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3,401,410

PATIENT HANDLING DEVICE

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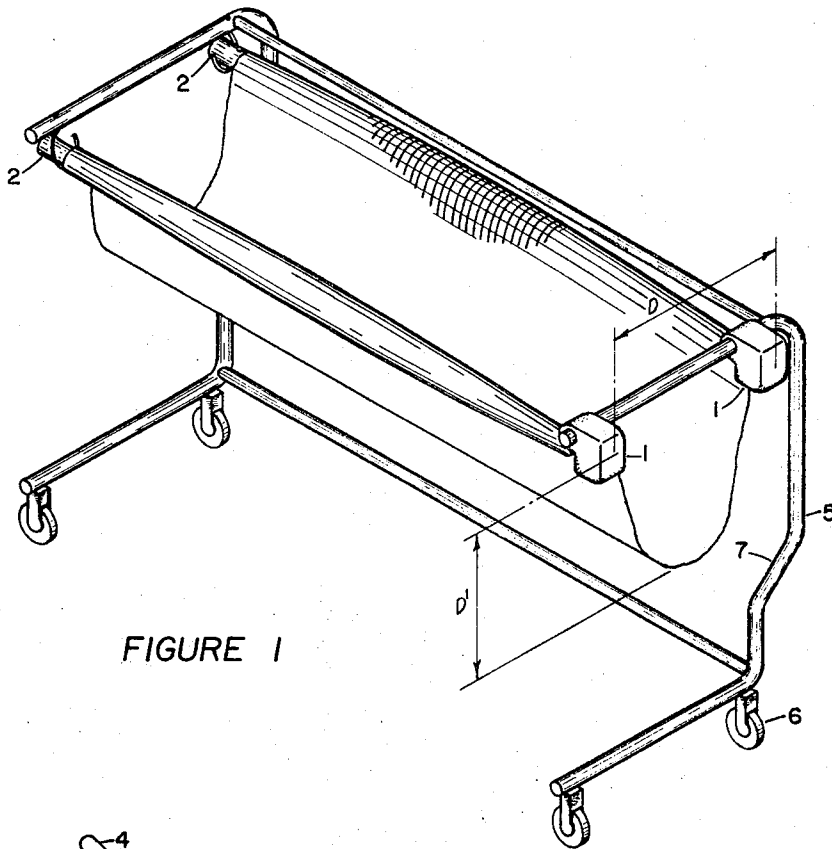


FIGURE 1

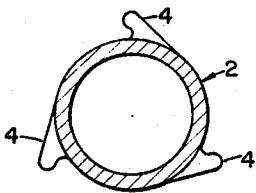


FIGURE 3

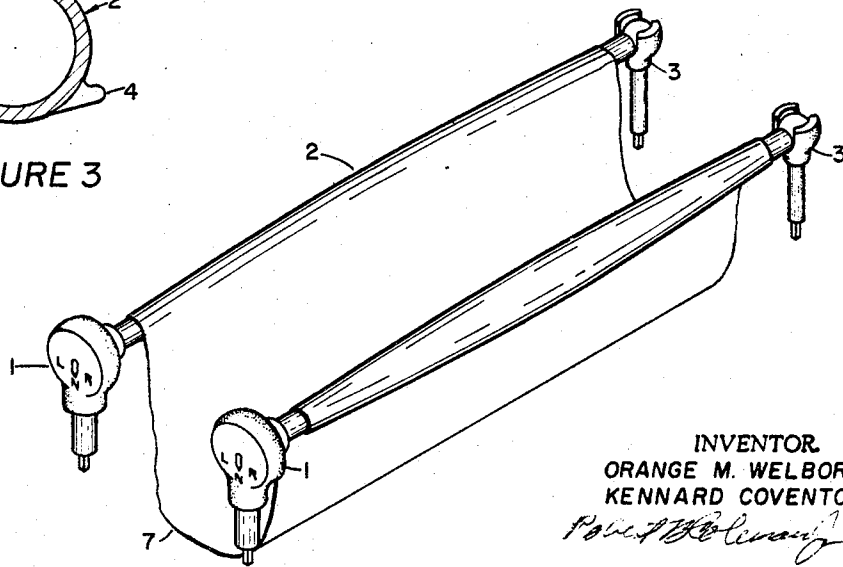


FIGURE 2

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3,401,410

PATIENT HANDLING DEVICE

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ABSTRACT OF THE DISCLOSURE

A patient handling device for lifting, turning, holding and transporting a patient in hospitals, nursing homes and the like with controlled tumbling of the patient where- in a flexible porous fabric is controlled by rolling on a pair of driven side rails, said side rails comprising a plu- rality of angular projections arranged in generally trans- verse planes on the surface of said each of said side rails.

Background

This invention relates generally to the art of handling patients in sickrooms and is particularly concerned with new apparatus for lifting, turning and holding or maintain- ing a desired position during handling and transferring patients.

