May 29, 1956 C. E. DAWSON 2,747,203

BED LIFT

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Fig. 1

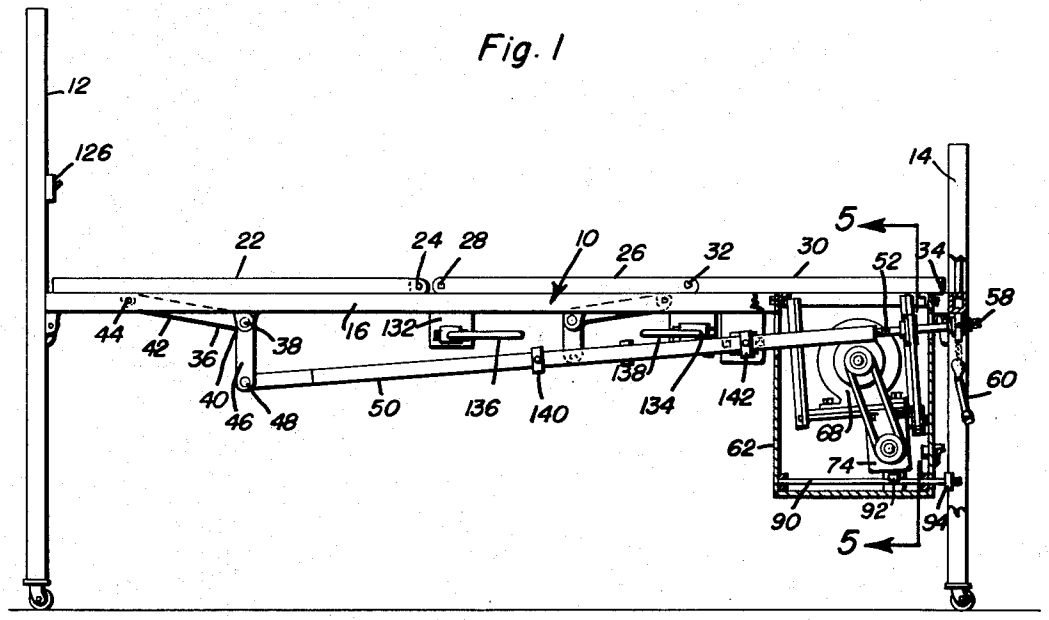


Fig. 3

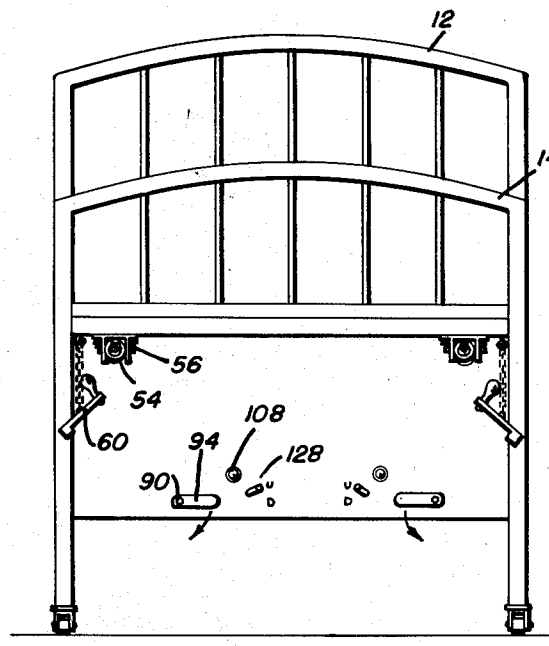
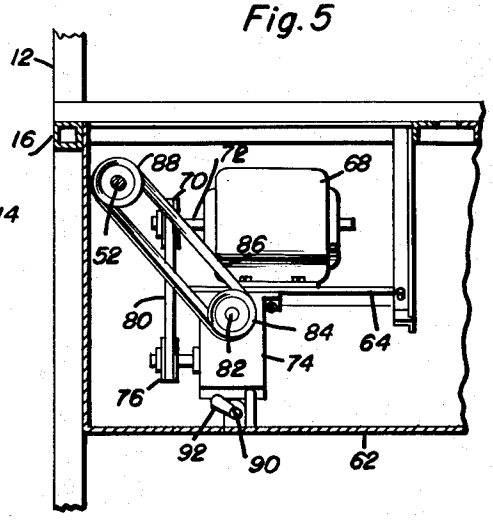


