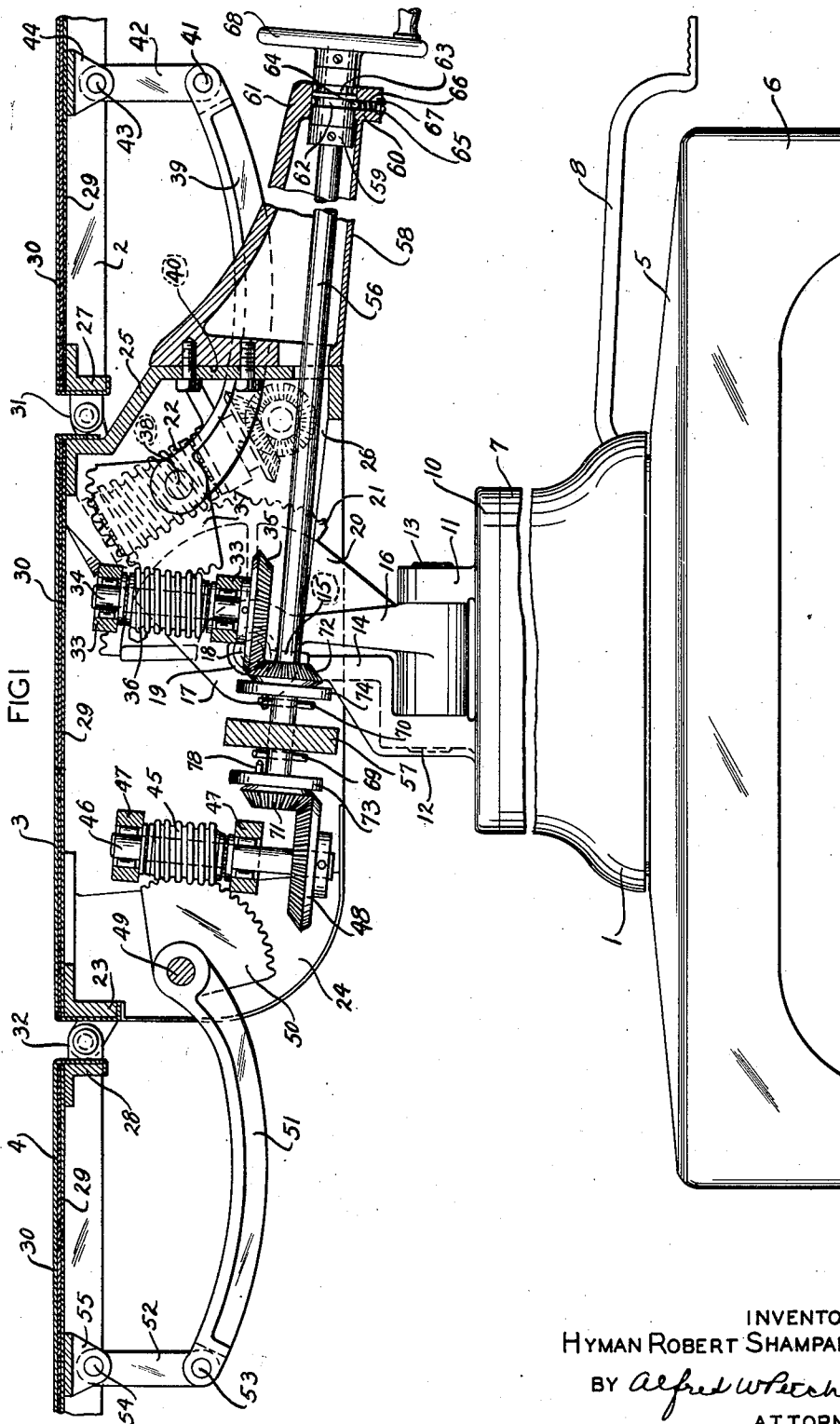


Filed June 7, 1945

CLUTCH FOR SURGICAL TABLES AND THE LIKE

2 Sheets-Sheet 1



INVENTOR
HYMAN ROBERT SHAMPAINÉ
BY *Alfred W. Schacht*
ATTORNEY

March 21, 1950

H. R. SHAMPAINE

2,501,415

CLUTCH FOR SURGICAL TABLES AND THE LIKE

