Jan. 14, 1958 N. L. BUCK ET AL 2,819,713

MASSAGE TABLE

Filed Aug. 15, 1956 6 Sheets-Sheet 1

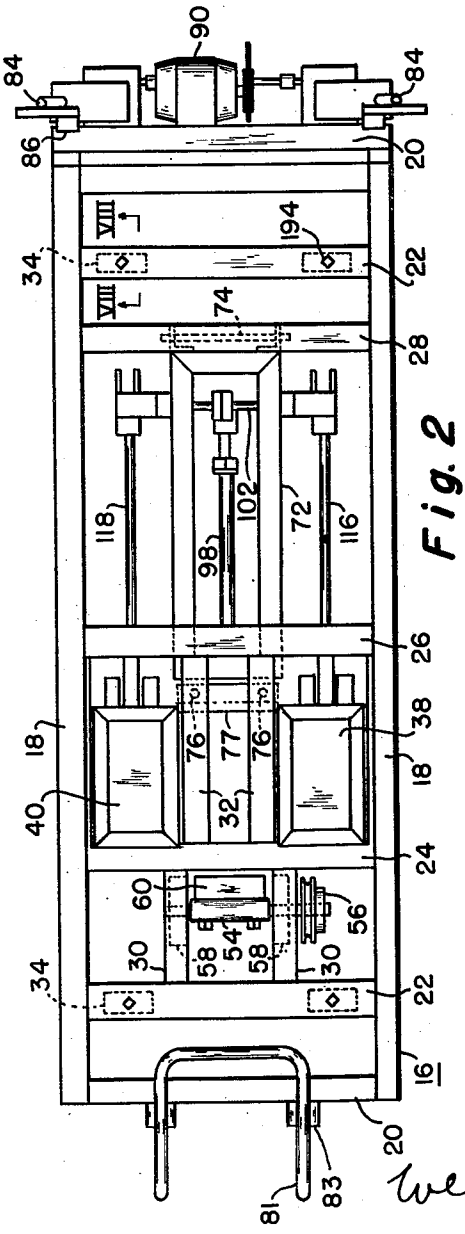

Fig. 2

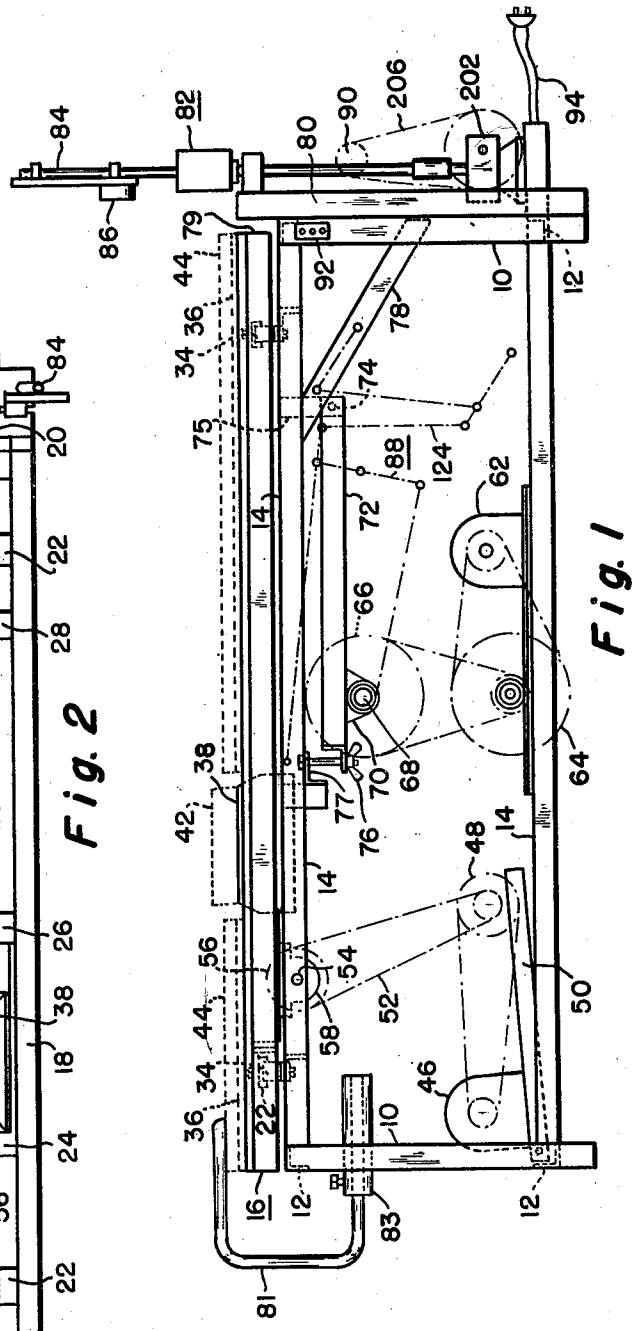

Fig. 1

