Dec. 18, 1956 B. D. JUDOVICH 2,774,349

BED WITH LUMBAR TRACTION APPARATUS

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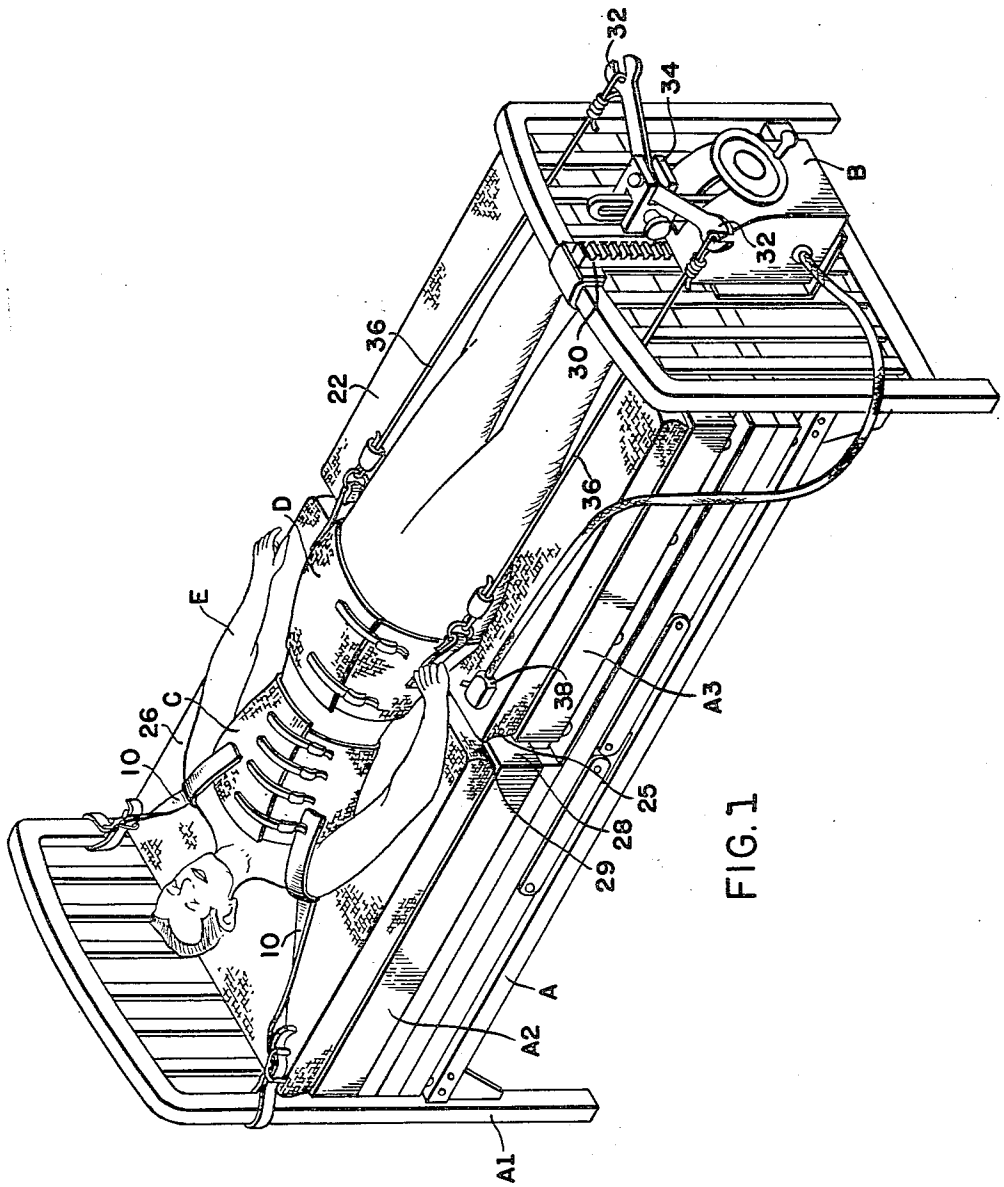