Filed June 7, 1945

2 Sheets-Sheet 2

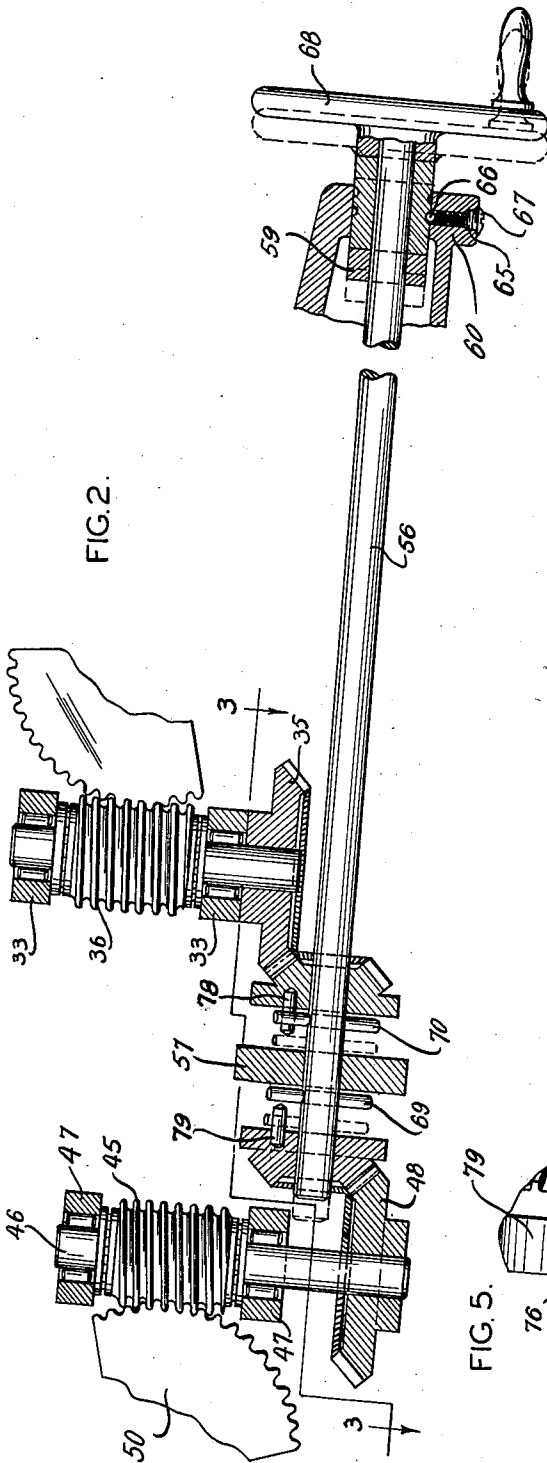


FIG. 2.

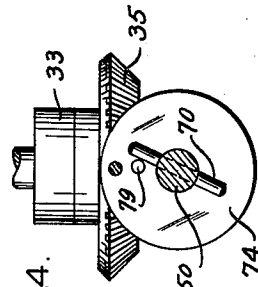


FIG. 4.

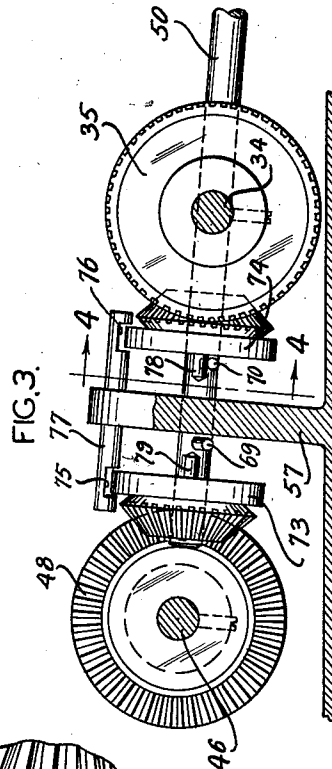


FIG. 3.

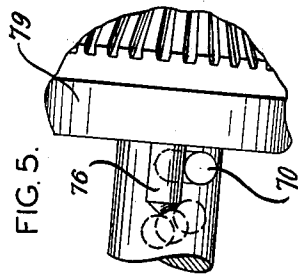


FIG. 5.

