a** of the headboard **71** by a hinge plate unit **73**. This permits the portion **61a** to be folded rearwardly from its solid outline position of FIGURE 10 to its folded position of FIGURES 2 and 11. A suitable latch **75** is interposed between the headboard portions **61** and **61a**.

THE POWER-OPERATED MEANS P

Referring now particularly to FIGURE 12, the power-operated means P includes a conventional electric motor **100** that is disposed within one side of the aforementioned power housing **86**. The midportion of the housing **86** supports a pair of longitudinally aligned bearings **102** and **104** which rotatably support the rear end of a longitudinally extending drive tube **106**. The front portion of the drive tube **106** carries an internally threaded drive nut **108**. A rearwardly extending pusher member such as a drive screw **110** extends into this nut **108**. This drive screw **110** is encompassed by a tubular grease shield **111** having its front end welded to a cross-piece **112**. The front end of

the drive screw **110** is rigidly affixed to the front end of the grease shield by a pin **113**. The outermost ends of the cross-piece receive the pins **65** that pivotally interconnect the front ends of the buttock rails **62** and the rear ends of the leg rails **64**.

The shaft **116** of the electric motor **100** is rigidly affixed to a worm gear **118**. The teeth of this worm gear **118** mesh with a pinion **120** formed on the portion of the drive tube **106** between the aforementioned bearings **102** and **104**. With this arrangement, rotation of the motor **100** will effect concurrent rotation of the drive tube **106** and hence the nut **108**. Such rotation of the nut **108** will in turn effect concurrent longitudinal movement of the power housing **86** relative to cross-piece **112**. The motor **100**, gear **118**, pinion **120**, drive tube **106** and nut **108** thus act as a drive means for actuating the pusher member or drive screw **110**.

THE DRIVE MEANS D1 AND D2

The drive means D1 and D2 are mirror images of one another and are employed respectively with the front or traction wheels **25**. As indicated particularly in FIGURES 9 and 14, the sides of the periphery of the rubber tires **130** of the traction wheels **25** are formed with radially inwardly extending grooves **132**. These grooves **132** are adapted to receive complementary cogs **134** formed on the sides of the drive spools **136**. The drive spools **136** are keyed to the shafts **138** of electric motors **140** and **141** forming a part of the drive means D1 and D2. If desired, the drive [spools **136**] *cogs 134* could take the form of rotatable rollers formed of Teflon or the like. As indicated in FIGURE 9, each electric motor is supported by a depending bracket **142**. The upper midportion of each bracket **142** is pivotally affixed to a lug **144** that depends from the intermediate portion of one of the struts **50** just rearwardly of a point of the strut aligned with the periphery of its respective tire. The upper portion of each bracket **142** is formed with an integral rearwardly extending arm **146**. The rear end of such arm **146** is pivotally connected by a pin **147** to the front end of a toggle arm **148**. The rear portion of such toggle arm **148** is pivotally connected by a pin **149** to the free end of a short toggle crank **150**. The upper end of each crank **150** is pivotally connected to its respective strut **50** at a point **156** rearwardly of its respective lug **144**. The pivot pin **152** which pivotally interconnects the lug **144** to the upper portion of its respective bracket **142** extends sidewardly so as to receive the front end of a conventional coil toggle spring **154** (FIG. 17). The rear end of this spring **154** is received by a sideward extension of the pivot pin **149** interconnecting the rear end of the toggle arm **148** and the free end of the toggle crank **150**. As indicated in FIGURE 14, the pivot pin **156** that connects the toggle crank **150** to strut **50** also connects the lower end of link **52** to such strut.

With this arrangement, either spool **136** may be moved forwardly to its position of FIGURE 14 when it is desired to effect rotation of the traction wheels **25**. At this time the cogs **134** of the spools will engage with the grooves **132** of the tires **130**. The spools will be maintained in engagement with the tires **130** by virtue of the tension applied to the free end of the toggle arm **148** by the spring **154**. When it is desired to disengage the spools **136** from the tires **130**, it is merely necessary to effect counterclockwise movement of the toggle crank **150** to its position of FIGURE 15. This may be readily accomplished by means of a sidewardly extending control handle **160** which is supported by the pivot pin **149**, as shown in FIGURE 17. With the toggle crank **150** arranged in its over-center position of FIGURE 15 the spring **154** will maintain the crank in this position once the axis of the pivot pin **149** has been moved over a straight line extending between the axis of the pivot pin **152** and the axis of the pivot pin **156**. With this arrangement, the tires **130** can be worn down as much as one-third and yet the cogs **134** will properly mesh with grooves **132**.

