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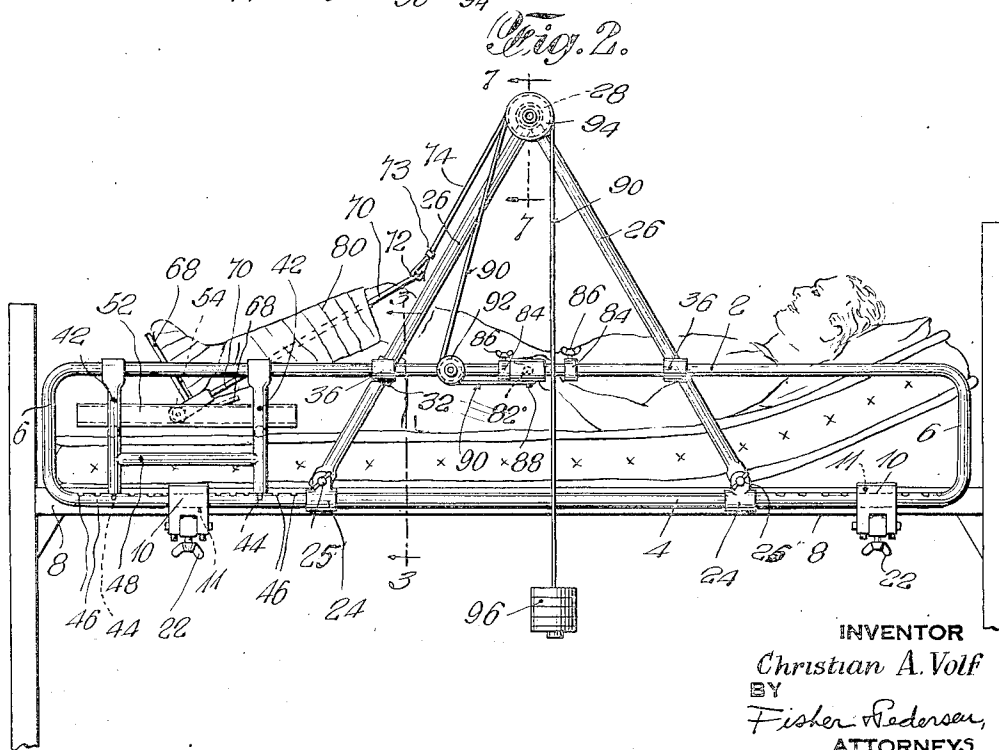
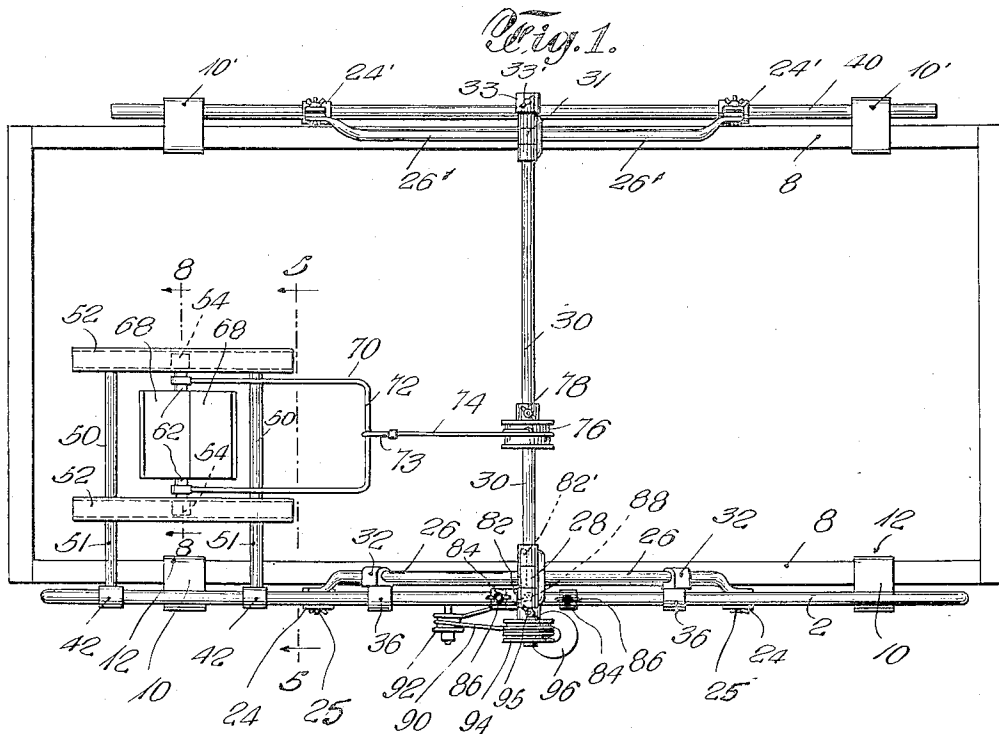
C. A. VOLF