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MASSAGE TABLE

Filed Aug. 15, 1956 6 Sheets-Sheet 2

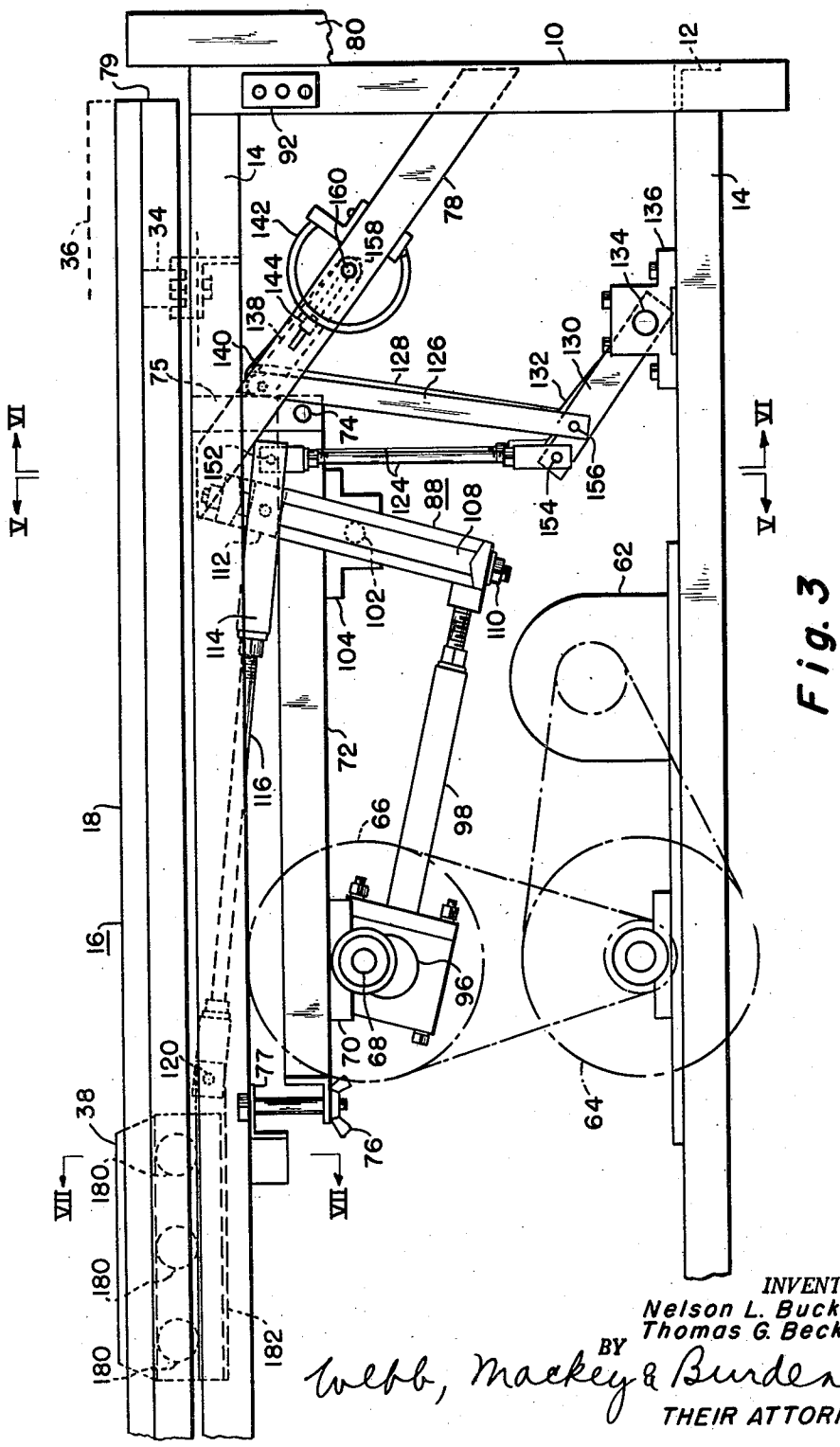

Fig. 3

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Filed Aug. 15, 1956 6 Sheets-Sheet 3