Fig. 5



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Fig. 2

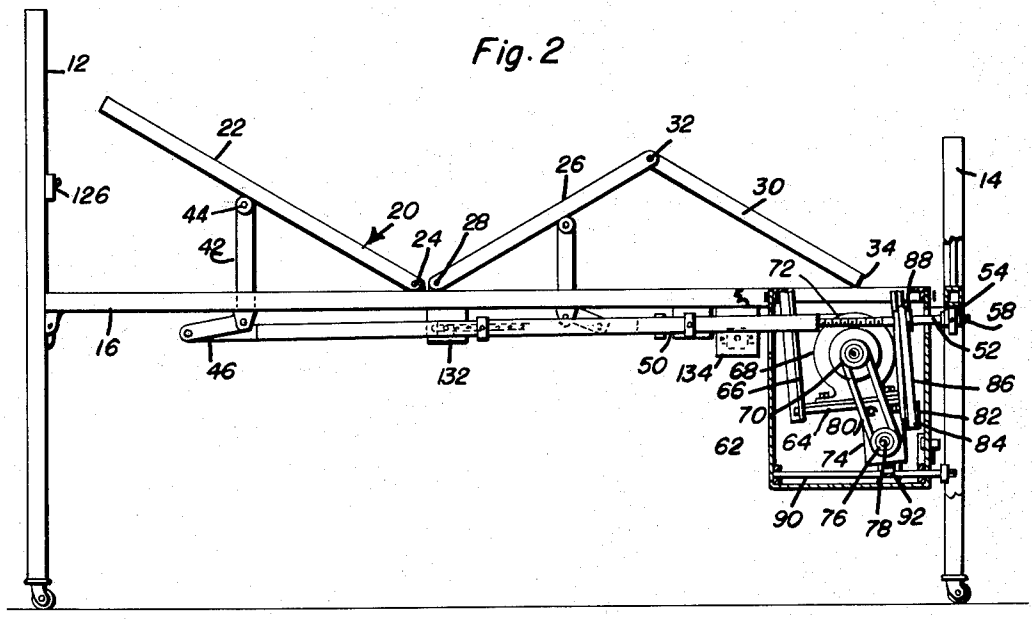


Fig. 4

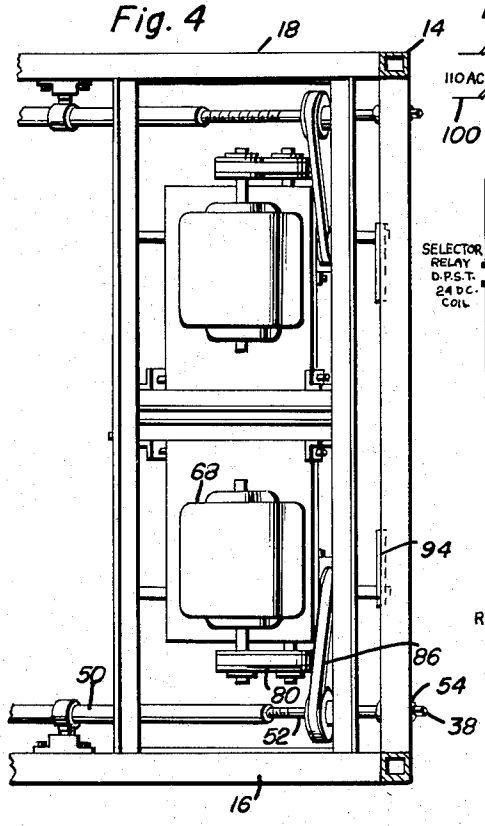
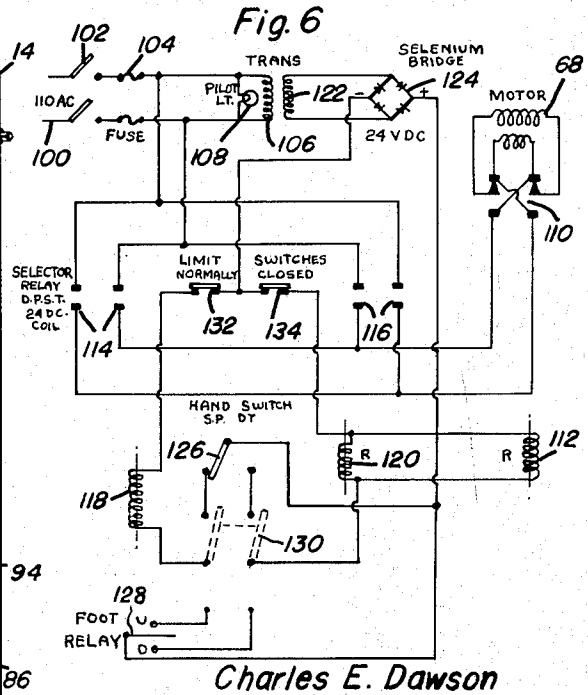


Fig. 6



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2,747,203

BED LIFT

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Application July 18, 1952, Serial No. 299,671

1 Claim. (Cl. 5—69)

This invention relates to a bed lift and particularly for a device for adjusting the angle of the supporting platform of an invalid's bed.

