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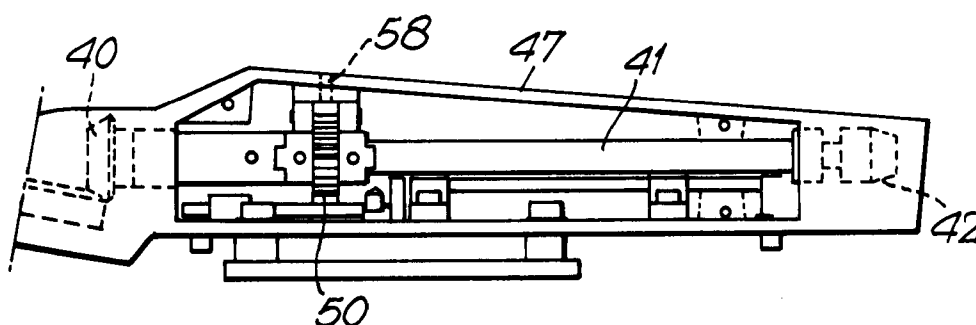
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(54) Patient support tables

(57) A surgical operating table has two leg support sections 2 and 3 made up of an articulated thigh support part 30 and a calf support part 31. A rotatable shaft 41 extends along the thigh support part 30. The shaft 41 has a gear 40 at one end engaging a bevel gear 36 fixed to the table. At the other end, the shaft has a gear 42 engaging a gear 44 in the calf support part 31 so that raising or lowering the thigh support part 31 causes the

calf part to bend in the opposite sense. A pawl 54 is connected to a button 58 and engages a ratchet wheel 50 on the shaft 41. The ratchet allows the shaft 41 to be rotated in one direction, caused by raising the thigh support part 30, but prevents rotation in the opposite direction, and hence lowering of the thigh support part, unless the button 58 is released.

Fig.3.



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Description

This invention relates to patient support tables of the kind having an articulated limb section comprising first and second articulated parts, the first part being connected to the table and the second part being connected to the first part, the first part having a rotatable shaft extending along its length, the shaft being coupled via a gear at one end of the shaft to a cooperating gear such that raising or lowering the first part causes the shaft to rotate, and the shaft having a gear at its opposite end that engages a gear on the second part such that rotation of the shaft causes a raising or lowering of the second part.

Operating tables are available with leg sections for supporting the legs. Each leg section is articulated at the hip and the knee so that the section can be put into various different positions. In one form of such a leg section, the upper part of the section, on which the thigh is supported, has a shaft running along its length. The shaft is coupled at its upper end, towards the hip of the patient, by a bevel gear that engages a fixed gear. At its other end, the shaft has a second bevel gear coupled to a gear attached to the upper end of a lower section, on which the calf is supported. Rotating the upper part of the section about the hip joint to raise the knee causes the shaft to rotate, which in turn causes the lower part of the section to rotate in the opposite sense, to lower the foot end of the lower part. In this way, the leg section mimics the behaviour of the human leg when this is raised. Some form of lock is provided so that the leg section can be fixed at any desired position.

When the leg section lock is released, it is free to be moved in any direction. The leg section can be heavy, especially when supporting the weight of the patient's leg. If the leg section were inadvertently released during manoeuvring, it would be free to fall, with the risk of injuring the patient and theatre staff. It might also cause damage to the operating table itself or to other equipment in the near vicinity.

It is an object of the present invention to provide an improved patient support table.

According to the present invention there is provided a patient support table of the above-specified kind, characterised in that the limb section has a unidirectional device that normally prevents rotation of the shaft in one direction but is releasable to allow rotation in that direction.

The unidirectional means is preferably a ratchet and pawl. The ratchet may be a wheel fixed with the shaft and the pawl may be coupled with a manually-engageable button. The first part of the limb section is preferably coupled with the table by means of a ball joint fixed with the table and a bevel gear displaceable around the ball joint about a vertical axis. The table preferably includes two limb sections arranged to support the legs of a patient, the limb sections being connected with the table at one end of the table, and each first part

supporting a thigh and each second part supporting a calf.

A surgical operating table with two articulated leg sections, in accordance with the present invention, will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a plan view of the table;

Figure 2 is a cut-away simplified plan view showing one of the leg sections;

Figure 3 is a sectional plan view showing the leg section in more detail;

Figure 4 is an enlarged sectional plan view showing the pawl and ratchet in more detail; and

Figure 5 is a simplified view along the arrow V showing the ratchet and pawl.