FIG. 1

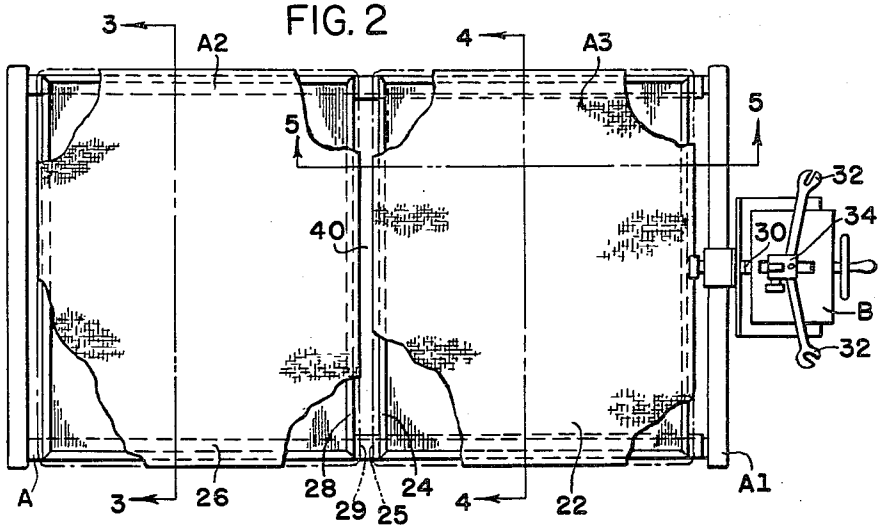
INVENTOR.
BERNARD DAVIS JUDOVICH
BY
Harry Langsam
ATTORNEY

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FIG. 2



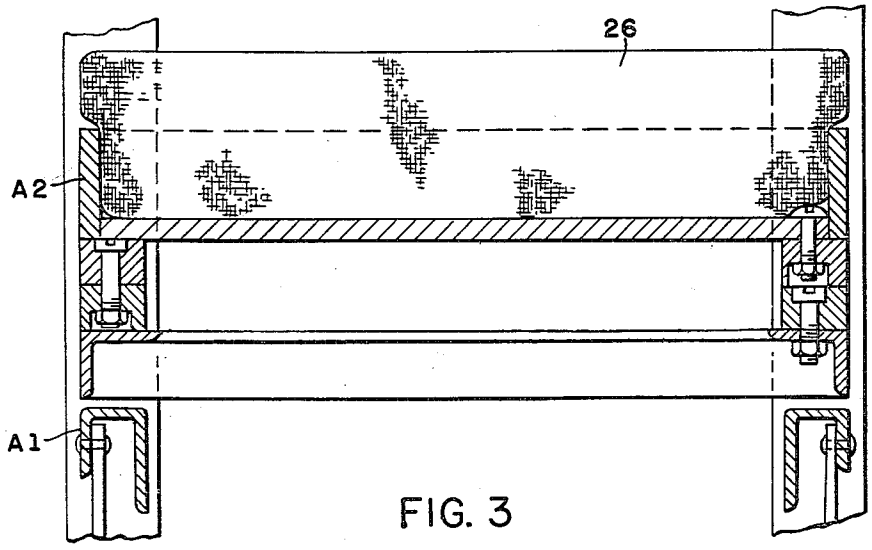


FIG. 3

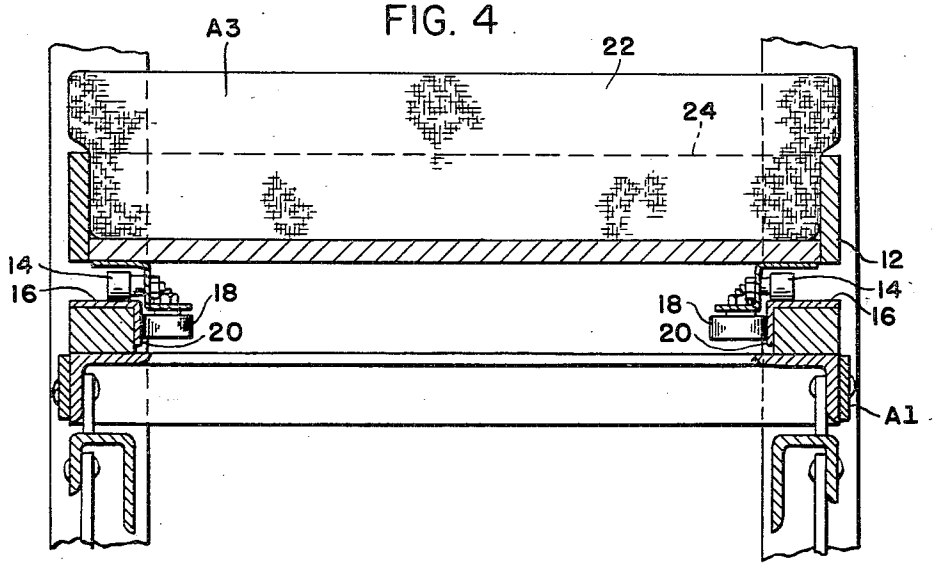
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FIG. 4