2,024,670

THERAPEUTIC EXERCISING APPLIANCE

Filed April 26, 1934

2 Sheets-Sheet 1



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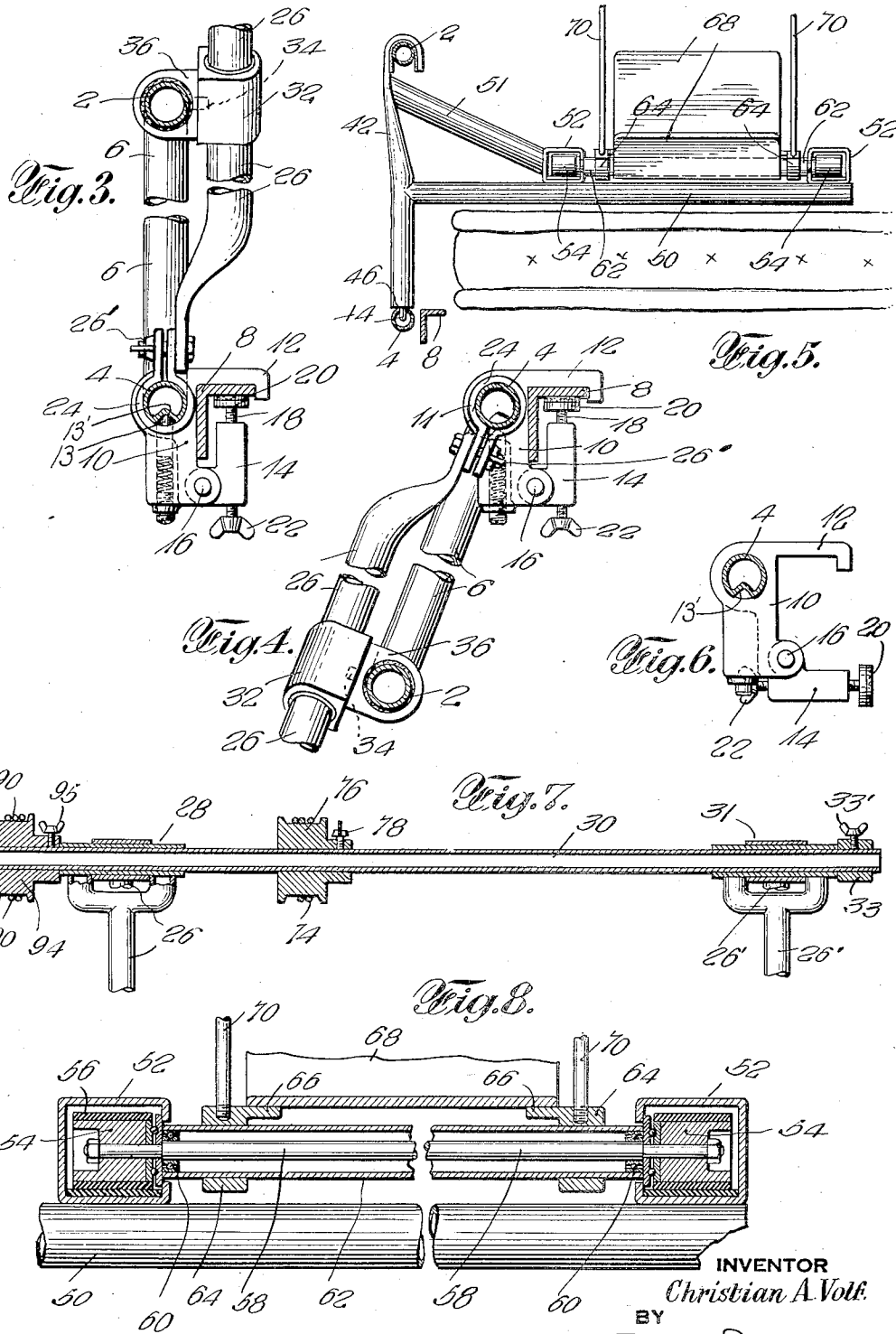
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THERAPEUTIC EXERCISING APPLIANCE