THE PATIENT LIFT L

The patient lift L is preferably removably affixed to the invalid's bed of the present construction. This patient lift L includes a pair of rigid arms **170**. The intermediate portion of each of these arms is pivotally connected by a pivot pin **172** to a mounting bracket **174**. Each mounting bracket **174** is adapted to be removably telescopically disposed within the rear ends of the aforedescribed back rails **60**, as shown in FIGURES 2 and 4. The front ends of the arms **170** are each affixed to a depending flexible element, such as a cable or chain **176**. The cables **176** have their opposite ends secured to the sides of a sling **178** that conform to and receives the buttocks of a patient disposed upon the mattress **31**. Preferably, the sling **178** will be formed with an aperture **180** whereby it may be employed with a portable commode (not shown). The intermediate portions of the chain **176** are affixed to the sides of a back-rest auxiliary sling **182**. The rear ends of the arms **170** are affixed to the upper ends of a second pair of flexible elements or cables **184**. The lower ends of these cables **184** are affixed to a suitable mounting bracket **186** which is telescopically removably disposed within the rear ends of the buttock rails **62**. With particular reference to FIGURE 11, the length of the cables **176** and **184** should be such that with the bed disposed in its unloading position the sling **178** will be supported above the buttock portion **28** of the mattress **31**.

THE GUARD RAILS G

Referring to FIGURES 1 and 2, it should be noted that the body-supporting member S incorporates a pair of jointed guard rails R1 and R2. Each guard rail has its front end pivotally removably connected to the intermediate portion of the rail elements **62** of the buttock portion **28** and its rear end removably affixed to the intermediate portion of the rails **60** of the back portion **26**. Each guard rail consists of an angular front element **200** having its rear end pivotally affixed to a straight intermediate element **202** and a straight rear element **204** pivotally connected to the rear end of the intermediate element **202**. Preferably, suitable padding **206** will cover all of the intermediate element **202** and a portion of the front and rear elements **202** and **204**.

Referring now to FIGURE 7, the front end of the front element **200** is integrally formed with a steel ball **208**. This ball is shown removably disposed within a brass washer **210** that is rigidly affixed to the rail **62**. A permanent magnet **212** is secured to the underside of the brass washer **210**. With this arrangement, when the steel ball **208** is disposed within the confines of the washer **210** the permanent magnet **212** will restrain the inadvertent withdrawal of the ball therefrom. This affords a pivotable connection between the front element **200** of the guard rails R1 and R2 and the rails **62**. Referring now to FIGURE 8, the rear end of the rear element **204** of each guard rail extends through aligned openings **214** and **216** formed in the back rail **60**. A permanent magnet **218** is supported by the underside of each back rail **60** in vertical alignment with the openings **214** and **216**. Since the guard rail element **204** is of steel construction once its rear end has been disposed within the openings **214** and **216**, the permanent magnet **218** will serve to restrain inadvertent withdrawal of the element **204** from the openings **214** and **216**.

Referring now particularly to FIGURE 2, it will be observed that the elements of the aforedescribed guard rails R1 and R2 pivot so as to provide a pair of arm rests when the bed is disposed in its chair-defining position of this figure. When it is desired to provide ready access to the mattress **31**, the guard rails R1 and R2 may be readily removed. In this manner, changing the bedding may be more easily accomplished than if the guard rails were permanently affixed to the body-supporting member

S. Also, the patient may more readily enter and leave the bed.

THE CONTROL MEANS C

Electric current for the electric motors **100**, **140** and **141** of the power-operated means **P** and the power-operated means **D1** and **D2**, respectively, is provided by means of a conventional electric storage battery **220** carried within a suitable bracket **222**. The upper end of the bracket **222** is pivotally affixed to the intermediate portion of the back-supporting portion **26**. Referring to FIGURE 12, a conventional battery charger **226** is mounted within the power housing **86** opposite the electric motor **100**. The battery charger **226** may be connected to domestic house current by suitable conduit means **228** and to the battery **220** by conduit means **230**. With continued reference to FIGURE 12, a master switch and circuit breaker **232** will preferably be mounted within the power housing **86**. The provision of this device will permit a nurse to prevent an invalid from operating a bed against orders. The master switch and circuit breaker **232** will be connected to the battery **220** by suitable conventional wiring (not shown).