In the operation of invalids' beds such as those used in hospital or the so-called hospital beds it is customary to provide a bedstead or bed frame on which is provided a platform which is divided into a plurality of sections with a pivot point intermediate the ends of the supporting platform so that the supporting platform may be elevated in angular relation about the pivot point to aid in selecting a comfortable position for the patient. A well-known type of such bed has provided a head section somewhat less than half of the length of the supporting platform and having a bell crank supported on the frame and attached to the section so that when the bell crank is operated the section will be raised to lift the upper portion of the patient to an angle which is more comfortable than lying flat down. The remaining section is generally provided with a middle pivot with a bell crank operating adjacent the middle pivot so that the section can be elevated in the middle at a point adjacent the knees of the patient so that the knees of the patient can be elevated with the heels depending in a normal sitting relation. Such beds have heretofore been operated by hand cranks usually by means of a screw operating in a nut which is connected to the bell crank lever operating levers. For safety and sanitation reasons the nuts are generally preferred in the form of long tubes with internal threads which in at least one position substantially enclose a longitudinally extending screw one end of which is anchored on the bed frame. A hand crank is usually provided for operating the screws and this requires considerable muscular exertion particularly if a heavy patient must be raised with the platform.

The present invention provides a motor driven operating device for the bed lift which can be readily controlled either by the patient or by the nurse so that a power driven device performs the necessary heavy work of adjusting the platform sections to comfortable positions.

This is accomplished by means of a motor mounted under the platform or preferably on the frame of the bed and having a driving connection from the motor to the screw adjusting device. Preferably the tension on the driving connection is provided by the weight of the motor and a suitable cam arrangement is provided for lifting the motor so that the driving connection can be rendered inoperative so that the hand crank may be utilized in the event of power failure or other accident.

It is accordingly an object of the invention to provide an improved bed lifting device.

It is a further object of the invention to provide a motor driven bed lift.

It is a further object of the invention to provide a bed lift which may be controlled either by the patient or by the nurse.

It is a further object of the invention to provide a motor driven bed lift which may be rendered inoperative if desired.

Other objects and many of the attendant advantages of the invention will be apparent from the following detailed description taken in conjunction with the accompanying drawing, in which:

Figure 1 is a side elevation of an invalid bed in retracted position;

Figure 2 is a similar view of the bed in elevated relation;

Figure 3 is an end elevation of the bed;

Figure 4 is a top plan view of the power plant of the bed lift;

Figure 5 is a sectional elevation of the lift taken substantially on the plane indicated by the line 5—5 of Figure 1; and

Figure 6 is a schematic wiring diagram for the bed lift.

In the exemplary embodiment of the invention, an invalid's bed indicated generally at **10** is provided with a head board **12** and a foot board **14** connected together by side rails **16** and **18**. A supporting platform **20** usually of somewhat resilient construction is provided with a head section **22** pivoted to the side rails **16** and **18** at **24** and a foot section having an intermediate section **26** pivoted to the side rails **16** and **18** adjacent to the point **24** at the point **28** and a foot section **30** having one end pivotally connected to the section **26** at the point **32** and having the other end slidably associated with the rails **16** and **18**.

A bell crank lever **36** is pivotally mounted on a cross rod **38** mounted in ears **40** of the side rails **16** and **18**. One end **42** of the bell crank **36** is in contact with the section **22** and preferably is provided with a roller **44** engaging the edges of the section **22**. The other end **46** of the bell crank **36** is pivotally connected by means of a pivot **48** with a substantially tubular nut like member **50**. The nut-like member **50** being provided with internal threads as is well-known. A driving screw **52** extends into the tubular member **50** and is threadedly engaged with the interior thereof. The outer end of the screw **52** is journaled in a bearing **54** pivotally mounted in a U-shaped bracket **56** secured to the foot board **14**. The extreme end of the member **52** being provided with an out-of-round shank **58** being engaged by a hand crank **60** for turning the screw member when power is not available.

