

Oct. 14, 1969

C. L. APLIN

3,472,222

THERAPEUTIC APPARATUS

Filed July 3, 1967

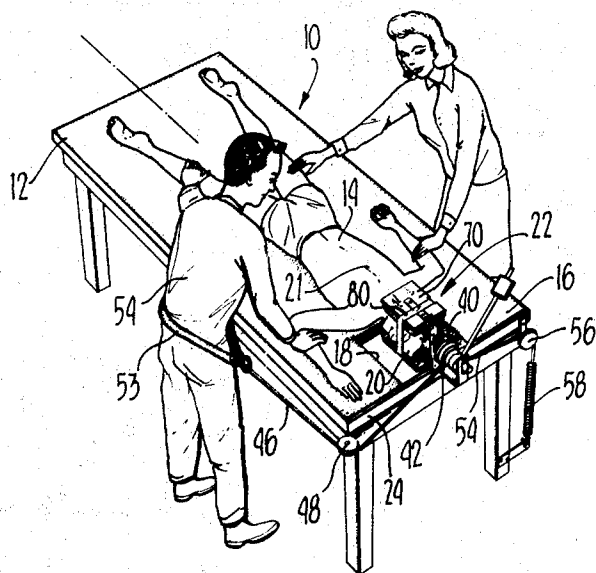


FIG. 1

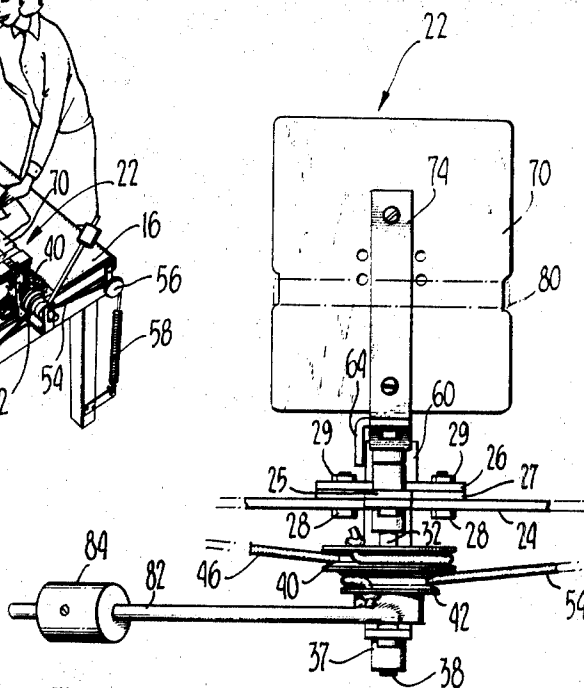


FIG. 2

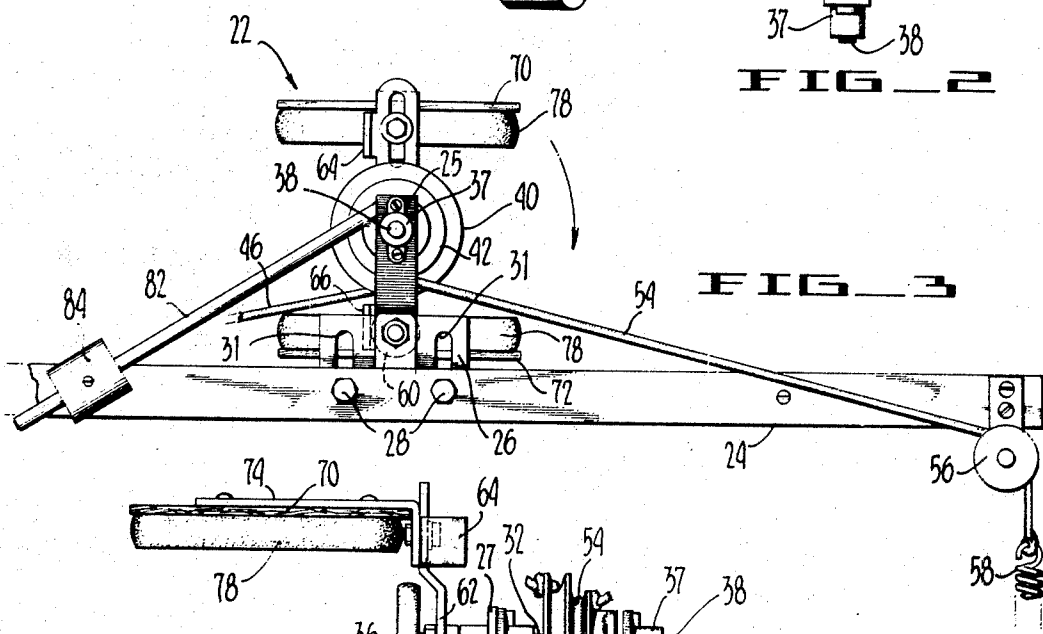


FIG. 3

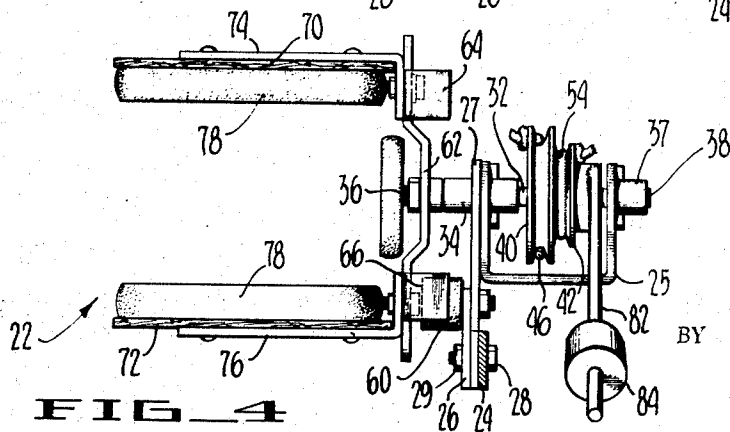


FIG. 4

CYRIL L. APLIN
INVENTOR.

BY

Ronald P. Shipman
PATENT AGENT

1

3,472,222

THERAPEUTIC APPARATUS

Cyril L. Aplin, Oakland, Calif.

(Elmo, Mont. 59915)

Filed July 3, 1967, Ser. No. 651,022

Int. Cl. A61h 1/02, 15/00

U.S. Cl. 128—25

10 Claims

ABSTRACT OF THE DISCLOSURE

A table for holding a patient in a prone position and having a central cutout at one end thereof to accommodate angular rotation of the patient's head about a generally horizontal axis. Also, a head gripping harness is adjustably rotatably secured to the table so as to securely receive a patient's head and to rotate the head by means of a human operator's body swaying movement acting in cooperation with a biasing spring and force conveying cables and pulleys.

Background, field of invention

This invention relates to a therapeutic device and more particularly concerns an apparatus for treating patients having disease, anomaly, or trauma to the brain or spinal cord (upper motor neuron lesion), hereinafter generally termed "brain damage."

Background, prior art

In the past patients having brain damage have generally been benefited by a therapeutic treatment known by the term "patterning." Patterning concerns imparting any one or more of a variety of motions to various parts of a patient's body. The theory underlying the patterning process is that in this manner non-damaged cells of the patient's brain will take over or substitute for the damaged portions of the brain and thus restore, or nearly so, the patient to full body and intellectual capacities and abilities.

When performing the patterning process or therapy three or more human operators are generally required. One person grips and twists or turns the patient's head in rhythm with movements imposed on the patient's arms and legs by two or four other operators.

It has been found that human operator gripping and twisting of a patient's head has the undesirable and generally uncontrollable effect of bending the patient's head and neck backwards with an accompanying degree of discomfort and pain to the patient.