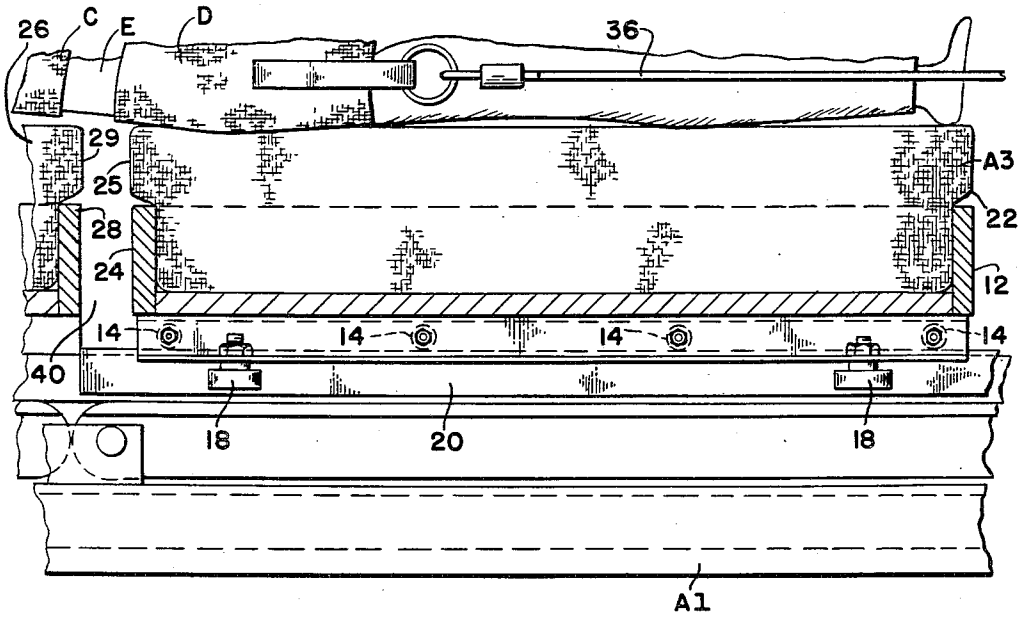


FIG. 5

INVENTOR.
BERNARD DAVIS JUDOVICH
BY
Harry Langsam
ATTORNEY

United States Patent Office 2,774,349 Patented Dec. 18, 1956

2,774,349

BED WITH LUMBAR TRACTION APPARATUS

Bernard Davis Judovich, Philadelphia, Pa.

Application November 12, 1954, Serial No. 468,222

1 Claim. (Cl. 128—71)

My invention relates to a traction apparatus for applying efficient traction and, more particularly, relates to a traction bed or table for treatment of the lumbar spine and painful conditions of mechanical disturbance such as a ruptured or herniated intervertebral lumbar disc.

Traction is a widely employed procedure in low back and/or sciatic pain, especially in the treatment of ruptured or herniated lumbar intervertebral discs. As applied to the present time, patients lie in bed and weights are used to apply pull either to the legs or to the pelvis by means of a pelvic belt, using approximately 10 or 15 pounds on each leg, a total pull of 30 pounds which hangs from pulleys attached to the foot of the bed.

This method, however, provides no stretch to the lumbar spine. The weight loses all of its effect because of the surface traction resistance or horizontal drag component of the lower segment of the body. This resistance causes the pull of the weights to become completely neutralized or dissipated before it can reach the lumbar spine. It is, therefore, useless as a stretch force in the lumbar spine. Patients cannot tolerate a constant pull of sufficient force to both overcome this resistance and also to provide adequate stretch. In the instance of an average weight patient, 40 pounds of pull are completely neutralized.

Important factors which create and modify surface traction resistance are the area of surface contact of the body or body segments; the weight of the body or body segments; and the quality, contour and texture of the contacting surfaces. In lumbar traction, surface traction resistance may be defined as the horizontal dragging force necessary to overcome these combined factors. All applied weight which does not exceed the surface traction resistance of the lower half of the body will fail to produce any stretch upon the tissues of the low back. After these resistance factors are overcome, only adequate additional weight will have a therapeutic stretch effect upon the lumbar spine.