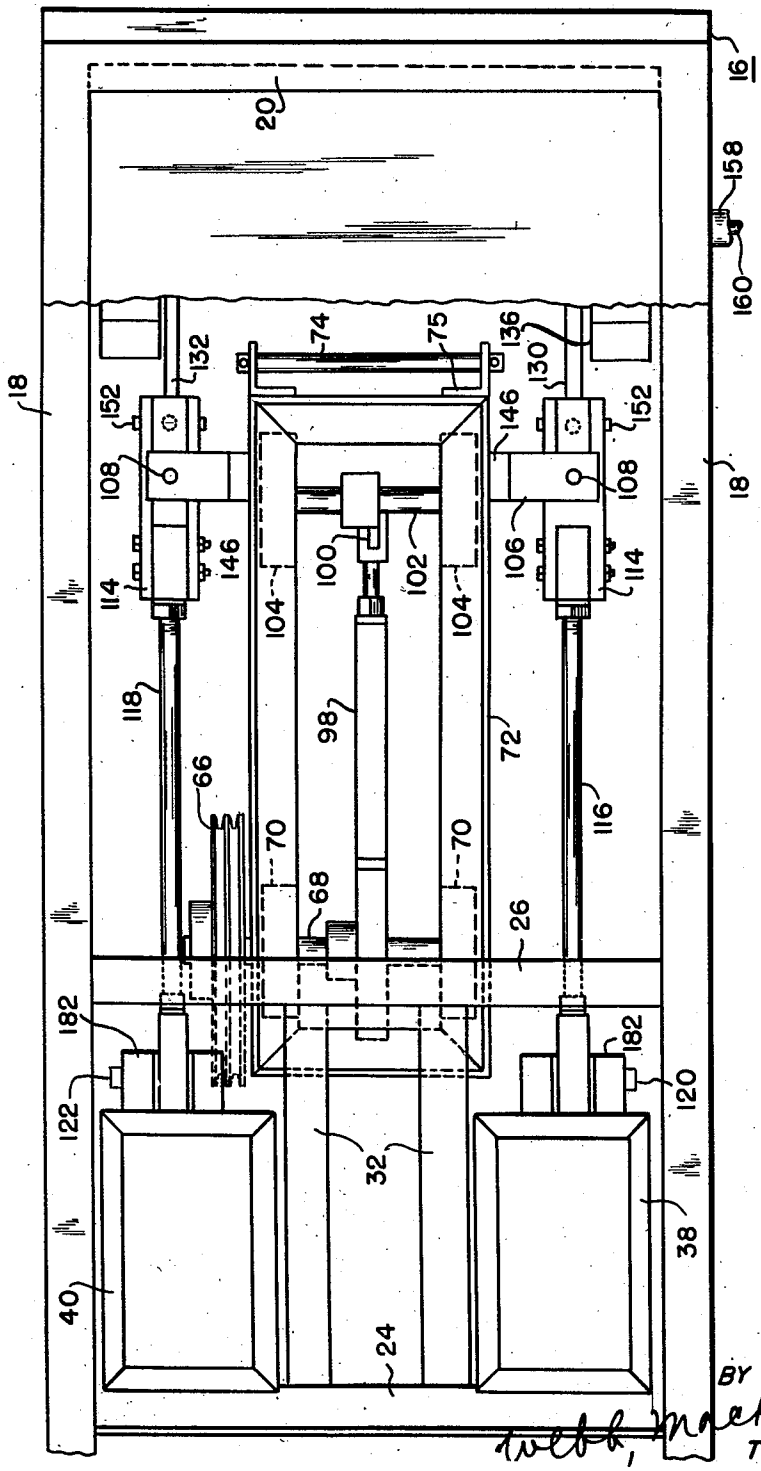

Fig. 4

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MASSAGE TABLE

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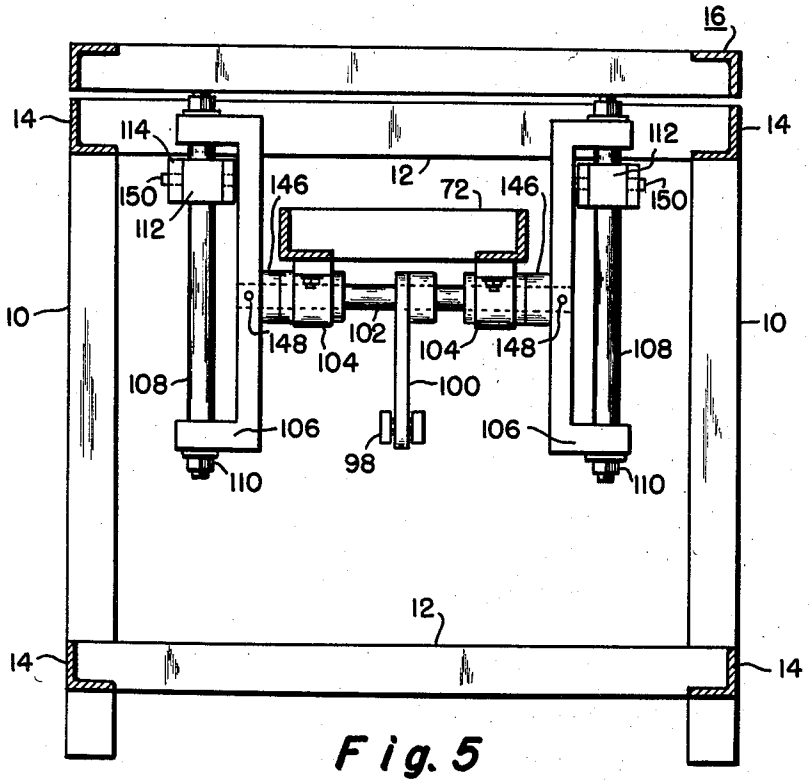