INVENTOR
HYMAN ROBERT SHAMPAINE
BY *Alfred W. Petcher*
ATTORNEY

UNITED STATES PATENT OFFICE

2,501,415

CLUTCH FOR SURGICAL TABLES
AND THE LIKE

Hyman Robert Shampaine, Clayton, Mo.

Application June 7, 1945, Serial No. 598,034

2 Claims. (Cl. 192—48)

1

This invention relates generally to surgical apparatus and, more particularly, to a certain new and useful improvement in clutches for surgical tables and the like.

The invention has for its principal object the provision of clutch means for an operating table or the like in which the table or like structure is provided with a top or body-supporting element comprising a plurality of sections connected or joined for adjustable articulation for supporting the human body in the many different positions required in various surgical procedures the movement of said sections being optionally controlled by said clutch means.

More specifically, the present invention has for an object the provision of a clutch of the character mentioned, constructed for simplifying and reducing the number of controls heretofore requiring separate and independent manipulation, to the end of facilitating the work of the anesthetist, technician, nurse or other operator in adjusting the top-sections to meet the requirements of the patient.

The invention has for another object the provision of clutch means of the type described whereby all of the controls for the respective top-sections are within easy and convenient reach of an operator seated at the head-end of the table, and such that all adjustments may be made by so-called touch control, without visual observation of dials or complicated levers or the use of a multiplicity of separated controls for each top-section.

These and other objects and advantages of the invention will be fully explained in the following description of a preferred embodiment of my invention, reference being made to the accompanying drawings forming a part thereof, wherein—

Figure 1 is a fragmental vertical sectional view of the table;

Figure 2 is an enlarged schematic view of a preferred form of driving mechanism for the table, constructed in accordance with and embodying my present invention;

Figure 3 is a fragmental transverse sectional view of the driving mechanism taken along line 3—3, of Figure 2;

Figure 4 is a fragmental sectional view of the driving mechanism taken along line 4—4 of Figure 3; and

Figure 5 is an enlarged fragmental view of the pin engagement mechanism forming a part of the present invention.

Referring now more in detail and by reference characters to the drawings, the operating table, 55

2

as best appears in Figure 1, comprises generally a pedestal 1 and a jointed or articulated top, which latter, in the present instance, consists of a plurality of individually adjustable sections, namely, back-rest 2, a seat 3, and leg-rest 4. In addition to such top-sections, but not specifically here shown, there is preferably provided a head-rest, formed as a hinged continuation of the back-rest 2, a foot-rest formed as a hinged extension of the leg-rest 4, and a body elevator or kidney bridge which forms a part of the seat 3.

The pedestal 1 includes a hollow, generally rectangular base-member 5 having leg formations 6 at the four corners thereof for housing concealed coasters (not shown). The base-member 5 is provided with a hydraulic piston 7, as more fully described and shown in my co-pending applications Serial No. 476,699 now Patent Number 2,416,410, issued Feb. 25, 1947, and No. 590,755, for adjusting the height of the table.

It may be here remarked that a suitable pump (not shown) concealed within the base 5 is arranged for actuation as by a pedal 8 and conventionally serves to force suitable fluid into the cylinder-space and thereby elevate the piston 7 and table-top mounted thereon.

Suitably bolted to the upper end of the piston 7 is a trunnion-member 10 having a pair of up-standing bearing arms 11 and 12, in which are received the ends of a horizontal axle-shaft 13 for supporting the table-top and pivotally enabling lateral tilting thereof.

The arm 12 is provided with an inwardly offset extension 14, to which is bolted a sector-shaped worm gear 15, disposed in a vertical plane and extending transversely with reference to the seat 3.

A stanchion or coupler member 16 is journaled at its lower end on the axle-shaft 13, so as to permit lateral tilting thereof, and formed on one side of the member 16 above the gear sector 15, is a pair of bearing-bosses 17, in which is journaled a transverse shaft 18, keyed on which and meshing with gear-sector 15 is a lateral tilting worm 19, and adapted to be rotated by means more fully described in my co-pending applications Serial No. 476,699 now U. S. Patent No. 2,416,410, issued Feb. 25, 1947, and No. 590,755.