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UNITED STATES PATENT OFFICE

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THERAPEUTIC EXERCISING APPLIANCE

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15 Claims. (Cl. 128—25)

This invention is a therapeutic exercising appliance, primarily for use in applying gentle movements to various parts of the body, particularly to a fractured limb. The medical profession appreciates that the immobility given to a fractured limb by the use of splints or plaster casts is in some instances distinctly harmful to the patient because the normal circulation, due to lack of movement of the muscles and joints and due to the pressure of the bandages, is very much hindered, so that when the cast or splints are taken off, the limb is stiff and the patient is usually unable to move it at all, and weeks of massage and gentle exercise are required to restore the normal circulation and normal tone to the muscles.

According to this invention, movements of graduated and controlled type may be applied to a fractured limb so that the circulation through the muscles and joints is maintained to a much better degree than with an immobilized limb. When the patient is discharged, he is usually able to walk without the aid of crutches.

The invention is capable of use generally in applying movements to various parts of the body, for improving the circulation and for improving and maintaining the tone of the muscles, under any conditions where such movements would be helpful, such for example as with fractures of the arm or leg, infantile paralysis, rheumatic conditions, arthritis, etc.

The primary purpose of the invention is to provide an apparatus for kinetic therapeutics which is operated by the patient himself and where the motion of the patient's hand, for example, which is applying the power, moves in harmony with the motion of the fractured limb. More particularly, and according to this invention, where the hand operated by the patient moves in a certain path, the injured limb is moved in such a way that it is more or less an instinctive, normal and harmonious movement on the part of the patient.

Another important feature of the invention is an apparatus so designed that it can be readily and detachably secured to a standard hospital bed, and can be readily and quickly partially disassembled, so as to be put out of the way when not in use and to be put out of the way while the bed clothes are being changed, or the patient is being bathed, for example. After the patient has been treated as may be required with the apparatus out of the way, it may be quickly and readily put back in normal and operative position. The apparatus may also be completely and read-

ily removed from the bed upon the recovery of the patient.

Another important feature of the invention is an operating shaft which extends across the bed from one side to the other which shaft is rotated by the patient. On this shaft is positioned one or more pulleys, depending on the number of injured limbs which are undergoing treatment.

The main features of the invention having been thus outlined, further advantages of structure and operation will be apparent from the following description of the present preferred embodiment of the apparatus.

In these drawings:

Fig. 1 is a plan view of the exercising appliance, in place on a hospital bed;

Fig. 2 is a side view of the same;

Fig. 3 is a section on an enlarged scale taken on the line 3—3 of Fig. 2;

Fig. 4 is a view similar to Fig. 3 with the frame swung into an inoperative position;

Fig. 5 is a sectional view taken on the line 5—5 of Fig. 1;

Fig. 6 is an end view of one of the clamps for engaging with the bed rail;

Fig. 7 is an enlarged sectional view taken on the line 7—7 of Fig. 2; and

Fig. 8 is an enlarged sectional view taken on the line 8—8 of Fig. 1.