Fig. 5

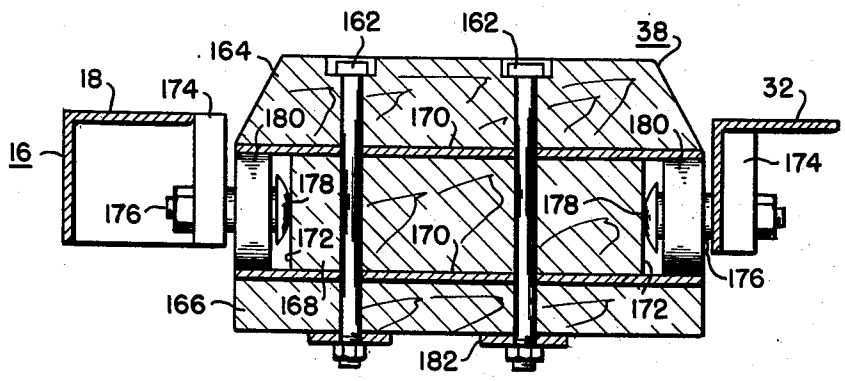

Fig. 7

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MASSAGE TABLE

Filed Aug. 15, 1956 6 Sheets-Sheet 5

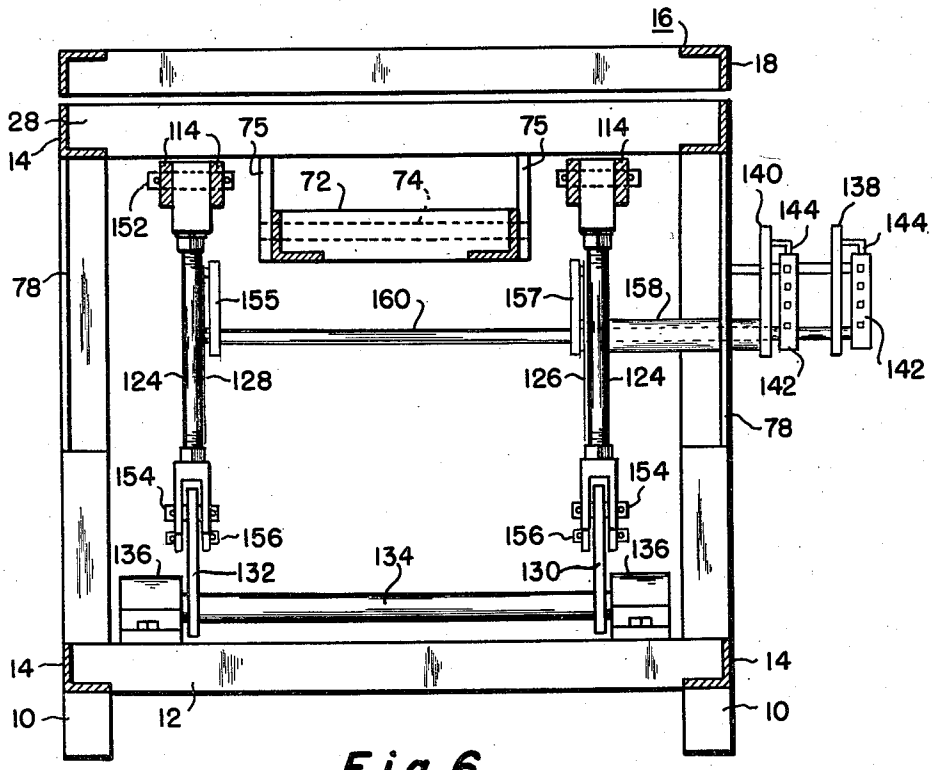

Fig. 6

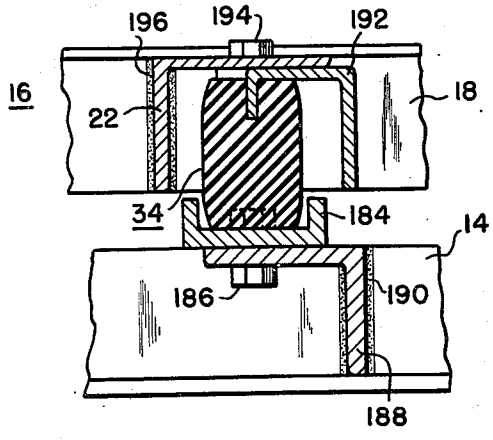

Fig. 8

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MASSAGE TABLE

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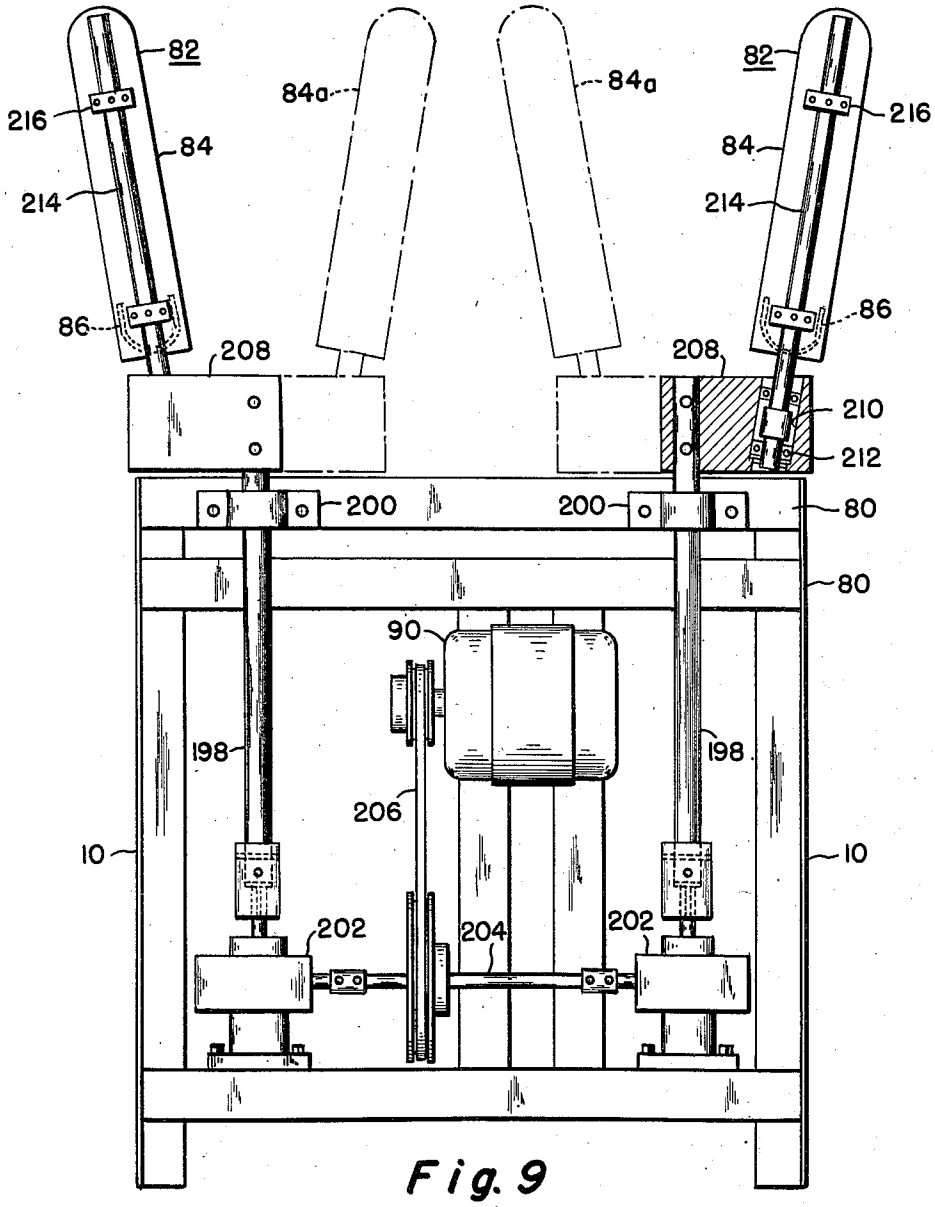

Fig. 9

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United States Patent Office 2,819,713
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2,819,713

MASSAGE TABLE

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Application August 15, 1956, Serial No. 604,197

9 Claims. (Cl. 128—33)

The present invention relates to a massage table, particularly a massage table providing body supporting parts and applicators, all of which are power driven.