With reference to Figure 1, the operating table includes a generally rectangular support section 1 mounted at the upper end of a vertical support column (not shown) in the usual way. The rectangular section 1 is adapted to support the head and torso of the patient. The table also has two, narrower leg support sections 2 and 3 mounted at the right-hand, hip end of the torso section 1.

With reference now also to Figures 2 and 3, the leg sections 2 and 3 are of similar construction so only the section 3 for supporting the right leg, will be described. The section 3 has two parts or leaves 30 and 31 arranged to support the thigh and calf respectively. The first, thigh leaf 30 is coupled to the main support section 1 at one end by a joint 32. The joint 32 comprises a ball 33 about which the thigh leaf 30 is rotatable. The ball 33 is fixed at one end of a short arm 35 projecting horizontally from the end of the main support section 1. A bevel gear ring 36 encompasses the ball 33 and is oriented in a vertical plane. The bevel gear ring 36 has a pin that engages a track (not shown) extending horizontally around the ball 33 by about 90°, so that the gear ring can be rotated through about 90° but only about a vertical axis. The gear ring 36 has teeth around its inner face 37 that mesh with teeth around a second bevel gear 40, which forms a part of the joint 32. The second bevel gear 40 is fixed at the left end of a rotatable lay shaft 41 extending axially along the thigh leaf 30 within its outer housing 47. A third bevel gear 42 at the opposite end of the shaft 41 rotates with the shaft. The third bevel gear 42 forms a part of a joint 43 between the thigh leaf 30 and the calf leaf 31 located in the region of the patient's knee. The joint 43 is completed by a fourth bevel gear 44 fixed to a short, horizontal stud shaft 45. The fourth bevel gear 44 lies in a vertical plane and has teeth on its outwardly-facing side 46 meshing with teeth around the third bevel gear 42.

Towards its left-hand, hip end, the shaft 41 has a ratchet wheel 50, as shown in Figures 3 to 5, fixed with it so that the ratchet wheel rotates with the shaft. The wheel 50 has a series of teeth 51 around its edge each of which has one long, shallow edge 52 and another short, steep edge 53. The ratchet 50 is engaged by a catch or pawl lever 54 pivoted midway along its length, which has one end 55 urged by a spring 56 into contact with the teeth 51. The end 55 of the pawl lever 54 is shaped to lie between the steep edge 53 of one tooth 51 and the shallow edge 52 of an adjacent tooth. The other end 57 of the pawl lever 54 is coupled with a manually-engageable release button 58, which extends through an opening 59 in the side surface of the housing 47 to lie flush with its outer surface. The pawl lever 54 allows the shaft 41 to rotate in an anti-clockwise sense, because the end 55 of the lever can ride up the shallow edge 52 of the teeth 51. The pawl lever 54, however, prevents the shaft 41 rotating in the opposite direction because the lever is unable to ride up the steep edge 53 of the teeth. The lever 54 can be lifted from engagement with the ratchet wheel 50, to allow free rotation of the shaft 41 in either direction, by pressing the release button 58 inwardly. When the button 58 is subsequently released, the spring 56 rotates the pawl lever 54 back into engagement with the ratchet wheel 50 to prevent further clockwise rotation. The ratchet 50 and pawl 54, therefore, act as a unidirectional device that can be released to allow rotation of the shaft 41 in the other direction.

The calf leaf 31 is fixed at its left-hand end to the stud shaft 45 to extend radially from the shaft, so that it is rotated with the shaft about its axis.

In use, the two leg sections 2 and 3 can be brought together or abducted by rotating them about the vertical axis 34 through each joint 32 in the region of the hip of the patient. A lock, not shown, is used to clamp the thigh leaf 30 to the ball 33 and prevent further movement about the vertical axis 34 once the desired angle in the horizontal plane has been set. With the thigh leaf 30 horizontal, the calf leaf 31 also extends horizontal, so that the leg section 2 or 3 is flat and straight. The leg sections 2 and 3 can be raised by lifting the knee end of the thigh leaf 30 about the joint 32. As the section 2 or 3 is raised, the second bevel gear 40 rotates around the gear ring 36, thereby rotating the shaft 41 in an anti-clockwise sense, when viewed from the foot end. This rotation of the shaft 41 is permitted by the ratchet and pawl mechanism 50 and 54, without any need to actuate the release button 58. As the shaft 41 rotates, it also rotates the third bevel gear 42 at the knee end of the shaft. This, in turn, causes the fourth bevel gear 44 to rotate and hence causes the shaft 45 to rotate in a clockwise sense when viewed along the arrow II of Figure 2. Rotation of the shaft 45 rotates the calf leaf 31 with it, to lower the foot end of the leaf with respect to the knee end. Thus, as the leg section 2 or 3 is lifted, it bends at the knee joint 43 in a way that mimics the natural flexing of the human leg.