Referring now to these figures, in which similar reference characters indicate similar parts, the improved exercising appliance comprises a generally rectangular frame consisting of an upper horizontal rail 2, a lower horizontal rail 4 and end bars 6. This frame is firmly and detachably secured to the side rail 8 of a standard hospital bed by a clamp comprising a body member 10 provided with a hole 11 therethrough for slidable engagement on the lower rail 4. Clamp 10 is provided with a spring pressed positioning stud 13 adapted to snap into depressions 13' on the underside of rail 4, as shown in Fig. 3. The clamp 10 has an arm 12 which takes over the top of the bed rail 8 and an anchoring clamp 14 pivotally engaged at 16 with the main clamp. The anchor member 14 is internally threaded and carries a threaded shaft 18 terminating in a bearing face 20 which through the medium of the thumb nut 22 firmly anchors the clamp and lower rail 4 to the bed rail, as shown more particularly in Figs. 3 and 4.

A pair of collars 24 are slidable on the rail 4, these collars passing around the rail 4 and gripping it frictionally through the medium of thumb screws 25. Pivoted to the collars 24 is a pair of

converging legs 26 which meet in suitable bearings 23 carried on a transversely extending shaft 30, the other end of which is provided with similar bearings 31, with which engages a pair of converging legs 26' on the other side of the bed, having a function analogous to the legs 26. A retaining collar 33 and cooperating set screw 33' hold the bearings 31 in place on shaft 30.

The legs 26 preferably pass through guides 32 and slidably engage therewith. Guides 32 are pivotally connected by pins 34 to guides 36, respectively, which slide on the upper rail 2. By virtue of this arrangement, the angularity of legs 26 may be adjusted by sliding collars 24 along the rail 4, the legs 26 moving in the guide members 32 and 36, the guides moving with respect to each other about pins 34 to allow for this adjustment. The lower ends of the other legs 26' on the side of the bed engage with slidable collars 24' which slide on a horizontal rail or bar 40 which is detachably clamped to the bed rail on the other side of the bed by clamps 10' which have the same structure and operation as the clamps 10.

The supporting means for the limb of the patient will now be described. A frame consisting of vertical standards 42, is provided, the upper ends of which standards encircle the rail 2 and the lower ends of which are provided with pins 44 engageable in holes 46 in lower rail 4, the frame being completed by a cross piece 48. Extending from the standards 42 is a pair of horizontally extending arms 50, arranged to extend about as far as the middle of the bed, or, if desired, all the way across the bed. Supported on these arms 50 is a pair of channeled members 52, forming a channeled guideway for rollers 54, these rollers being faced with rubber 56. Diagonal braces 51, attached to frame 42 and the guideway 52, further support the guideway. Rollers 54 support a shaft 58, and this shaft, through the medium of bearings 60, supports a tube 62 which in turn carries collars 64, the collars being secured to tube 62 and being provided with extensions 66 for supporting a foot rest or the like 68. The collars 64 also support a stirrup 70 to the cross piece 72 of which is attached an actuating rope 74, which rope wraps around a pulley 76, which pulley is slidable on the shaft 30 and may be secured in any desired position on this shaft by the thumb screw 78. The stirrup 70 is adapted to be bound into contact with the patient's leg by the bandages or wrappings 80, the patient's foot resting against the foot piece 68 and the foot piece and the stirrup being rockable with the tube 62 about the axis 53, and slidable back and forth along the channeled guideway 52. A snap hook 73 may be used to attach rope 74 to the stirrup bar 72.

It should be noted that the support for the patient's foot is held by the frame 42, and does not rely on the mattress for support.

