Sept. 24, 1957 H. D. HELSEL 2,807,174

HOSPITAL BED

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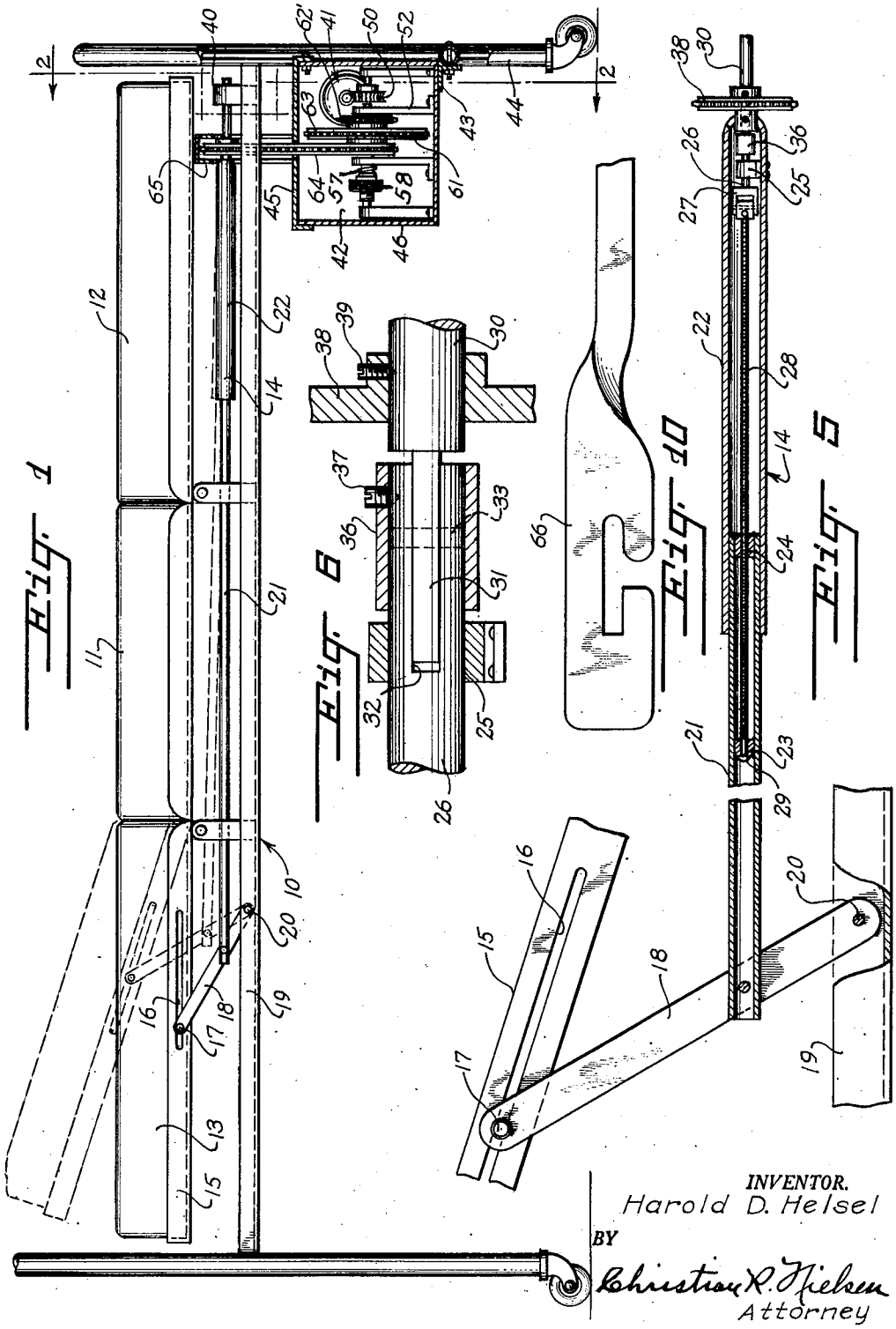