Certain objectives heretofore suggested in massage treatment consist of vibrating a table or a couch upon which the patient reposes, applying localized massage to selected portions of the body of that patient, and manipulating his legs with a compound motion effecting materially all of the leg muscles at one phase or another during the motion, with all driving power for such motion being supplied from external sources. However, no one has, prior to our invention, suggested that all of these objectives could be accomplished from a single, power operated massage table upon which the patient can remain for the entire sequence of treatment. Past apparatus embodying separate units for each operation required that the patient be disturbed from time to time in being removed and transferred from one unit to the next for successive operations.

The consolidated massage table structure according to this invention includes a vibrating top or table portion having body applicators and additional mechanism for exercising the legs. More specifically, the massage table has a stationary bed or frame constituting the table supporting structure, a reciprocating table top secured thereto on bodies forming vibration mountings, a pair of pads slidably mounted in longitudinally formed openings in the table top to reciprocate lengthwise of the table substantially in the plane of those openings, a pair of foot supports rotatably mounted above one end of the table supporting structure to manipulate the feet and legs of a reclining patient with compound motion and first, second, and third electric motors disposed at different points in the table supporting structure which have separate drives to the table top, pads, and the foot supports.

More particularly, the electric motor drive to reciprocate the table top includes an idler sheave spaced from the first motor, an unbalanced weight device connected to reciprocate the table when the weight is rotated, and V-belts continuously interconnecting the motor and the unbalanced weight device through the idler sheave.

The separate motor drive to reciprocate the pair of body pads includes an eccentric, eccentric shaft, crank, and a connecting rod driven by the second motor, rollers and roller ways to carry the individual applicator pads which reciprocate on the ways and which have individual drive links at one end of each pad, and a rocking fork mechanism providing a split drive between the connecting rod and the drive link for each applicator pad. The rocking fork mechanism carries a spaced pair of rigid pins which are rocked thereby about their midportions and which carry slide blocks pivoted to the pad drive links and slidable vertically to adjusted positions on the length of the pins. A parallelogram linkage for supporting each slide block includes a hand lever which controls the individual elevation of the slide block for setting the stroke

of the associated pad and which also selectively controls whether the pad oscillates in direct or opposite phase to the other pad, depending on whether the slide block is set at a point above or below the neutral midportion on the pin along which it slides. This second motor which drives the applicator pads is run continuously and the applicator motion is individually stopped or run by appropriate operation of the parallelogram stroke setting linkages to give the applicator pads the same or different strokes both with respect to stroke length and to stroke phase.

The separate motor drive to move the foot supports includes a pair of spaced vertical shafts geared through separate drive connections to the third motor, a crank arm extending from the upper end of each vertical shaft and having a diagonally outwardly extending socket in the outer end thereof, and a foot support journaled in spaced bearings contained in that socket so that they will not rotate about their own axes as the crank arms revolve about the vertical shafts.

The three motors indicated above run entirely independently from one another and the table top is started and stopped by starting and stopping the first motor. The body pads are not only started and stopped by the stroke setting mechanism, but also by starting and stopping the second motor. The foot supports are started and stopped by starting and stopping the third motor.

In the accompanying drawings, we have illustrated certain preferred embodiments of our invention, in which:

Figures 1 and 2 are side elevation and plan view, respectively, of the massage table according to our invention;

Figures 3 and 4 correspond to Figures 1 and 2, but show the various stroke pad mechanism to enlarged scale;

Figures 5 and 6 are sections taken along the line V—V and VI—VI of Figure 3 showing the stroke setting mechanism;

Figure 7 is a section along the lines VII—VII of Figure 3;

Figure 8 is a fragmentary section taken along the lines VIII—VIII of Figure 2 showing a typical vibration mounting for the corners of the table top; and

Figure 9 is an end elevation of the table showing the foot supports.

In Figures 1–4, the present massage table invention includes a generally upright rectangular framework having a set of legs **10** at the four corners which are interconnected by means of the usual sets of upper and lower cross bars **12** at the ends of the table and upper and lower side rails **14** extending longitudinally of the table. At the upper end, the rectangular framework supports a unitary table top **16** having a rectangular metal frame formed by a spaced pair of longitudinally extending side rails **18** joined at their opposite ends by means of a first pair of cross rails **20** and further joined by a second pair of cross rails **22** intermediate the first rails, and also by a series of three center section rails **24**, **26**, and **28**. The center section rail **24** is connected by means of a pair of hanger bars **30** with the adjacent one of the second pair of rails **22** and the rail **24** is further connected to the adjacent center section rail **26** by means of a spaced pair of rails **32**. At the four corners thereof, the table top **16** is secured to the upright framework by means of a set of deformable bodies forming vibration mountings **34**. The unitary table top **16** carries a plywood foundation panel **36** having openings therein generally corresponding to the rectangular openings defined between the rails **18**, **24**, **26**, and **32** which receive therein a pair of body applicator pads **38** and **40**. Each of these pads is in the form of a pad **42** of foam rubber or the like covered by the usual upholstery cloth which is preferably waterproof and this pad moves within a corresponding rectangular opening

formed in a pad 44 carried by the plywood foundation panel 36.

A first electric motor 46 is mounted at one end of the table framework and has a V-belt drive connection to an idler sheave diagrammatically indicated at 48. A cantilever beam 50 is pivoted at one end to the table supporting framework and carries the idler sheave 48 at its outer end in order that, under the influence of gravity, it maintains tension on a V-belt 52 which is trained with its lower end about the idler sheave 48. The V-belt 52 drives a shaft 54 through a sheave 56 fast to one end thereof. The shaft 54 is rotatably mounted at its opposite ends in a set of bearings 58 carried by the hanger bars 30 and at its midportion the shaft 54 has an unbalanced weight 60 bolted thereto so as to produce a vibratory motion of unbalance when it is rotated.