The mechanism whereby the patient may operate the foot rest back and forth will now be described. A collar 82 is slidable on the upper rail 2 and the extent of its movement in either direction is determined by stop collars 84 which may be positioned at various points along the rail 2 by the thumb screws 85. The collar 82 is provided with a handle 82' which may be grasped by the patient. To this collar 82 is attached as at 88 a rope or cable 90 which passes around a pulley 92 on the rail 2 and then wraps around a pulley 94 fixed on one end of the actuating shaft 30, the rope continuing over the pulley

94 and having attached to its lower end an adjustable counter-balance weight 96. Pulley 94 is detachably secured to shaft 30 by a set screw 95. As the patient moves the collar 82 back and forth, the rope 90 rotates pulley 94 and shaft 30 which in turn actuates rope 74 to pull on the stirrup 72 and pull up and let down the patient's leg. The ropes are preferably engaged with their pulleys in such a way that when the patient pulls the handle 82' towards him, the leg is straightened out, while when the handle is moved in the opposite direction the knee is pulled up and the leg flexed at the knee. The extent of this movement is controlled by the setting of the collars 84 and as the patient's condition improves the amount of movement and the resulting flexing of the limb can be increased. The use of the counter-balance 96 lessens the effort required on the part of the patient.

When it is desired to get the apparatus out of the way for any purpose, the patient's leg is disengaged from the apparatus in any convenient way, as by moving him lengthwise of the bed so that the rollers 54 come out of the guideway, the thumb screws 94 and 33' loosened up, the shaft 30 moved toward the left with respect to the patient as shown in Fig. 2, sufficient to disengage the right hand end of the shaft 30 from the bearing 31 and then the apparatus swung nearly 180° as indicated in Fig. 4, so that it swings toward the floor and is entirely out of the patient's way. The apparatus may be removed completely from the bed by release of the clamps 10 and 10'. The patient's foot could also be released from the foot rest 68 by making the connection between stirrup 70 and collars 64 a detachable connection.

As illustrated in the drawings, the patient's left leg is undergoing treatment and the apparatus is set up on the left hand side of the bed. If the right leg of the patient should require treatment the entire apparatus is set up on the opposite side of the bed, that is, opposite from the set up shown in Fig. 1. If both legs of the patient require treatment the foot rest 68 and associated parts shown in Fig. 1 may be duplicated. Similarly if the arms of the patient require treatment the apparatus may with slight modifications be used for that purpose also.

While the preferred embodiment of the invention has been illustrated in some detail, it should be understood that the invention is not limited to the precise details shown and described, but modifications may be made of the particular construction illustrated without departing from the invention.

I claim as my invention:—

1. A therapeutic exercising appliance for use with a hospital or similar type of bed, said appliance comprising, in combination, a slideway for supporting an injured limb of a patient for back and forth movement, means for supporting said slideway above the bed of the patient and means actuated by the patient and movable back and forth, for moving said slideway.

2. A therapeutic exercising appliance for use with a hospital or similar type of bed, said appliance comprising, in combination, means for supporting an injured limb of a patient for movement, a power shaft extending across the bed, above the patient, and operatively connected to the limb supporting means, and means, operable by the patient, for applying manual power for actuating the power shaft.

3. A therapeutic exercising appliance for use

with a hospital or similar type of bed, said appliance comprising, in combination, means for supporting an injured limb of a patient for movement, a power shaft extending across the bed, 5 above the patient, and operatively connected to the limb supporting means, and means, operable by the patient, for applying manual power for actuating the power shaft, said limb supporting means and said power shaft actuating means, 10 being movable in paths which are lengthwise of the bed.

4. A therapeutic exercising appliance for use with a hospital or similar type of bed, said appliance comprising, in combination, a frame for attachment to the bed of a patient, lengthwise of 15 the bed and at one side thereof, a power shaft supported by said frame, and extending across the bed, over the patient, movable supporting means for the injured limb of the patient, and 20 operatively connected with the power shaft, and means operable by the patient, for actuating the power shaft.

5. A therapeutic exercising appliance for use with a hospital or similar type of bed, said appliance comprising in combination, a frame for attachment to the bed of a patient, lengthwise of 25 the bed and at one side thereof a power shaft supported by said frame, movable supporting means for the injured limb of the patient, carried by said frame and extending over the bed 30 and operatively connected with the power shaft, and means operable by the patient, for actuating the power shaft.