The heretofore described bed construction is well-known and no part of the present invention.

The power operating device of the present invention comprises a housing **62** rigidly mounted under the framework of the bed and preferably adjacent the foot board **14**. Enclosed within the housing **62** is a motor mounting platform **64** which has a hanger **66** attached to one side thereof with the hanger **66** being pivotally connected adjacent the top of the housing **62**. A motor **68** preferably of the reversible type is mounted on the platform **64** and has a sheave **70** mounted on the central shaft **72** thereof. A gear box **74** is mounted on the platform **64** and preferably in suspended relation therewith and carries a sheave **76** mounted on the drive shaft **78** extending into the gear box **74**. A driving connection such as a belt **80** is entrained over the sheaves **70** and **76** to supply power to the gear box which drives a stud shaft **82** on which is mounted a sheave **84** on which is entrained a belt **86** which is likewise entrained over a sheave **88** which is mounted in non-rotative relation on the screw **52**.

The belt **86** supports one side of the platform **64** so that the weight of the motor and the gear box **74** supplies sufficient weight to tension the belt **86** to provide driving tension between the sheaves **84** and **88**. A

crank shaft **90** is journaled in the lower portion of the housing **62** and has a cam **92** engaging a portion of the driving mechanism such as the gear box **74** operable by a lever **94** so that the cam may be utilized to lift the platform **64** and relieve the tension on the belt **86** so that the hand crank **60** may be utilized to operate the screw **52** without the necessity of driving the motor and the gear box arrangement.

Activating energy is supplied to the motor **68** by means of a supply circuit **100** having a control switch **102** and protective fuses **104**. A transformer **106** is connected across the line **100** and is energized when the switch **102** is closed and the condition of the switch **102** is indicated by the signal lamp **108** also connected across the line **100**. Direction of rotation of the motor **68** is controlled by a reversing switch **110** which is normally biased to stay closed in a single direction. The solenoid **112** being provided for reversing the switch when necessary. An energizing switch **114** connects the line **100** to the motor in one direction of rotation and the switch **116** connects the motor to the line **100** in the other direction of rotation. The switch **114** being controlled by a solenoid **118** and switch **116** being controlled by a solenoid **120**. The solenoids, **112**, **118** and **120** are in a low voltage control circuit energized from a secondary **122** of the transformer **106** through a full wave bridge type rectifier **124**. The switch **126** is provided on the bed frame preferably adjacent the head board **12** within reach of the patient in the bed. Similar switch **128** is mounted on the panel board at the foot of the bed and preferably on the housing **62** and provides a second operating station which is not available to the patient. A selector switch **130** which is likewise not available to the patient is adjustable to connect either the station **128** or the station **126** in operative relation to the control circuit.

Limit switches **132** and **134** are mounted on the frame preferably on the side rails **16** or **18** and have levers **136** and **138** which can be actuated by collars **140** and **142** which are adjustably mounted on the tubular member **50** so that the limit switches **132** or **134** will determine the operation of the motor at any preselected position of the head member **22**. The section **26** is similarly mounted and controlled and as the control for the foot member is substantially identical to the arrangement of lifting and control for the head member the same will not be independently described.

It will thus be seen that dependent upon the position of the switch **130** either the patient or the nurse as the case may be may readily control the position of the section **22** and the stop members **140** and **142** may be adjusted to select the angular position beyond which the section may not be moved. It will also be seen that the motor and the weight thereof will properly tension the drive connection between the motor and the screw so that there will be no slippage thereof regardless of wear or other conditions therein. Likewise the device may be elevated to relieve the tension on the driving shaft so that the device may be manually operated in a case of necessity.

For purposes of illustration a particular embodiment of the invention has been shown, and described according to the best present understanding thereof. It will be apparent to those skilled in the art that changes and modifications can be made therein without departing from the true spirit of the invention.

Having described the invention, what is claimed as new is:

For use in an invalid bed having a pivoted supporting structure and means operable to alter the position of said supporting structure including an actuating screw, an adjusting system comprising a reversible motor, a driving means adapted to connect said motor in driving relation to said screw, a supply circuit for said motor, a control circuit controlling the connection of said supply circuit to said motor, said control circuit being energized at a reduced voltage from said supply circuit, a housing, a motor mounting platform, said motor being mounted on said motor mounting platform, a pivotal connection between one side of said motor mounting platform and said housing, said driving means providing support for the other side of said motor mounting platform, a bell crank pivoted on said housing, said crank being rotatable into supporting relation to said motor mounting platform.

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