To be effective, the patterning therapy must be performed with regularity a substantial number of times each and every day. It has been found extremely difficult to obtain the full complement of operators to help conduct the patterning process; this has been found to be especially true on bad weather days; even one's best of friends soon tire of the routine.

In the past a number of devices have been developed which replace one or more human operators with a mechanical device for manipulating the head and/or the limbs of a patient upon which patterning therapy is to be performed. Such devices, particularly those associated with twisting the head of a patient, have been found to impose a rather jerky movement to the patient much to his discomfort and pain.

Summary

One preferred embodiment of the present invention which solves the problems of the prior art and accomplishes the objects of this invention is achieved by providing a table for support of a patient's body in a prone position and a head frame for supporting, gripping and turning the patient's head about an axis substantially coaxial with the patient's spine. The head frame is mounted for adjust-

2

ment in the vertical position. A releasable biasing means normally maintains the head frame in one extreme angular position, and an operator attachable force applying means is provided for overcoming the biasing means thereby twisting or rotating the head frame to another angular position. A flywheel-like kicker arm is provided for aiding assurance of smooth rotation of the head frame and for providing easy operation by the operator by taking advantage of the potential and kinetic energy of a falling mass.

It is therefore an object of the present invention to provide an improved therapeutic device.

Another object is to provide an improved therapeutic device for performing patterning.

Still another object is to provide an apparatus for performing patterning therapy with a minimum number of human operators.

The features of novelty that are considered characteristic of this invention are set forth with particularity in the appended claims. The organization and method of operation of the invention may best be understood from the following description when read in connection with the accompanying drawings.

Description of the figures

FIGURE 1 is a perspective view of a preferred embodiment of the present invention illustrating its method of operation.