Many efforts have been made heretofore by workers in the art over a long period of time to devise apparatus by which one person could easily handle a patient who is unable to move about unaided. Some of the apparatus pro- posed were for lifting and lowering patients, others were for turning a patient, while still others were for transfer- ring a patient to or from a bed. However, each of these different classes of prior devices with which we are fa- miliar has one or more serious drawbacks and disad- vantages and none is what might be called universal ap- paratus, i.e., one which is capable of performing all these necessary services with a minimum of manipulation of the patient while being handled by a single attendant. Further, such prior art devices have generally not been well adapted to maintain the body of a patient in a proper position or to facilitate their being moved, rotated or lifted with controlled tumbling of the patient.

It is an object of the present invention to provide ap- paratus for handling a patient in various places, such as at home, in a hospital room or ward, a nursing home, and in conjunction with an X-ray machine, in emergency room, in surgery, in physical therapy and the like, which apparatus is adapted to maintain the patient in a desired position while being elevated, positioned for X-ray, trans- ported and the like.

It is another object of this invention to provide an ap- paratus for turning and holding a desirable position of a patient for X-ray examination or the like without tumbling or unduly maneuvering the patient.

Summary of invention

These and other objects are achieved by use of a novel patient sling and support rails that conform to the body, in combination with individual drive means for the rails, and will be further understood with reference to the specification and the accompanying drawing, in which:

Description of drawings

FIGURE 1 is a schematic drawing of the novel ap- paratus of this invention supported by a preferred trans- porting support means;

FIGURE 2 is a perspective view of the sling device of this invention; and

FIGURE 3 is a section through a side rail of the device.

Detailed description

Referring now to the drawings, and to FIGURES 1 and 2 in particular, there are provided generally a pair of drive

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units 1 which drive and support one end of a pair of side rails 2. These rails engage drive units 1 with a spline or other readily disengageable connection. The other ends of side rails 2 are suitably supported by Y-shaped bear- ing yokes 3 from which side rails 2 can be lifted. Thus, the side rails can readily be removed from the drive units and support yokes and the rails with the engaged fabric 7 left with the patient say on the bed, bath or table. The transporting means 5 can then be utilized with a second set of rails and fabric. Drive units 1 and bearing yokes 3 can be mounted on a transport cart 5 equipped with casters 6 or on a portable cart of the general configura- tion of that shown in FIGURE 1 of U.S. Patent 2,959,791 to Ramsey, issued Nov. 15, 1960. It is also obvious that the support cart can be arranged to enter lengthwise to the desired patient location such as operating table, bath tub, bed or the like. This type of arrangement would be particularly useful in nursing homes for lowering and lift- ing a patient from a bath tub installed to extend length- wise into the room. Alternatively, the drive means and bearing yokes can be adapted to attach to any standard hospital bed in the manner shown generally by FIGURE 1 of U.S. Patent 3,108,290 to Partridge, issued Oct. 29, 1963. The present device is also adapted for use as a port- able stretcher similar to the manner shown in FIGURE 7 of the aforesaid Partridge patent.

Although the support 5 is shown as a rigid fixed struc- ture, it is obvious that one skilled in the art by use of self-locking hinges can construct the portable support in a manner that same can be folded for storage.

We have discovered that a patient is supported in a device of this type much more satisfactorily when the side rails 2 are of a tapered configuration. Thus, we have discovered that side rails of a uniform diameter tend to arch a patient when lifted, because the heaviest portion of the body, i.e. the mid-section, causes the support fabric 7 to stretch in this area, with the result that the body sags here. In contrast, a side rail tapered from a larger diameter at its center section to a smaller diameter at its ends compensates for this sagging by reeling in a greater amount of support fabric in this area. Of course, the de- vice is designed such that the side rails are readily inter- changeable, and rails of special configuration can be used when desired. For example, it may be desired to elevate the feet or the head of a patient at a greater rate than the rest of the body, and, in this instance, a pair of side rails tapered from one large end down to the other small end can be used, whereby the large end causes a greater rate of elevation.

We have also devised a novel and simple manner of at- taching the support web to the side rails, which is shown in FIGURE 3. This figure shows a cross-section of a side rail 2, with one or more angular or arcuate projections 4 on its surface. These projections occur along the entire length of the side rail, and enable the mesh support fabric to be readily attached to the rail. Further unreeling of the fabric from the side rail causes the fabric to quickly and easily detach from the rail. The projections are prefer- ably blunt so as not to harm the patient or attendant working nearby.

We have also discovered that prior art devices tend to tumble the patient when utilized to turn or rotate the patient. For this reason the side rails should be supported sufficiently high above the level the patient is to be maintained that the distance D between side rails is not more than the distance D' from the side rails to the lowest point of the fabric 7. That is, D' should be equal to or greater than the distance D. By rotating one drive shaft clockwise and the other counter clockwise, the patient will be gently raised or lowered. By rotating both drive shafts either clockwise or counter clockwise, the patient will be gently turned in one direction or the other. When

the distance D' becomes less than the distance D, the patient has a tendency to be tumbled.