Fig. 1

Fig. 6

Fig. 10

Fig. 5

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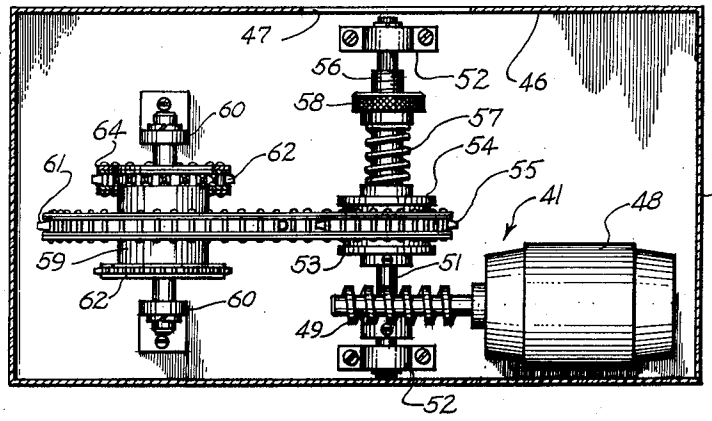

Fig. 3

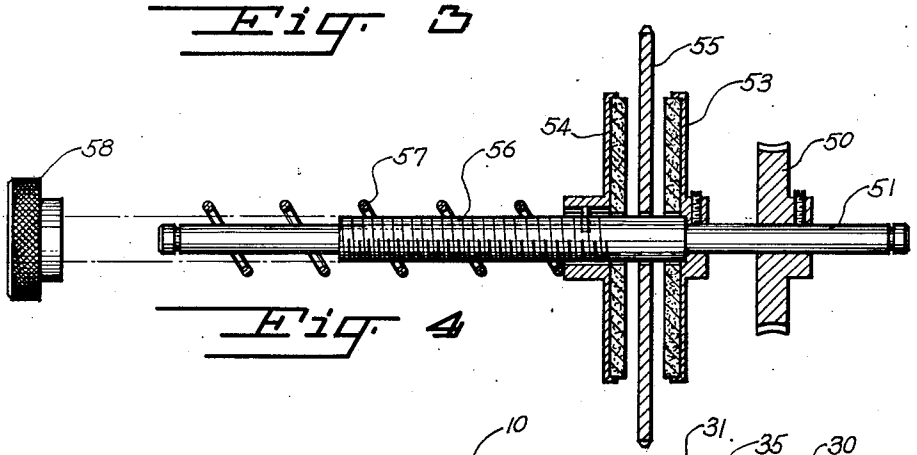

Fig. 4

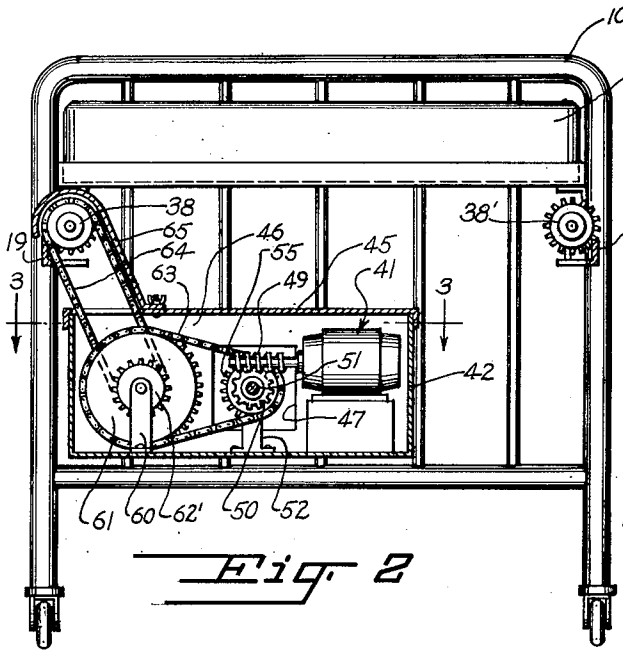

Fig. 2

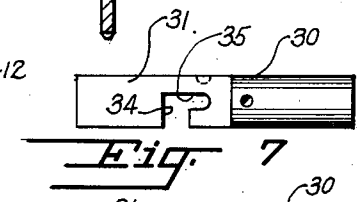

Fig. 7

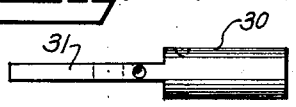

Fig. 8

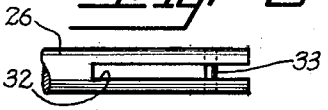

Fig. 9

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HOSPITAL BED

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Application August 3, 1956, Serial No. 602,026

2 Claims. (Cl. 74—722)

This invention relates to hospital beds and more particularly to a motor drive for raising and lowering the head and foot sections thereof and it consists in the constructions, arrangements and combinations herein described and claimed.