FIGURE 2 is an enlarged plan view of the head rotating frame of the present invention looking downward thereon.

FIGURE 3 is an end view of the head frame of FIG. 2. FIGURE 4 is a side view of the head frame of FIGS. 2 and 3.

Description of preferred embodiment

In FIG. 1 there is shown a four-legged table 10 the upper surface of which is preferably provided with a soft padding material 12 upon which a patient 14 may comfortably lie in a generally face down prone position. The height of the table is not critical but may be any preferred height that serves the comfort of the operators during operation of the invention as will become more apparent as the description proceeds.

One end, generally termed the forward or front end 16 of the table is provided with a cutout 18 opening outwardly of the table 12 for permitting correct positioning of the patient's head 20 with respect to a generally horizontal axis substantially defined by his spine 21.

A head rotating or turning frame or means 22 is disposed substantially above or slightly within the table cutout 18 and securely grips the patient's head 20 for controlled pivoting or twisting of the head about the mentioned horizontal axis.

As shown more fully in FIGS. 2, 3 and 4 the head rotating frame 22 includes a generally horizontal rigid support member 24 secured to the forward end 16 of the table and extending horizontally across the cut out 18.

An adjustable bearing mounting plate or means 26 is secured in an upright or vertical position by means of a pair of bolts 28 and nuts 29 inserted through a pair of horizontally spaced holes provided in the plate 24 and corresponding vertically elongated horizontally spaced slots 30 provided in the plate 26. An upper arm 27 extends upwardly from the plate 26. It can be readily understood that by loosening the nuts and bolts the position of the plate 26 and arm 27 may be adjusted vertically and then secured in its new position by once again tightening the nuts and bolts. Other means for adjustably securing the plate 26 may be employed as will be clear to those skilled in the art to which the present invention pertains.

A horizontally extending shaft 32 is mounted for rotation about a generally horizontal axis disposed above

the table and extending in the longitudinal direction of the table 12 by means of a bushing or bearing means 34 secured to the upper arm 27. One end 36 of the shaft extends rearwardly of the arm 27 while the other end 38 of the shaft extends forwardly of the arm 27.

A second bearing 37 mounted in a U-shaped frame 25 which is suitably secured to the arm 27, supports the extreme outer end 38 of the shaft 32.

A pair of capstan-like drums or pulleys 40 and 42 are coaxially mounted on the shaft 32 and rigidly secured thereto by means of set-screws or other desired means, such as, for example, as by welding, soldering, etc.

One end of a first rope, wire, or other flexible inextensible means 46 is secured to the first pulley 40. The rope 46 is then wrapped about the pulley for at least about one turn in the clock-wise direction (as viewed when looking toward the front end 16 of the table) and extends tangentially outward from the pulley to the one front corner of the table where it is then trained about an idler pulley 48 (FIG. 1) secured to such corner of the table.

The other end of the rope 46 is secured to or formed into a generally loose easy fitting loop or belt 53 that extends about the waist of an operator 54 situated or standing along one side of the table 10.

One end of second rope, wire or other flexible inextensible means 54 is secured to the second pulley 42. The rope 54 is then wrapped about the pulley 42 for at least about one turn in the counter-clockwise direction (as viewed when looking toward the front end of the table 10) and extends tangentially outwardly from the pulley to the other front corner of the table where it is trained about an idler pulley 56 secured to such other corner of the table. The other end of the rope 54 is then secured to one end a tension spring or other suitable biasing means 58 the other end of which is suitably secured to the table at any convenient location such as the right front table leg, as shown in FIG. 1.

It should be clear that the force imposed on rope 54 by the spring 58 will cause the pulleys 40 and 42 and shaft 32 to be biased in the counter-clockwise direction.

As shown best in FIG. 4 a stop member 60 is secured to the lower portion of upstanding arm 27 for limiting rotation of the head turning frame 22 as is described in more detail below.

The inner end 36 of shaft 32 has secured thereto a bar like member 62 having opposite end portions extending radially outwardly of the shaft. Each end portion of the bar like member has secured thereto a tab or dog member 64 and 66 respectively. As shown in FIG. 4 the one dog 66 is held against the stop member 60 by the biasing force of spring 58 acting through the rope 54, pulley 42 and shaft 32. It should be clear from the above that sufficient tension or unwinding force imposed on pulley 40 from rope 46 will overcome the biasing force of spring 58 and cause the bar member 62 to rotate in the direction of arrow 68 (FIG. 3) until the dog 64 engages the stop member 60; such rotation is slightly less than 180°. It will be clear that to those skilled in the art to which the present disclosure pertains that the stop member 60 could be made adjustable so as to provide adjustable control of the angular extent of travel of the bar member 62 and of course the total head turning frame 22.