If the person manipulating the leg section 2 or 3 were to let go of the thigh leaf 30 at any time, either deliberately or accidentally, the pawl lever 54 would prevent rotation of the shaft 41 in a clockwise sense and would also, therefore, prevent the leg section dropping. This prevents injury to the patient or to theatre staff that might otherwise be caused by the leg section falling. It also facilitates manipulation, because the leg section can be lifted without the need to release any lock.

When it is necessary to lower the leg section 2 or 3, this is done by raising the thigh leaf 30 slightly to release pressure on the pawl lever 54. The release button 58 is then depressed so that the pawl lever 54 is lifted clear of the ratchet wheel 50, and the shaft 41 can rotate freely in either direction. If the thigh leaf 30 were lowered, it would cause the foot end of the calf leaf 31 to rise relative to its knee end until the thigh leaf reached a horizontal position in which the calf leaf also extends horizontally.

Other forms of unidirectional means could be associated with the shaft to permit movement in one direction but prevent movement in the opposite direction until released.

Claims

1. A patient support table of the kind having an articulated limb section (2, 3) comprising first and second articulated parts (30 and 31), the first part (30) being connected to the table (1) and the second part (31) being connected to the first part, the first part having a rotatable shaft (41) extending along its length, the shaft being coupled via a gear (40) at one end of the shaft to a cooperating gear (36) such that raising or lowering the first part (30) causes the shaft (41) to rotate, and the shaft having a gear (42) at its opposite end that engages a gear (44) on the second part (31) such that rotation of the shaft causes raising or lowering of the second part, characterised in that the limb section (2, 3) has a unidirectional device (50, 54) that normally prevents rotation of the shaft (41) in one direction but is releasable to allow rotation in that direction.
2. A patient support table according to Claim 1, characterised in that the unidirectional device is a ratchet (50) and pawl (54).
3. A patient support table according to Claim 2, characterised in that the ratchet is a wheel (50) fixed with the shaft (41), and that the pawl (54) is coupled with a manually-engageable button (58).
4. A patient support table according to any one of the preceding claims, characterised in that the first part (30) of the limb section (2, 3) is coupled with the table (1) by means of a ball joint (33) fixed with the table and a bevel gear (36) displaceable around the ball joint about a vertical axis.

5. A patient support table according to any one of the preceding claims, including two limb sections (2 and 3) arranged to support the legs of a patient, characterised in that the limb sections are connected with the table at one end of the table, and that each first part (30) supports a thigh and each second part supports a calf.

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Fig.1.

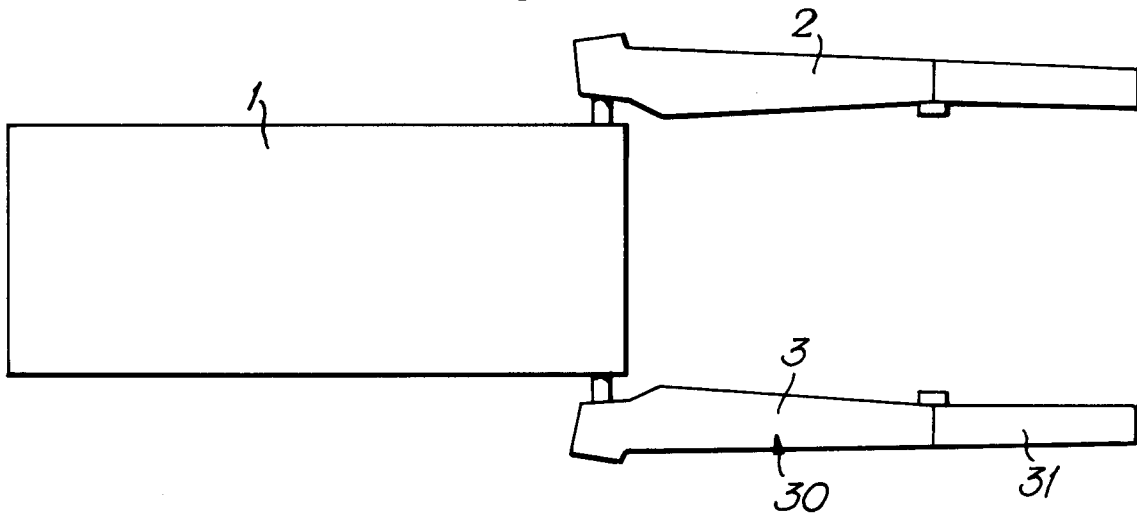


Fig.2.