More specifically, it is an important object of the invention to provide a motor drive which may be readily installed upon existing hopsital beds without material alteration in the bed structure and one which may be installed for actuating either the head section or the foot section of the bed to meet the requiremens of different patients.

It is a still further object of the invention to provide a friction drive mechanism which will protect the motor from excessive strains under operation and one which will prevent the motor from becoming overloaded when initially started, as well as being quiet and smooth during operation, so as to not excite a patient.

A still further object of the invention is the provision of a drive for a hospital bed wherein a slippage may occur between a pair of friction disks and an interposed drive sprocket, and which further includes an adjusting means for varying said slippage to accommodate varying loads disposed upon the head and foot sections of a hospital bed.

Additional objects, advantages and features of invention will be apparent from the following description, considered in conjunction with the accompanying drawings, wherein,

Figure 1 is a side elevation of an invalid or hospital bed having the motor drive installed, the housing for the drive being shown in section.

Figure 2 is a cross section on the line 2—2 of Figure 1.

Figure 3 is a cross section on the line 3—3 of Figure 2.

Figure 4 is an exploded side elevation of the friction drive parts being shown in section.

Figure 5 is a side elevation of a drive shaft, in section, for raising and lowering the head or foot sections of a bed.

Figure 6 is a fragmentary sectional view illustrating the drive connection between the motor shaft and the shaft for raising and lowering the bed sections.

Figure 7 is a side elevation of a portion of the motor drive shaft.

Figure 8 is a top plan view thereof.

Figure 9 is a fragmentary top plan view of one end of the shaft for raising and lowering the bed sections, and

Figure 10 is a fragmentary side elevation of the operating handle for actuating the shaft of the bed sections when the motor drive is not desired.

There is illustrated an invalid or hospital bed generally indicated by the reference character **10**, which comprises an intermediate spring section **11**, and hingedly connected end sections **12** and **13**, these end sections being raised and lowered as required to meet the needs of a patient.

It should be understood that the sections **12** and **13** are actuated through respective operating means **14**, which

are of identical construction, the operating means for raising and lowering section **13** will be described, attention being invited to Figures 1 and 5 of the drawings. The side frame **15** of section **13** is provided with a longitudinally extended slot **16** receiving a pin **17** secured in one end of a link **18**, the opposite end of said link being pivotally mounted in a side frame **19** of the bed as at **20**.

Movement of the link **18** is effected through telescopically arranged hollow tubing sections **21** and **22**. The tubing section **21** is provided interiorly thereof with a fixed bearing **23** and a threaded nut **24**, the latter being positioned at the end of the tube which is telescopically positioned within the tube section **22**.

The tube section **22** has an interiorly positioned bearing **25** for mounting a drive shaft **26** having a universal joint **27** having operative connection with a screw shaft **28**. The screw shaft **28** is threadedly engaged in the nut **24** and is rotatably mounted in the bearing **23**, the end of the screw shaft being upset as at **29** so that upon rotation of the screw shaft the section **21** may move inwardly and outwardly of the section **22** for raising and lowering the bed section **13**.

In order to apply my drive means to the screw shaft **28**, the convenitional hand lever (not shown) is removed and instead thereof, an adapter shaft **30** is employed (see Figures 6, 7 and 8) wherein it will be seen that the shaft **30** has a reduced flat extension **31** complemental to a longitudinal slot **32** formed in the end of the shaft **26**, there being a pin **33** extending across the slot **32**. The extension **31** is formed with an entrance slot **34** forming communication with a retainer slot **35** (see Figure 7). As clearly shown in Figure 6, a coupling sleeve **36** is mounted on the shaft **26**, the extension **31** is then presented in the slot **32** to admit the pin **33** through the entrance slot **34**, the adapter shaft **30** then being moved inwardly of the slot so that the pin **33** will occupy a position in the retainer slot **35**. The sleeve **36** is then moved to a position overlying the extension **31** and the sleeve is then secured in position by a set screw **37**. A sprocket **38** is fixed to the shaft **30** by means of a set screw **39**, the shaft therebeyond being supported by a bearing **40** on the bed frame.