When traction is applied to the lower extremities, the weight required to apply stretch will vary according to the level at which stretch force is desired. This is defined as ascending force dissipation. That is, the higher the segment in which stretch force is desired, the more weight will be necessary. Traction loses its effect as upper levels of body segments are reached. For example, 5 pounds of pull on the foot will cause some stretch in the ankle, but none in the knee; 10 pounds of traction on the foot would cause a mild stretch at the knee, but none at the hip; 15 pounds of traction on the foot may provide a mild stretch at the hip, but none in the lumbar spine. This progressive requirement of increased traction force as upper segments are reached, is due to surface traction resistance of the combined lower body segments. Tone and elasticity of tissues appear to have no bearing upon the required force.

This was proven by the following simple experiment in physics. The surface traction resistance of bodies, live

and cadaver, was measured. In both instances, results closely approximated 54% of the whole body weight. The cadaver was cut in half, transversely, at the level of the low back, and its surface resistance measured. It was again approximately 54% of the weight of the lower body. Since the lower half of the body weighs 48% of the total weight, the surface traction resistance of this lower body was 54% of 48% of the lower body weight, or 26% of the total body weight. This is completely lost or dissipated or neutralized when pull is applied to the lower half of the body. Thus, a weight of 44 pounds would be needed to overcome surface traction of the lower part of a 170 pound man. Only weight which exceeds this dissipated force will have any effect on the lumbar spine, and it is doubtful whether even 44 pounds could be tolerated as a constant hanging weight. Experimental facts establish that it is physically impossible to obtain stretch in the tissues of the lumbar spine by hanging weights upon the lower half of the body as it is now practiced.

It is, therefore, an object of my invention to provide a hospital bed or table which eliminates the surface traction resistance of the lower half of the body so that adequate traction can be provided on the lumbar spine.

Another object of my invention is to provide a traction apparatus for treating persons afflicted with a ruptured or herniated lumbar disc so that surface traction resistance of the lower body segment will be eliminated and the exerted force will have immediate effect on the lesion of the lumbar spine.

Another object of my invention is to provide a traction apparatus for treating persons afflicted with a ruptured or herniated lumbar disc wherein traction is applied to the patient lying in a prone or supine position in a bed, whose mattress and spring are split so that the upper segment of his body is anchored on the stationary portion of the mattress and spring and his lower body segment rests on a lower longitudinally mobile portion of the mattress which is movable on a track with roller bearings while the stretching device is harnessed to his legs or pelvic region.

Another object of my invention is to provide an alternative means for anchoring the upper segment of the patient's body to the upper fixed portion of the bed by the use of an electro-magnetic device in the upper mattress section and soft iron plates in the body jacket with provision for permitting the patient or operator to release the electromagnetic counter traction, reaction force.

Other objects of my invention are to provide an improved device of the character described, that is easily and economically produced, which is sturdy in construction, and which is highly efficient in operation.

With the above and related objects in view, my invention consists in the details of construction and combination of parts, as will be more fully understood from the following description, when read in conjunction with the accompanying drawings, in which:

Fig. 1 shows a perspective view of a bed embodying my invention, wherein a patient is lying in a supine position, with the upper body segment anchored by harnesses to the bed frame and with the lower segment of the patient embraced with the pelvic harness, which is attached to a traction unit, or hanging weights.

Fig. 2 is a plan view of the bed embodying my invention.

Fig. 3 is a sectional view taken along the line 3—3 of Fig. 2.

Fig. 4 is a sectional view taken along the line 4—4 of Fig. 2.

Fig. 5 is a sectional view taken along the line 5—5 of Fig. 2 showing the separation between the fixed portion of the bed and the movable portion of the bed with a

patient lying upon the bed with the pelvic harness embracing the patient and with the patient being pulled to his utmost position.

Referring now in greater detail to the drawings, wherein similar reference characters refer to similar parts, I show a bed, generally designated as A. The bed has attached thereto, at its foot end, a traction unit, generally designated as B, an upper body harness, generally designated as C, and a pelvic harness, generally designated as D. The upper body harness C, and the pelvic harness D are shown attached to a patient, generally designated as E. The bed A has a frame, generally designated A1, a head mattress and spring half-section, generally designated as A2, which are mounted in a stationary position and upon which the upper segment of the body rests, and a foot mattress and spring half-section, generally designated as A3, which is mobile, and upon which the lower segment of the body rests. The body harness C is anchored to the chest of the patient E and straps 10 are secured to the body harness C, and also to the head end of the bed A. The foot portion of the mattress and spring A3 is movable in a rectilinear position with respect to the fixed portion A2 of the bed. The movable portion A3 of the bed comprises a frame 12 mounted upon rollers 14 which ride upon a track 16 and guide rollers 18 which ride against guide rails 20. The frame 12 supports a mattress 22 and a spring (not shown) while a transverse bar 24 contains in position the leading edge 25 of the foot mattress 22 so that when pull is exerted, the mattress 22 will not slide.