Formed on the stanchion member 16 on the side thereof opposite the worm 19 is a longitudinally projecting flange 20, to which is fixed a worm gear sector 21 meshing with which is a worm 22 carried by the center section 3 of the table, such worm and gear assembly, with other agencies more fully described in the above men-

3

tioned co-pending applications, enabling angular adjustment of the table-top in a longitudinal plane.

The seat-section 3 of the table has a frame structure 23, the members of which are preferably angular in cross-section, and formed integrally with the side members of the frame 23, are depending rigid side panels 24, that serve to support and shield the control mechanism. At the opposite or anterior end of frame-portion 23, is a preferably integrally formed depending plate 25, from which project a pair of bearing arms 26 whose ends are journaled on shaft 18 for pivotally supporting the center-section 3, which, in turn, as presently fully appears, supports the other sections of the table-top.

The back-rest 2 and leg-rest section 4, substantially correspond in structure to the center-section 3, in that the sections 2 and 4 also are generally rectangular in plan and have frame structures 27 and 28 respectively, having suitably connected angular side and end members, and it may be here mentioned that the several top sections of the table are preferably constructed of two layers of sheet metal interposed by a layer of a suitable sound-deadening material. Of such sections, the respective bottom layers 29 are preferably formed of steel plates of appropriate thickness to provide for rigidity, and the upper layers 30 are desirably formed of thin sheets of stainless steel or the like and are turned downwardly over the sides and lower margins of the frames, where they are secured for constituting facings for such surfaces.

As best seen in Figure 1, the back-rest 2 and leg-rest 4 are hingedly connected to the respective opposite margins of the center-section 3 by means of pairs of pintle-joined projecting hinge-knuckles 31 and 32, which latter are preferably integrally formed on the frame-portions 27, 28.

Projecting inwardly from the side panel 24, is a pair of suitably spaced bearing-lugs 33 rotarily supporting a shaft 34 projecting downwardly beyond the lower bearing-lug 33. Fixed on the lower end of shaft 34, is a downwardly facing bevel gear 35, and secured between suitable thrust bearings on shaft 34 is a worm 36, which meshes with a worm sector gear 37 secured on a transverse shaft 38, one end of which is journaled in the side panel 24 and the opposite end in the adjacent bearing arm 26.

A crank-arm or link 39 having its inner end fixed to shaft 38 projects through suitable opening 40 in end-plate 25 and is connected at its forward end by means of a pivot pin 41 to a link 42 which is, in turn, pivotally connected by a pin 43 to a bearing cleat 44 secured to the under side of back-rest 2. It will now be evident that rotation of worm 36 by its gear 35 will cause shaft 38 to rotate and actuate crank-arm 39, the back-rest 2 raising or lowering with the forward end of the crank-arm 39. It may be observed that the link 42 and bowed shape of crank-arm 39 permit the latter to clear the hinge-knuckle 31 so that the upper body or back-rest section 2 may be fully raised to a vertical or chair position.

Support and adjustment of the leg-section 4 are obtained in much the same manner as described in connection with the back-rest 2. A worm gear 45 is keyed to a vertical shaft 46 journaled in suitably spaced bearing-plates 47, mounted on and projecting from the side panel 24. Shaft 46 projects downwardly beyond the lower plate 47 and has an upwardly facing bevel gear 48 fixed upon its lower end. A transverse

4

shaft journaled in the side panel 24 is driven from the worm 45 by means of a worm sector gear 50, and said shaft 49 is operatively connected to the leg-rest 4 by means of a crank-arm 51, a link 52, pivot pins 53 and 54, and bearing cleat 55.