A second electric motor 62 is mounted to a center platform in the table supporting framework and is belt connected through an intermediate sheave 64 to a sheave 66. The sheave 66 is carried at the end of a driven shaft 68 which is rotatably mounted in a set of depending bearings 70 secured to the respective beams of a frame 72. The frame 72 has a pivot bar 74 at one end pivotally securing it to a pair of brackets 75 depending from the upright framework. At the opposite end, the frame 72 has an adjustable wing nut connection 76 to a cross rail 77 affixed to the upright framework so as to vary the tension in the connecting belt between the sheaves 64, 66. The pivot bar 74 provides a fixed swing axis facilitating this tension adjustment. A pair of diagonal braces 78 rigidifies the connection at one end of the table between the upper side rails 14 of the framework and the pair of adjacent table legs 10. These latter legs 10 have an upright frame 80 bolted thereto which carries a foot support mechanism generally indicated at 82. Each of said foot supports 84 includes a heel rest 86 for supporting the foot of a patient reclining on the unitary table surface defined by the pad 44 on the table top 16. The end of this unitary table surface and table top 16 is foreshortened at 79 and the supporting framework extends therebeyond to give clearance to the frame 80 for the mechanism 82. At the opposite end, there is a hand rail 81 extending across the central portion of the table and having U-shaped side pieces which extend around and under the end of the table. The lower portion of these side pieces extends into sleeves 83 secured to the main frame.

The driven sheave 66 is suitably connected through the shaft 68 and suitable mechanism 88 to the individual body pads 38, 40 so as to reciprocate them in the plane of the rectangular openings in the table. The electric motors 46, 62 plus a third electric motor 90 in the foot support mechanism 82 are controlled from the respective upper, middle, and lower buttons in a push type switch box 92 which is energized from a plug-in type electric cord 94 carried by the table framework.

As best seen in Figures 3 and 4, the driven shaft 68 which carries the sheave 66 at one end also carries an eccentric 96 fast thereto and fitting into one end of a connecting rod 98. The connecting rod 98 is connected at the opposite end to a depending crank 100 which is fast to a cross shaft 102 forming a driving member of the mechanism 88 to operate the pads 38 and 40 with an adjustable stroke. The driving member shaft 102 carries the crank 100 so as to depend from a midportion thereof and at spaced points from this midportion the shaft is journaled to rotate in a pair of bearings 104 which depend from the pivoted frame 72. At its outer extremities, the driving member shaft 102 carries a pair of outwardly directed forks 106 which support individual vertically disposed rocking pins 108 bridging across the forks and secured thereto by means of a set of nuts 110. An apertured slide block 112 mounted to each of the rocking pins 108 has a pivotal connection to a pair of spaced end plates 114 together carried at the end of an applicator pad drive link 116 or 118 as appropriate. The one drive link 116 is pivotaliy joined at 120 to the body applicator pad 38 and the other drive link 118 is pivotally joined at 122 to the remaining applicator pad 40 which is substantially transversely aligned with the applicator pad 38. Each pair of the end plates 114 at its rear extremity is pivotally connected to a different elevating link 124, which links are separately carried in spaced relationship by means of respective parallelogram type stroke setting linkages 126 and 128. The parallelogram stroke setting linkages 126 and 128 each include driven links 130 and 132 which pivotally support the individual links 124 and which are rotatably received to rock upon a fixed cross shaft 134 carried in spaced apart bearings 136 mounted to the lower side rails 14 of the table supporting framework. A pair of adjacent hand levers 138 and 140 have individual fixed quadrants 142 upon which they are adjusted and locked by means of a set of detents 144 so as to raise and lower the drive links 116, 118 by means of the parallelogram linkages to adjust the stroke of the body applicator panels 38 and 40.

Figures 5 and 6 show the slide block and stroke setting mechanisms for the pad drive links 116, 118 in detail. The forks 106 have hubs 146 received on the common driving shaft 102 and they are each made fast to this shaft by means of a cross pin 148. Each of the slide blocks 112 carries a pair of outwardly extending trunnions 150 to which the spaced end plates 114 of the drive rods 116, 118 are secured. These end plates 114 carry a pivot pin 152 connected to the upper ends of the respective elevating links 124. The lower ends of the elevating links 124 carry a pivot pin 154 which is mounted to each of the driven links 130 and 132 at a point spaced from another pivot 156 connecting that link with its respective parallelogram linkages 126 and 128. The driving links 155 and 157 for the parallelogram linkages are mounted to corresponding ends of the telescoped inner and outer shafts 160 and 158. The inner shaft 160 extends through bearings, not shown, mounted to the diagonal braces 78 in the table supporting framework. At their outer ends, the shaft 158, 160 carry the respective hand levers 140 and 138 and by independently rotating and locking these hand levers an operator is able to adjust the corresponding parallelogram linkage 126 or 128 to change the stroke setting on the body applicator panels.

Figure 7 shows the body applicator pad 38 which is typical for both pads 38, 40. The pad 38 is essentially a wooden plate assembly bolted together at 162 and consisting of an upper plate 164, a lower plate 166 and a narrow spacer plate 168. Sheets 170 are clamped between these plates and extend beyond the sides of the narrow spacer plate 168 to define roller channels 172. The metal rails 18 and 32 adjacent the channels 172 carry rails 174 each of which presents a row of fixed studs 176. Each stud 176 carries a spherical bearing portion 178 at the head end and adjacent the head carries a roller wheel 180 received in the channel 172 so as to roll on the sheets 170. In one physically constructed embodiment of the invention, the spherical bearing portion 178 at the head had a two-inch radius of curvature where it engaged the spacer plate 168 and the roller wheels 180 were ball bearing type roller skate wheels. In brief reference to the foregoing Figure 3, it can be noted that the roller wheels 180 are provided three to a side for each of the body applicator pads 38 and 40 and that a pair of spaced straps 182 secured to the bottom of the bolts 162 have bent ends carrying the respective pivots 120 connected to the panel drive links 116.