6. A therapeutic exercising appliance, comprising, in combination, a frame for attachment 35 to the bed of a patient, a power shaft supported by said frame, movable supporting means for the injured limb of the patient, comprising a slide-way supported by said frame and extending over 40 the bed and operatively connected with the power shaft, and means operable by the patient, for actuating the power shaft.

7. A therapeutic exercising appliance, comprising, in combination, a frame for attachment 45 to the bed of a patient, lengthwise of the bed and at one side thereof a power shaft supported by said frame, and extending across the bed, over the patient, movable supporting means for the injured limb of the patient, carried by said frame 50 and extending over the bed and operatively connected with the power shaft, and means operable by the patient, for actuating the power shaft.

8. A therapeutic exercising appliance, comprising, in combination, a frame for attachment 55 to the bed of a patient, a power shaft supported by said frame, and extending across the bed, over the patient, movable supporting means for the injured limb of the patient, comprising a slideway supported by said frame and extending 60 over the bed and operatively connected with the power shaft, and means operable by the patient, for actuating the power shaft.

9. A therapeutic exercising appliance, comprising, in combination, a frame substantially the 65 length of a patient's bed, means for detachably securing said frame to one of the side rails of the bed, means, carried by said frame, for movably supporting an injured limb of the patient, a power shaft, supported by said frame and extending 70 across the bed above the patient, means operatively connecting the limb supporting means and the power shaft, and means, operated by the patient, for actuating said power shaft.

10. A therapeutic exercising appliance, com-

prising, in combination, a frame substantially the length of a patient's bed, means for detachably securing said frame to one of the side rails of the bed, means, carried by said frame, for movably 5 supporting an injured limb of the patient, a power shaft, supported by said frame and extending across the bed above the patient, means operatively connecting the limb supporting means and the power shaft, and means, carried by said frame 10 and operated by the patient, for actuating said power shaft.

11. A therapeutic exercising appliance, comprising, in combination, a frame substantially the length of a patient's bed, means for detachably securing said frame to one of the side rails of 15 the bed, means, carried by said frame, for movably supporting an injured limb of the patient, a power shaft, means, carried by said frame and extending upwardly well above the frame, for supporting said power shaft, means operatively 20 connecting the limb supporting means and the power shaft, and means, operated by the patient, for actuating said power shaft.

12. A therapeutic exercising appliance, comprising, in combination, a frame substantially 25 the length of a patient's bed, means for securing said frame to a side rail of the bed, said means allowing said frame to be swung away from the bed, toward the floor, without disengagement from the side rail of the bed, means, carried by 30 said frame, for movably supporting an injured limb of the patient, and means, operated by the patient, for operating said limb supporting means.

13. A therapeutic exercising appliance, comprising, in combination, a frame for attachment 35 to a side rail of a patient's bed, a power shaft, supported by said frame, and extending across the bed, above the patient, means for movably supporting an injured limb of the patient, and operatively connected with said power shaft, 40 means, operated by the patient, for actuating the power shaft, and means for detachably securing said frame to a side rail of the bed, and engageable pivotally with the frame for allowing the appliance to be swung away from the bed, 45 toward the floor, for putting it temporarily out of the way.

14. A therapeutic exercising appliance, comprising, in combination, a four sided frame, comprising upper and lower rails which extend 50 substantially horizontally, means for detachably securing the lower rail to a side rail of a patient's bed, means, carried by the frame and extending inwardly over the bed, for movably supporting an injured limb of the patient, a power shaft 55 extending across the bed, above the patient, supported by said frame and operatively connected with said limb supporting means, and means for operating said power shaft.

15. A therapeutic exercising appliance, comprising, in combination, a four sided frame, comprising upper and lower rails which extend 60 substantially horizontally, means for detachably securing the lower rail to a side rail of a patient's bed, means, carried by the frame and extending inwardly over the bed, for movably supporting an injured limb of the patient, a power shaft 65 extending across the bed, above the patient, diagonally extending, upwardly converging legs, carried by the frame, for supporting the power shaft, 70 and means, operated by the patient, for actuating said power shaft.

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