Selective control and adjustment of the back-rest 2 and leg-rest 4 are obtained by means which includes a shaft 56 journaled in a bearing-lug 57 for both rotatory and axially shifting movement, and extends rearwardly through a shaft housing 58 bolted or otherwise secured to the depending frame-plate 25. At its rear end the shaft 56 is provided with an enlarged tubular sleeve 59 journaled in a bearing 60 formed in the end wall 61 of the shaft housing 58. Along that portion of its length which is within the bearing 60, the sleeve 59 is provided with two axially spaced peripheral grooves 62, 63 for shaft positioning engagement with a detent-ball 64 shiftably mounted in a bore-hole 65 and urged upwardly by means of a spring 66 which is in turn held in place by a cap bolt 67. The shaft 56 projects through the sleeve 59, and on its projecting end is provided with a hand-wheel 68, which is conveniently accessible to the left hand of the technician or operator when standing at the "head-end" of the table. As has been stated, the shaft 56 is adapted for both endwise shifting and rotary movement and at its interior end is provided with two diametral pins 69, 70, located respectively on opposite sides of the plate 57. Also mounted on the shaft 56, outwardly from the pins 69, 70 (with respect to the bearing lug 57), are two freely rotatable bevel gears 71, 72, having peripheral collar plates 73, 74, which are in turn, edgewise rotatably engaged in slots 75, 76 formed in the opposite ends of a holding-pin 77, the latter extending through and, at its midsection, secured in the bearing lug 57 as best seen in Figure 3. The holding-pin is of such length that the gears 71, 72 are respectively held in permanent meshing engagement with the gears 48, 35. In their outwardly presented faces, that is to say, the faces which are respectively presented toward the bearing lug 57, the collar plates 73, 74 are provided with axially projecting, pointed studs 78, 79 each of such length that, when the shaft is in the rearwardly shifted position shown in full lines in Figure 2, the stud 79 will be engaged with pin 70 and the stud 78 will be disengaged from the pin 69 consequently the worm 36 will be rotated and the back-rest 2 elevated or lowered depending upon direction of rotation of the hand-wheel 68 and shaft 56. When desired, the hand wheel 68 and shaft 56 may be quickly and conveniently shifted forwardly to the position shown in dotted lines in Figure 2, whereupon the stud 78 becomes engaged with the pin 69 and the stud 79 becomes correspondingly disengaged from the pin 70. As a result, the back-rest 2 remains stationary and the leg-rest 4 is elevated or lowered depending upon the direction of rotation of the hand wheel 68 and the shaft 56.

Ordinarily the pins 69, 70 will be to one side or the other of the studs 78, 79 so that there will be no interference as the shaft 56 is shifted from one position to the other, and after shifting, the shaft 56 will have to be rotated for some portion of a turn to bring the pin and stud into driving engagement as shown, for example, in Figure 4. If, by chance, the pin and stud should happen to be in line, no interference would occur due to the pointed end of the stud and the rounded cross-sectional shape of the pin, the stud being

5

automatically rotated to one side or the other as diagrammatically shown in Figure 5.

In this connection it should be noted that the lateral and transverse tilting mechanism more fully described in my co-pending applications Serial No. 476,699 now U. S. Patent No. 2,416,410, issued Feb. 25, 1947, and No. 590,755 are driven from a shaft, hand wheel and gear mechanism substantially identical with that above described in connection with the back-rest 2 and leg-rest 4 and therefore has not been separately shown or described herein.

Although the clutch of the present invention has been described in conjunction with a surgical table it should be understood that its application is not thereby limited and that such clutches are equally applicable to other types of similar equipment wherein a multiplicity of articulated sections must be optionally driven from a common source of driving movement, and it should also be understood that changes and modifications in the form, construction, arrangement, and combination of the several parts of the clutch for surgical table or the like may be made and substituted for those herein shown and described without departing from the nature and principle of my invention.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A mechanical transmission comprising a bearing lug, a shaft extending rotatably and shiftably through the lug, a pair of gears rotatably mounted on the shaft on opposite sides of the lug, means carried by the lug for preventing

6

the gears from shifting toward and away from the lug, and means rigidly mounted upon the shaft between the gears for optionally engaging with one or the other of said gears depending upon the shifted position of the shaft.

2. A mechanical transmission comprising a bearing lug, a shaft extending rotatably and shiftably through the lug, a pair of gears rotatably mounted on the shaft on opposite sides of the lug, said gears each being provided with a peripheral collar plate, a pin extending through and carried by the lug, said pin being provided at its ends with slots slidably engaging said collar plates for preventing the gears from shifting toward and away from the lug, and means rigidly mounted upon the shaft between the gears for optionally engaging with one or the other of said gears depending upon the shifted position of the shaft.

HYMAN ROBERT SHAMPAINÉ.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
571,964	Adams	Nov. 24, 1896
812,903	Tropp	Feb. 20, 1906
1,078,840	Druschel	Nov. 18, 1913
1,208,746	Cavanagh	Dec. 19, 1916
1,497,368	Fries et al.	June 10, 1924
2,416,410	Shampaine	Feb. 25, 1947