The mobile section A3 is adapted to be aligned with the head mattress 26 and upper fixed portion A2 of the bed. The spring is not shown, but the mattress is shown. A transverse bar 28 contains the trailing edge 29 of the fixed head mattress 26 so that when pull is exerted, the mattress 26 will not slide.

The traction unit B comprises a motor which drives an eccentric or cardinoid cam which is illustrated in the patents to Louis Yellin, No. 2,633,124 and No. 2,633,125. It is adjustably mounted upon the rear frame of the bed A by virtue of the rack 30 and pinion, which is not shown. The cardinoid cam is geared to a linkage which operates a bracket 34 to oscillate in a longitudinal direction so that a plurality of hooks 32 carry straps 36 which are, in turn, attached to the pelvic harness D. A switch 38 is mounted to the motor mechanism B and rests at the patient's side to enable him to turn the traction apparatus on or off at his desire.

The patient is placed so that the level of the injured spine lies in the split 40 between the two mattresses 22 and 26, so that when pull is exerted upon the lower segment of the body by means of a pelvic harness D or other attachment, the surface traction resistance of the lower body segment is almost completely overcome except for 3 to 5 pounds. Because of the fact that the upper segment of the body does not provide sufficient countertraction to allow adequate pull upon the lumbar spine, the patient must be strapped to the upper half of the bed A1 to provide a means of countertraction.

In operation, the traction machine B pulls the harness D so that the lower segment of the patient's body, which rests on the mobile lower portion of the bed A3, allowing an almost frictionless motion of the movable portion, and enables the entire oscillatory load to be applied at the portion of lesion of the intervertebral lumbar disc. Placing the body segment to be pulled upon roller bearings eliminates its surface traction resistance. Pull upon the legs or pelvis may be applied either by a motorized

traction apparatus described, by hanging weights, or any other acceptable method.

In addition, I disclose a bed in which the mattress compartments may be split at various levels, locking together those which are not desired, and releasing the level at which traction is desired. For example, in a fractured femur, the lower third of the bed may be split, allowing pull upon the femur with the application of 8 or 10 pounds less than is usually employed because of the release of surface traction resistance of the lower extremity. This system can be applied to any level of the body, including a split upper section for the head and neck for the treatment of cervical spine condition by traction.

In addition, I disclose an alternative system of countertraction wherein an electro-magnet is set in the upper mattress section A2 with a soft iron plate constructed within the upper body harness C together with a switch control governed by the patient so that the patient may apply or release the electro-magnetic force, thereby allowing countertraction or release of countertraction as the patient desires.

Although my invention has been described in considerable detail, such description is intended as being illustrative rather than limiting, since the invention may be variously embodied, and the scope of the invention is to be determined as claimed.

I claim as my invention:

A bed wherein a patient is treated for lesion of the spine comprising a frame supported by legs at the head and foot end, said frame having means thereon for elevation of the head and foot portion, a fixed half-section secured upon the upper surface of said frame adjacent the head end thereof and being adapted to support the upper segment of a person's body, and a mobile half section borne upon the upper surface of said frame adjacent the foot end thereof and being adapted to support the lower segment of a person's body, said mobile half-section having a plurality of rollers, each rotatably supported about a horizontal axis and riding upon a track on the upper surface of said frame, and a plurality of guide wheels each rotatably supported about a vertical axis upon the lower portion of said mobile half-section, said guide wheels being positioned against vertical guide rails on said frame whereby said mobile half-section is adapted to move rectilinearly between said fixed half-section and the foot end of the bed, means for applying a counter traction force to the upper segment of a person's body, said counter traction force means having straps affixed to the head end of the bed and a harness for embracing a person's chest, and means for applying a traction force to the lower segment of a person's body, said last mentioned means comprising a pelvic harness for embracing the lower trunk of a person's body, said pelvic harness being secured to a longitudinally oscillating bracket secured to the foot end of the bed whereby maximum intermittent traction may be directly applied to the region of the person's body overlying the area between said fixed and mobile half-sections.

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