With the master switch and circuit breaker **232** in an "on" position, a patient disposed upon the bead may effect control over the power-operated means P, **D1** and **D2** by the control means C, such means including a switch box **240** which is mounted upon the front element **200** of the guard rail **R2**, as clearly shown in FIGURE 2. The switch box **240** is connected by suitable wiring **242** to the electric motors **100**, **140** and **141**. The control box **240** includes a number of conventional electric switches. Switch **246** extends from the underside of the switch box **240**. This switch **246** serves as a patient-operated master switch and when moved to an "off" position cuts off all flow of electric current from the battery **220** to the electric motors **100**, **140**, **141**. A second switch **248** extends from the rear of the switch box **240**. This switch **248** controls the flow of electric current to the electric motor **100** of the power-operated means P that effect movement of the bed between its bed-defining position of FIGURE 1 and its unloading position of FIGURE 11.

Referring now particularly to FIGURES 12 and 12a, the switch **248** operates in conjunction with upper and lower limit switches **250** and **252** secured within the power housing **86** just outwardly of the electric motor **100**. These limit switches **250** and **252** are of conventional microswitch type construction and include an actuator leaf **254** which when depressed serves to cut off the flow of electric current to the motor **100**. The actuating leaves **254** of the limit switches **250** and **252** are adapted to be engaged by a finger **256** formed at the free end of an actuator arm **258**. The opposite end of the actuator arm **258** is supported by the pivot bolt **88** and is locked against rotation relative to the bushing **89** in a suitable manner. The mode of operation of the limit switches will be described fully hereinafter. A pair of electric switches **260** and **262** extend from the upper portion of the switch box **240** in side-by-side relationship. Referring to FIGURE 6, the left-hand switch **260** controls the operation of the electric motor **140** of the left-hand drive means **D1**. The other switch **262** controls the operation of the electric motor **141** of the right-hand drive means **D2**. These electric motors are connected to the battery **220** by suitable wiring **254**.

Preferably, the switches **248**, **260** and **262** are provided with thimbles **263** permitting a patient to effect movement of these switches by his fingertips. Switches **246**, **248**, **260** and **262** are preferably spring-biased to a neutral position.

OPERATION

Referring to FIGURE 1, the parts of the afore-described invalid bed are shown arranged in position to support an invalid in a bed-defining supine condition, the back portion **26**, buttock portion **28** and leg portion **30** of the body-supporting member S being disposed in horizontal alignment. Generally, at this time the headboard **71** will be arranged with its upper portion **61a** in an upstanding position. If the invalid desires to assume a partially reclining position, he will move the switch **248** on the switch box **240** to the left relative to FIGURE 6 so as to cause the electric motor **100** to rotate. Referring now to FIGURE 12, such rotation of the electric motor **100** will cause the drive screw **110** to urge the power housing **86** downwardly and rearwardly relative to its position of FIGURE 1. Such movement will cause the struts **50** to be pivoted downwardly and rearwardly towards their positions of FIGURE 2. The cross-piece **112** will likewise be moved downwardly and rearwardly from its position of FIGURE 1 towards its position of FIGURE 2. In this manner the back, buttock and leg portions of the body-supporting member S will undergo a folding movement towards their positions of FIGURE 2. When the body-supporting member S has assumed a desired partially reclining position, the patient may return the electric switch **248** to a central position so as to cut off further flow of electric current to the motor **100**. The body-supporting member S will then remain locked in its partly folded position.

Assuming now that the patient wishes the bed to assume its unloading position of FIGURE 11 instead of a partially reclining position, he will maintain the electric switch **248** in its left-hand position. The electric motor **100** will then continue to run until the body-supporting member S has reached its position of FIGURE 11. As the latter reaches this position the finger **256** of the actuator arm **258** will engage the leaf **254** of the upper limit switch **250**, so as to automatically cut off further flow of electric current to the motor **100**. The body-supporting member S will then remain in its unloading position of FIGURE 11 until the electric switch **248** is again moved. Assuming the patient wishes the bed to resume its bed-defining position of FIGURE 1, he need only move the switch **248** to its right-hand position of FIGURE 6. The electric motor **100** will then rotate until the body-supporting member S is in its horizontal position. When it has reached this position the actuator leaf **254** of the limit switch **252** will be engaged by the finger **256** of the actuator arm **258** as indicated in FIGURE 12a so as to automatically shut off further flow of electric current to the motor **100**. It will be apparent that the switch **248** may be operated by a nurse or other attendant rather than the patient.