Figure 8 shows a transverse cross section through the table vibration mountings 34 which are elongated bodies of rubber, elastic plastic, or similarly deformable solid materials. The deformable bodies are bonded at the bottom to a channel shaped mounting member 184 which is bolted at 186 to a structural bridging member 188 of angle cross section. This bridging member 188 is welded at 190

at its opposite ends to the upper side rails **14** of the table supporting framework. Along the upper face thereof, the deformable bodies in the vibration mountings **34** are bonded to a partially embedded U-shaped channel member **192** which is deflected at its opposite ends to receive a bolt **194** carried by the adjacent table top cross rail **22**. The table top cross rail **22** has welds **196** at its opposite ends securing it between the table top side rails **18**. Being disposed so as to extend generally transversely to the unitary table top **16**, the deformable bodies in the vibration mountings **34** are relatively stiff against lateral movement of the table top and they act generally as narrow shear pads in the longitudinal direction of the table so that it readily is vibrated lengthwise with a patient reclining thereon.

In Figure 9, the foot support mechanism generally indicated at **82** includes a pair of spaced vertical drive shafts **198** mounted adjacent their upper ends in a set of bearings **200** carried by and disposed outboard of the foot support frame **80**. At their lower ends, these outboard drive shafts **198** are connected through worm type reduction gear boxes **202** to a common shaft **204** driving the same. The third mentioned electric motor **90** drives the shaft **204** through a sheave and V-belt drive indicated at **206**. At its upper extremity, each vertical drive shaft **198** is connected to a different one of the foot supports **84** in the same manner. A generally rectangular radius bar **208** formed from a block of hardened aluminum or light metal material is made fast to the extremity of the appropriate shaft **198** such that its outer end describes a horizontal path of swinging motion as the shaft **198** rotates.

The reduction gearing in the gear boxes **202** is such that these shafts rotate in opposite directions from one another so that the radius bars **208** rotate in opposite directions but symmetrically to one another. At the swinging outer end each radius bar **208** has a deep socket **210** which extends diagonally upwardly and outwardly and receives a pair of spaced ball bearings **212**. The ball bearings **212** are captive in spaced relation upon a shaft **214** carrying the foot support or applicator **84** and the lower ball bearing **212** rests on a bottom shoulder within the deep socket **210**. Each one of two spaced brackets **216** has a set of three screw connections to the respective shaft **214** and applicator **84** to hold them rigidly together and the center connection of each set comprises a set screw for effecting up and down adjustment of the applicator **84**.

In operation of the massage table of Figures 1 through 9 foregoing, a patient is placed on the pad **44** carried by the unitary table top **16** and an appropriate push button on the switch box **92** is depressed by the operator to energize the first motor **46** causing the table top to vibrate generally lengthwise upon the vibration mountings **34**. After a time, the first motor **46** is switched off and the second motor **62** is started as soon as the patient is shifted to a point at which the body applicator pads **38**, **40** are aligned with the proper massage points on the patient. Then the hand levers **138** and **140** are adjusted to set the mechanism **88** and stroke setting linkages **126**, **128** whereby the pads **38** and **40** move together in phase, or out of phase and with the same stroke or different strokes of travel as required. When the stroke setting mechanism brings the slide blocks **112** into alignment with the pin neutral axis defined by the driving member shaft **102**, Figure 5, neither pad **38** or **40** moves. This condition prevails even when the vibrating table top **16** is being oscillated on its vibration mountings **34**. From this neutral position of the stroke setting mechanism, the second motor **62** may be left running for possible further use or may be turned off, but in either case the pads **38**, **40** remain stationary and the patient is shifted and his feet are then secured to the foot supports **84** by means of straps, not shown. The third motor **90** is then switched on to set it in motion to impart symmetrical motion to the foot supports **84**. As a consequence the patient's legs and ankle muscles are manipulated in a fashion whereby both feet move toward the patient at the same time and then they move away from the patient. Simultaneously, they are first being spread apart and then they approach one another and at the same time, they are undergoing a twisting motion best appreciated in Figure 9. Thus, in Figure 9, the supports **84** move from their solid line position in which they are tilted away from one another into a position shown by the dotted lines **84***a* in which they tilt toward one another. In the plane perpendicular thereto they are also tilting the feet of the patient respectively toward him and away from him as his feet bodily move toward and away from him.

The plane of rotation of the unbalanced weight **60** extends at right angles to the general longitudinal direction of the unitary table top **16** and rotation causes the barely perceptible vibrations desired of the table top essentially in the fore and aft direction. The vibration mountings **34** are resistant to compression and tension forces but not to shear forces and therefore the table top **16** has little tendency to vibrate up and down.

It will be readily appreciated that the present single massage table affords the foregoing three-way massaging action on different parts of a patient reclining thereon and that all three motions are power driven so as to afford a very relaxing massage action.

While we have described certain presently preferred embodiments of our invention, it is to be understood that it may be otherwise embodied within the scope of the following claims.

We claim:

1. A massage table comprising a table frame, a driving member mounted thereon and carrying pin means cyclically rocked thereby, a unitary table top having transversely spaced openings intermediate its end portions and having the opposite end portions secured to the frame by means of a set of deformable mounting bodies, said table top having a pad received in the individual ones of the openings therein, with each pad mounted substantially in the plane of that opening and connected to the margins thereof by means of a set of channel and roller connections for reciprocatory movement in the aforesaid plane, means forming separate connections between the pin means carried by the driving member and each of the pads comprising an individual drive link for each pad, a slide block connecting each drive link and the pin means, and linkages for setting the slide block on each of the pin means at adjusted positions with respect to its rocking axis to vary the stroke of the pads independently of one another, and means operatively connected to said table top and effective to vibrate the same on the deformable mounting bodies independently of the operation of said driving member.