The motor generally indicated by the reference character **41** is mounted in a housing **42** which is suitably supported by brackets **43** carried by the frame **44** of the bed. The housing **42** includes a cover **45** permitting access to the drive without removal from the bed, although a wall **46** is provided with an opening **47** permitting adjustment of a friction clutch as will be presently described.

Attention is now invited to Figures 2 and 3 of the drawings for an understanding of the drive **41**, which includes a motor **48**, the drive shaft of which is provided with a worm gear **49** in mesh with a gear **50** mounted upon a drive shaft **51** extending transversely with respect to the motor and is rotatably supported in spaced bearings **52** mounted upon the floor of the housing.

With reference to Figure 4, it will be seen that the shaft **51** has fixedly mounted thereon a friction disk **53** and a slidably mounted friction disk **54** and between these friction disks there is a freely rotatable sprocket **55**. The intermediate portion of the shaft **51** is of greater diameter than the respective ends thereof, this portion having screw threads as at **56**. A helical spring **57** encircles the shaft and a knurled nut **58** when engaged with the threads **56** of the shaft will compress the spring so as to urge the sprocket **55** into engagement with the fixed friction disk **53** by virtue of longitudinal movement of the friction disk **54**. The degree of movement of the disk **54** will determine the gripping action or slippage upon the sprocket and this can be regulated by varying the tension of the spring **57** through rotation of the nut **58**.

Also mounted within the housing **42** there is a drum **59** rotatably supported between a pair of bearings **60**. The drum has keyed thereon a sprocket **61** which is in alignment with the sprocket **55** of the friction drive, and upon opposite sides of the sprocket **60**, small sprockets **62** and **62'** are keyed to the shaft of the drum. A sprocket chain **63** is trained about the aligned sprockets **55** and **61** so as to impart rotation to the drum **59**. In order to effect rotation of the screw shaft **28**, a sprocket chain **64** is trained around the sprockets **38** and **62** and preferably a chain guard **65** partially encases the sprocket chain.

In order that the section **12** may be raised and lowered by the drive unit **41**, the unit is reversed and mounted upon the opposite side of the bed, in which event, the sprocket **62'** will be aligned with the sprocket **38'** to receive the chain **64**.

The motor **48** may be controlled by means of any suitable starting and reversing switches now available upon the market.

In the event that a motor drive is not desired, the unit may be readily released from the shaft **26** by releasing the coupling **36**. An operating lever **66** as shown in Figure 10 may then be employed for engaging the pin **33** for manually raising and lowering the bed sections **12** and **13**.

While I have shown and described a preferred form of the device, this is by way of illustration only and I consider as my own all such modifications in construction as fairly fall within the scope of the appended claims.

I claim:

1. In a means for raising and lowering hingedly connected sections of a hospital bed comprising a screw shaft, said shaft having a slotted end, a pin transversely of said slotted end, said means including a coupler shaft complemental to said slotted end and said pin, a sprocket keyed on said coupler shaft, a drive means carried by said bed, said drive means including a housing mounted on said bed, an electric motor within the housing, said motor having a shaft including a worm gear, a shaft mounted in said housing extending transversely of said motor shaft and having a gear in mesh with said worm gear, said transversely extending shaft having a friction clutch consisting of a friction disk fixed to the shaft and a slidable friction disk, a sprocket interposed between said friction disks, a compression spring on said shaft operative against said slidable friction disk and thereby under normal load to transmit rotation of said shaft and sprocket, a drum rotatably mounted in said housing having a sprocket mounted intermediate the length of the drum, said sprocket being in alignment with the sprocket of the friction clutch, a drive chain trained about said sprockets, respective sprockets being mounted at the ends of the drum, one of said sprockets being in alignment with the sprocket on said coupler shaft and a drive chain trained about said sprockets to effect rotation of said screw shaft.

2. The structure of claim 1, wherein a pair of shafts are employed for raising and lowering respective sections of the bed, said drive means being constructed for selective engagement with either of said shafts.

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