Assuming now the patient wishes to have the bed driven from one location to another, he will first cause the spools **136** of the drive means **D1** and **D2** to be moved to their driving position of FIGURE 14. This is accomplished by means of the handle **160**. With the drive spools disposed in this position the cogs **134** thereof will be engaged with the grooves **132** of the tires **130**. Thereafter, movement of the switches **260** and **262** forwardly will cause the electric motors **140** and **141** to drive the front wheels **25** forwardly. If the patient wishes the bed to undergo rearward movement, he will move the switches **260** and **262** rearwardly. In order to effect turning of the bed in either direction it is only necessary to advance one switch and move the other rearwardly. In order to stop rotation of the electric motors **140** and **141** the switches **260** and **262** will be arranged in an upstanding position. With the switches in this position and the drive spools **136** engaged with the tires **130**, the wheels **25** will be effectively braked against rotation. Thus, the bed will be securely locked against inadvertent movement should, for example, it be desired to remove the patient therefrom. When the bed is to be moved by an attendant, the drive spools **136** may be retracted to their position of FIGURE 15.

It should be particularly noted that as the body-supporting member S is folded from its bed-defining position of FIGURE 1 to its unloading position of FIGURE 11,

the foot rest **70** will be retracted from its solid outline position of FIGURE 1 to its dotted outline position therein. Such movement will be permitted by the longitudinal shortening of the mattress **31** which takes place as the latter is folded. The foot piece **70** undergoes such retraction under the influence of the tension rod **74**, the bell crank **76** undergoing clockwise rotation under the influence of the link **54** as will be apparent by a comparison of FIGURES 1 and 11. This retraction of the foot rest **70** insures that it will clear the floor when the bed is arranged in its unloading position of FIGURE 11 whereby the foot rest will be disposed at floor level for the unloading of a patient. This construction permits the bed to have a maximum length for a given height.

It should additionally be noted that the wheel base and the various linkages of the aforedescribed bed do not extend beyond the width of the body-supporting member S, as will be apparent from FIGURE 12. Accordingly, the mattress **31** can be made wide enough to comfortably accommodate a patient and yet the bed can be readily manuevered through a standard size door.

Another important advantage of the aforedescribed construction is that the columns **32** will always be disposed in a generally vertically extending position when the bed is to be moved from one location to another. This permits the rear wheels **20** to caster freely.

Various modifications and changes may be made with respect to the foregoing detailed description without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. In an invalid's bed, the combination of, a base member having a pair of traction wheels formed with resilient tires, the radially outer sides of said tires being formed with a plurality of circumferentially spaced, radially inwardly extending grooves with the intermediate portion of said tires being of greater diameter than said radially outer sides; a motor for each of said traction wheels, said motor driving a spool and said spools each being formed with cogs that are complementary to and consecutively insertable within said groves so as to effect rotation of said traction wheels; support means on said base member for each of said spools, said support means maintaining said spools in a driving position wherein they engage the peripheries of said tires or alternatively in a disengaged position spaced from said peripheries; and control means for said motors operable by an invalid when in said bed.

2. In an invalid's bed, the combination of, a base member having a pair of traction wheels formed with resilient tires, both radially outer sides of said tires being formed with a plurality of circumferentially spaced, radially inwardly extending grooves with the intermediate portion of said tires being of greater diameter than said radially outer sides; a motor for each of said traction wheels, said motor driving a spool and said spools each being formed on either side with cogs that are complementary to and consecutively insertable within said grooves so as to effect rotation of said traction wheels; support means on said base member for each of said spools, said support means maintaining said spools in a driving position wherein they engage the peripheries of said tires or alternatively in a disengaged position spaced from said peripheries, resilient means interposed between said support means and said base member normally biasing said spool towards said driving position; and control means for said motors operable by an invalid when in said bed.

3. A drive for an invalid's conveyance or the like, comprising: a pair of traction wheels formed with resilient tires, the radially outer sides of said tires being formed with a plurality of circumferentially spaced, radially inwardly extending grooves with the intermediate portion of said tires being of greater diameter than said radially outer sides; motor means for said traction wheels, said motor means driving a pair of spools and said spools each being formed with cogs that are complementary to and consecutively insertable within the grooves of one of said tires so as to effect rotation of said traction wheels; and means to maintain said spools in either a driving position wherein they engage the peripheries of said tires or alternatively in a disengaged position spaced from said peripheries.

4. In a wheeled vehicle having a pair of traction wheels, each of which is provided with a resilient tire having its opposite, radially outer sides formed with a plurality of circumferentially spaced, radially inwardly extending grooves and further having the portion of said tire intermediate said outer sides of greater diameter than said outer sides, the combination of: drive means for said traction wheels including a pair of rotatable spools engageable with said traction wheels, respectively, each of said spools mounting a plurality of circumferentially arranged elements that are complementary to and consecutively insertable in said grooves of one of said tires to effect rotation of said traction wheels upon rotation of said spools; and means for maintaining said spools in engagement with said traction wheels for driving said traction wheels, and operative for moving said spools out of engagement with said traction wheels.

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