2. A massage table comprising a table frame, a driving member mounted thereon carrying rocking pin means, a unitary table top having transversely spaced openings intermediate its ends and having those ends secured to the frame by means of a set of deformable mounting bodies, said table top having a pad received in the individual ones of the openings therein, with each pad mounted in the plane of the opening and connected to the margins thereof by means of a set of channel and roller connections for reciprocatory movement in the aforesaid plane, guide means formed by the channel and by cooperating spherical bearing means to prevent turning movement of each pad in the plane of its opening, and means forming separate connections between the pin means on the driving member and each of the pads comprising an individual drive link for each pad, a slide block connecting each drive link and the pin means, and parallelogram linkages for setting the slide block on each of the pin means at adjusted positions with respect to the pin rocking axis to vary the stroke of the pads independently

of one another, and an unbalanced weight carried by said table top and rotatable to vibrate the same on its deformable mounting bodies independently of the operation of said driving member.

3. A massage table according to claim 2 wherein said unitary table top is rectangular and the deformable mounting bodies therefor are of elongated construction and arranged at the four corners of the table transversely to the length thereof.

4. A massage table according to claim 2 wherein each pad has channels formed in each of the opposite sides thereof and the margin of the table opening at that side carries a row of pins protruding into the said channel, and sets of spherical bearings and roller bearings carried by the pins and seating respectively on the floor of the channel and on its opposite sides to support the panel for anti-friction movement.

5. A massage table according to claim 2 wherein said parallelogram linkages have operating means comprising shafts arranged one within the other with the ends of the inner shaft extending beyond the corresponding ends of the outer shaft, said shafts being connected at one end to hand setting levers and connected at the other end to the driving link of the respective parallelogram linkages, and a lifting link connecting the driven links of the parallelogram linkages and different ones of the panel drive links.

6. A massage table according to claim 2 wherein each panel comprises a plate assembly with channels in each of the opposite sides thereof and each cooperating with the margin of the opening at that side which carries a fixed row of rollers confined within said channel, said plate assembly being formed of upper and lower plates spaced by a narrow plate to cooperatively define the channels at their corresponding sides, and wear sheets clamped between the plates and extending laterally beyond the spacer plate to line the opposite walls of the channels.

7. A massage table comprising a table frame, a driving member mounted thereon carrying rocking pin means, a unitary table top having laterally spaced openings intermediate its ends and having those ends secured to the frame by means of a set of deformable mounting bodies, said table top having a pad received in the individual ones of the openings therein with each pad mounted in the plane of the opening and connected to the margins thereof by means of a set of channel and roller connections for reciprocatory movement in the aforesaid plane, a table supporting framework having one end extending beyond the corresponding end of the table top, vertical shafts mounted outboard of said one end of the frame, a radius bar fast to the upper end of each vertical shaft and rotatably carried thereby in a plane adjacent the plane of the table top, said radius bar having a deep diagonally extending socket in the swinging outer end thereof, and a set of spaced bearings in said socket holding a diagonally outwardly extending foot support structure for horizontal circular movement free from rotation.

8. A massage table comprising a table frame, a driving member mounted thereon carrying rocking pin means, a unitary table top having laterally spaced openings intermediate its ends and having those ends secured to the frame by means of a set of deformable mounting bodies, said table top having a pad received in the individual ones of the openings therein with each pad mounted in the plane of the opening and connected to the margins thereof by means of a set of channel and roller connections for reciprocatory movement in the plane of the opening, a table framework having one end extending beyond the corresponding end of the table top, vertical shafts mounted outboard of said one end of the frame, a crank arm fast to the upper end of each vertical shaft and rotatably carried thereby in a plane adjacent the plane of the table top, said crank arm having a deep socket formed in the swinging outer end thereof with the socket axis extending diagonally outwardly and upwardly, a set of spaced bearings in said socket holding a diagonally outwardly extending foot support structure for horizontal circular movement free from rotation, unbalanced weight means operatively carried by said table top for vibrating the same on its mounting bodies, and separate means drivingly connected to the weight means and to the foot support shafts and to the pads to oscillate the table top and foot supports and each of the panels independently of one another, said means which is drivingly connected to independently oscillate each of the pads including an individual drive link pivoted to each pad, a slide block connecting each drive link and the pin means, and linkages for setting the slide block on each of the pins at adjusted points with respect to the rocking axis thereof to vary the stroke of the pads independently of one another.

9. A massage table comprising a table frame, a pad driving member mounted thereon carrying rocking pin means, a unitary table top having laterally spaced openings intermediate its ends and having those ends secured to the frame by means of a set of deformable mounting bodies, vibratory means operatively carried by said table top for vibrating the same on its mounting bodies, said table top having a pad received in the individual ones of the openings therein, each of said pads mounted in the plane of the opening, and connected to the table top by a set of channels and means cooperating therewith for supporting the pad on the table top for reciprocatory movement in the aforesaid plane, a table supporting framework having one end extending beyond the corresponding end of the table top, vertical shafts mounted to said framework outboard of said one end of the frame, a radius bar fast to the upper end of each vertical shaft and rotatably carried thereby in a plane adjacent the plane of the table top, each of said radius bars having a deep diagonally extending socket in the swinging outer end thereof and a set of spaced bearings in said socket holding a diagonally outwardly extending foot support structure for horizontal circular movement free from rotation, power delivery means for applying power to operate the vibratory means and separate means drivingly connected to the vertical shafts and to the driving member to operate the foot support structures and pads.

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