Each end of the bar member 62 has secured thereto a head engaging plate 70 and 72 respectively. Each plate is secured to a strap member 74 and 76 respectively which is adjustably secured to the associated end of the bar member 62 by means of a bolt, nut and associated elongated slot. Thus the head engaging plates may be moved toward and away from each other and secured in position. It should be clear from FIG. 1 that the patient's head is inserted into the space between the plates with his ears adjacent the flat surfaces of the plate. Soft cushioning material 78 may be provided on the facing

surfaces of the plates to gently engage the sides of the patients head.

A feature of the present invention is the provision of a fly-wheel like means for preventing as much as possible jerky motion of the head frame as it is rotated, thereby turning the patient's head in as comfortable a manner as possible. As shown in the figures a long bar 82 is suitably attached to the side of pulley 42 as by welding or the like, and extends radially outward therefrom. At the outer end of the arm a mass or weight 84 is adjustably secured thereto by a setscrew or the like. As the head frame is rotated the mass 82 is moved in an arcuate or circular path of travel. The inertia of the mass reduces any tendency for jerky motion. It should be noted that the arm and mass are arranged such that as the mass is moved upward in the arcuate path of travel in the clockwise direction as viewed in FIGS. 1 and 3 it eventually reaches an apex and then travels downwardly. The force of gravity acting on the mass aids overcoming the biasing force of spring 58. Further, in reverse movement back to its position as shown in FIG. 3, the falling movement of the mass in the counter-clockwise direction works with and aids the force of spring 58. It can thus be understood that the unbalanced mass 84 aids rapid comfortable operation of the present invention.

In operation the operator 54 about whose waist the loop or belt 53 is positioned sways his body from side-to-side as he manipulates the patient's near arm and leg. The swaying motion pulls and releases the rope 46 alternately thereby turning the patient's head back and forth about the horizontal axis defined by his spine. Since the patient's head is gripped in the head frame, and not by a human there is no bending backwards and consequent pain or discomfort.

It is to be noted that if the operator 54 does not desire to operate the head frame 22 a third operator (not shown) may grip the mass 84 and manually cause the head frame to be oscillated as described in rhythm with the movements of the operator 54 and the other oppositely situated second operator (shown in FIG. 1 as a female).

While the principles of the invention have been made clear in the illustrative embodiments, there will be obvious to those skilled in the art, many modifications in structure, arrangements, proportions, the elements, materials, and components, used in the practice of the invention, and otherwise, which are adapted for specific environments and operating requirements, without departing from these principles. The appended claims are, therefore, intended to cover and embrace any such modifications within the limits only of the true spirit and scope of the invention.

What is claimed is:

1. In a therapeutic apparatus wherein a patient is in a generally prone position, and the spine of the patient generally defines a longitudinal axis, the improvement comprising:

head turning means mounted for rotation about said axis;

biasing means releasably biasing said head turning means in one angular direction about said axis; and means for applying a force to said head turning means to overcome said biasing means and turn said head turning means in a direction opposite to said angular direction.

2. In the improvement according to claim 1 wherein there is further included means for limiting the extent of angular rotation of said head turning means.

3. In the improvement according to claim 1 wherein said force applying means is human operable and includes means releasably securable to the body of an operator.

4. In the improvement according to claim 1 wherein said head turning means includes an unbalanced mass disposed radially outwardly of said axis, said mass being

5

6

moved in an arcuate path of travel an said head turning means is rotated, said arcuate path of travel being disposed above said axis and passing through a vertical plane defined by said axis.

5. In the improvement according to claim 1 wherein said head turning means is vertically adjustable.

6. In a therapeutic apparatus according to claim 1 wherein the patient is disposed in a prone position on a generally horizontally surfaced table;

said table being provided with a cutout portion; said head turning means being mounted on said table substantially over said cutout portion.

7. In a therapeutic apparatus according to claim 6 wherein said head turning means includes, a shaft mounted for rotation about said axis, a pair of pulleys coaxially mounted on said shaft and secured thereto against relative rotation; a first inextensible flexible means wrapped in one direction about a portion of one of said pulleys, a second inextensible flexible means wrapped about at least a portion of the other pulley in a direction opposite to the wrapping direction of said

first flexible means; spring means having one end fixed to said table and the other end attached to one of said inextensible flexible means.

8. In the improvement according to claim 4 wherein said mass is radially adjustable with respect to said axis.

9. In the improvement according to claim 3 wherein said force applying means is human operable by swaying movement of an operator's body.

10. In the improvement according to claim 1 wherein said extent of angular rotation of said head turning means is less than about 180°.

References Cited

UNITED STATES PATENTS

2,290,407	7/1942	Collins	128—48
3,229,688	1/1966	De Rossi	128—25

L. W. TRAPP, Primary Examiner