We have further discovered that the prior art devices of this general type often present a hazard due to the generation of static electricity when a patient is turned over in a prior art fabric or web. We have also found that much of the prior art support fabric is tightly woven or closed mesh which prevents air circulation through the fabric and tends to be hot and is unsuitable for immersing the patient into a bath. Accordingly, we prefer to use a support 7, an open mesh fabric in which are incorporated a pattern of metallized or otherwise electrically conducting fibers which serve to drain off such static charges through the metal side rails or by other suitable means to ground connections, thus eliminating hazards of explosion or fire in an atmosphere of oxygen or anaesthetic vapor. A suitable support fabric comprises a washable plastic open mesh, woven in, e.g., a hexagonal pattern or rectangular pattern. In the latter instance, the fabric can be cut so that the strands are either on a bias pattern or on a longitudinal and transverse arrangement.

Referring next to drive units 1, these can be manually cranked or can be electrically or hydraulically powered and must, of course, be reversible. These units are not interconnected and operate independently of each other. The drive units should be so constructed that the units stop immediately upon power shut off. This can be accomplished, as would be recognized by one skilled in the art, by use of worm gears of sufficient ratio that the side rails are self-locking. Individual electrically driven motors for each side rail are presently preferred, each of said drive motors being controlled from a conveniently located control panel. As shown in the drawing, each drive unit has on it a momenting switch which actuates the motor to rotate the rail to the left or right, and is in a neutral or off position at its center. It will also be obvious that the control switches can be remote from the drive units via a control cable. However, it is important and presently preferred that each side rail can be separately controlled, since it has been discovered that a patient tends to gradually be shifted away from the center of the bed when being turned over if both drive units are activated for an equal number of revolutions especially as the distance D' approaches the distance D. This is caused by the effective radii of the two side rails gradually changing as the fabric reels onto one reel and off the other and to the varying effective radii of a supine patient. With each drive unit capable of being individually activated, this slight drift of a patient off-center can readily be corrected by operating the appropriate drive unit for a slightly longer or shorter interval of time.

In operation, a patient is simply placed onto the support fabric, i.e., the support fabric can be made up as part of the bedding of a hospital bed or stretcher. The lateral edges of the support fabric are then engaged on the fastener projections 4 of side rails 2. The side rails 2 can already be in position on the support device, i.e., engaged in drive units 1 and resting in idler yokes 3, or they can be placed into this position subsequent to having the support fabric engaged thereto. Then, rotation of both drive units so as to reel the fabric onto the side rails causes the patient to be lifted. While lifted, the patient can be turned over by activating the drive units so as to reel fabric onto one side rail and off the other. The patient can, of course, be transported by simply rolling the entire device on its support carriage. Rotation of both drive units so as to unreel the fabric lowers the patient.

The support carriage designed for side-entry to a hospital bed, such as of the type shown by FIGURE 1 of the Ramsey patent, finds greatest use in the emergency ward of a hospital since it can easily place a patient in a desired position on an X-ray table and can then sub-

sequently transfer the patient to a hospital bed. The support of the type fastened to a hospital bed, such as shown in FIGURE 1 of the Partridge patent, finds greatest use for bedfast patients who must be turned over and otherwise tended periodically. Of course, the fabric and side rails interchange between such devices readily so that a patient can easily be transferred from one such type device to another.

Example

A device similar to that shown in the drawing was constructed, using electric drive motors. The side rails were of uniform diameter of about one inch. Various support fabrics were tested, including plastic mesh. It was found that a desirable rotational speed for the drive units to turn the rails was about 14-24 r.p.m. The device operated satisfactorily in all respects, although it was noted that the mid-section of the patient tended to sag slightly in the support fabric. Side rails tapering from about 1" diameter at their ends to about 1/4" diameter at their intermediate portion reduce this sag.

While there has been shown and described a particular embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and, therefore, it is aimed to cover all such changes and modifications as fall within the true spirit and scope of the invention by the appended claims.

What is claimed is:

1. In a patient handling device wherein a pair of individually driven side rails are adapted to reel and unreel a flexible patient support fabric, the improved means for attaching said fabric to one of said rails which comprises a plurality of projections arranged in generally transverse planes on the surface of the said one rail and wherein at least one of said side rails is tapered in diameter so as to have a diameter at one of its ends different than the diameter at an intermediate portion thereof.

2. The device of claim 1 wherein said projections are curved.

3. The device of claim 1 wherein said projections are angular.

4. The device of claim 1 wherein said side rails have a variable diameter from one end to the other.

5. The device of claim 1 wherein said fabric comprises electrically conductive fibers.

6. In a patient handling device wherein a pair of individually driven side rails are adapted to reel and unreel a flexible patient support fabric, the improved means for maintaining a patient in a straight position comprising at least one of said side rails being tapered in diameter such that a diameter at one of its ends is different than the diameter at an intermediate portion thereof.

7. The device of claim 6 wherein the said flexible support fabric supports the center of gravity of said patient at a vertical distance below said driven side rails greater than the horizontal distance between said side rails.

8. The device of claim 7 further having improved means for attaching said fabric to said side rail comprising a plurality of projections arranged in generally transverse planes on the surface of said side rail.

9. The device of claim 7 wherein said fabric comprises a net containing electrically conductive fibers that conform to odd shapes of the body.

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