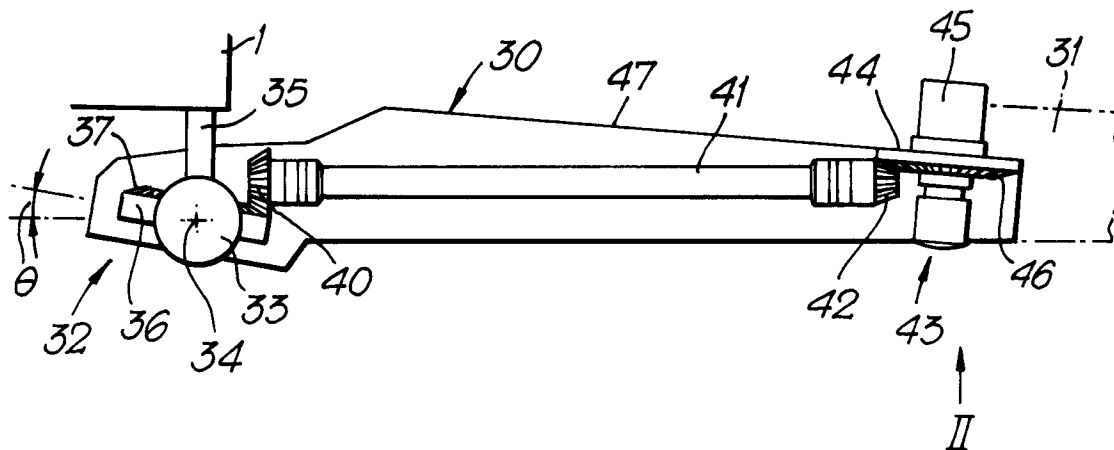


Fig.3.

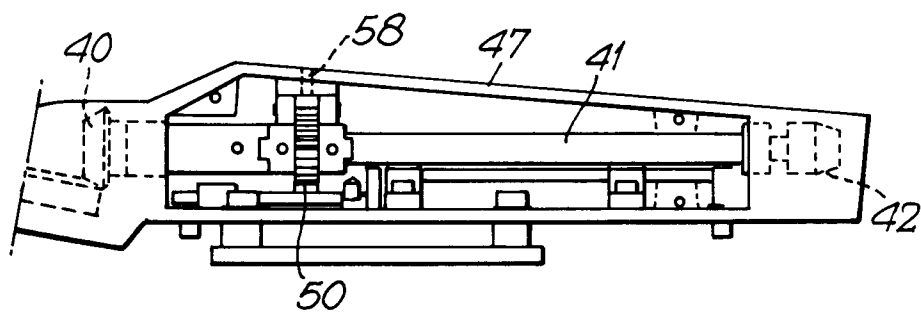


Fig.4.

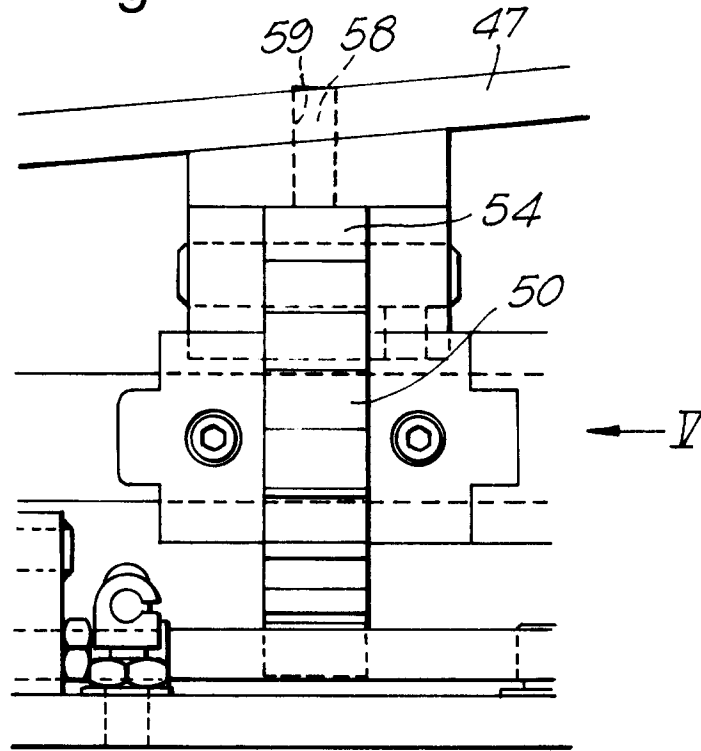


Fig.5.

