

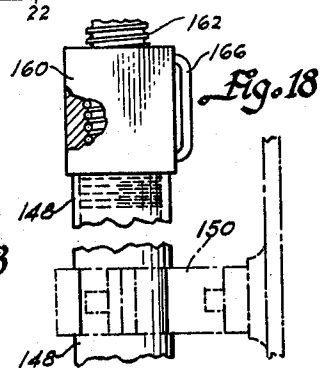
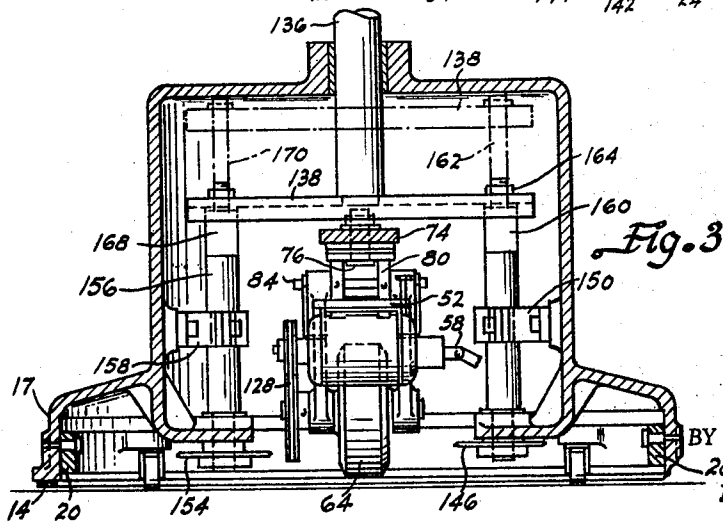
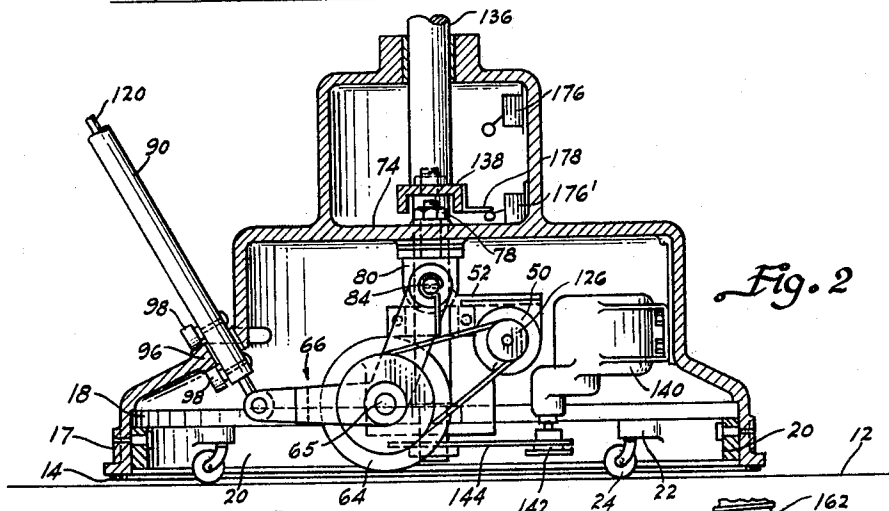
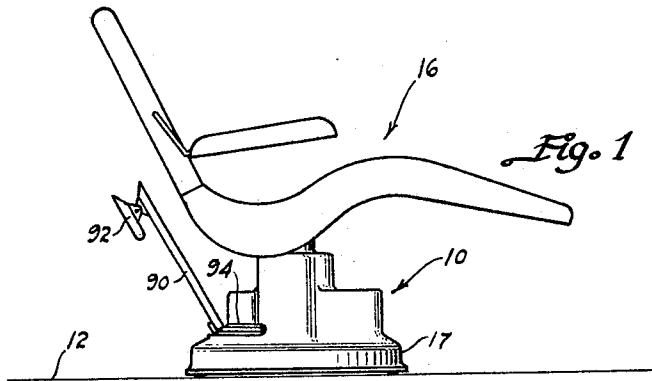
Aug. 2, 1966

C. H. JUST ETAL
MOBILE CHAIR UNIT

3,263,765

Filed Sept. 5, 1963

4 Sheets-Sheet 1



INVENTOR
CHARLES H. JUST
BY JOHN MCCARTNEY
BY *[Signature]*
ATTORNEY

Aug. 2, 1966

C. H. JUST ETAL

3,263,765

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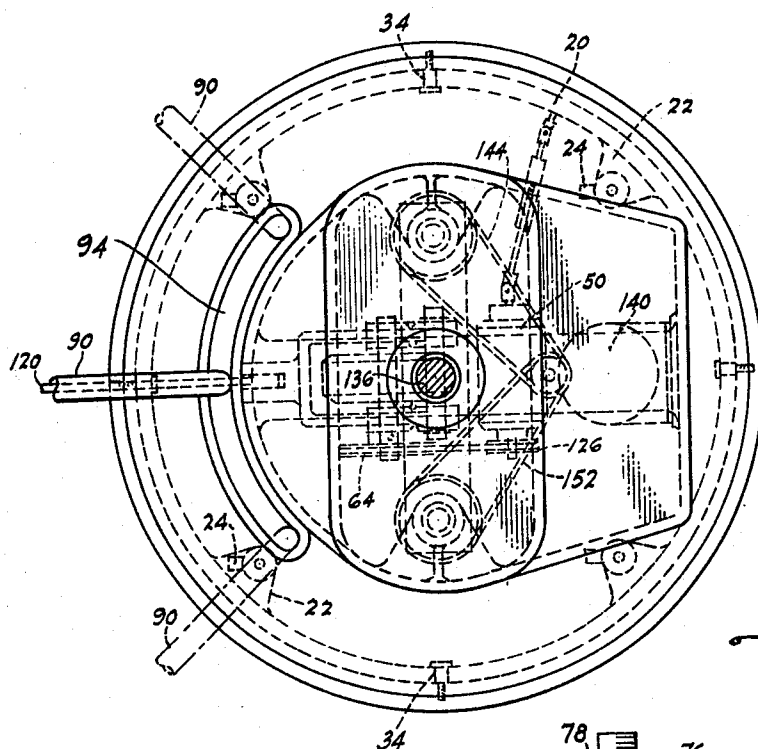


Fig. 4

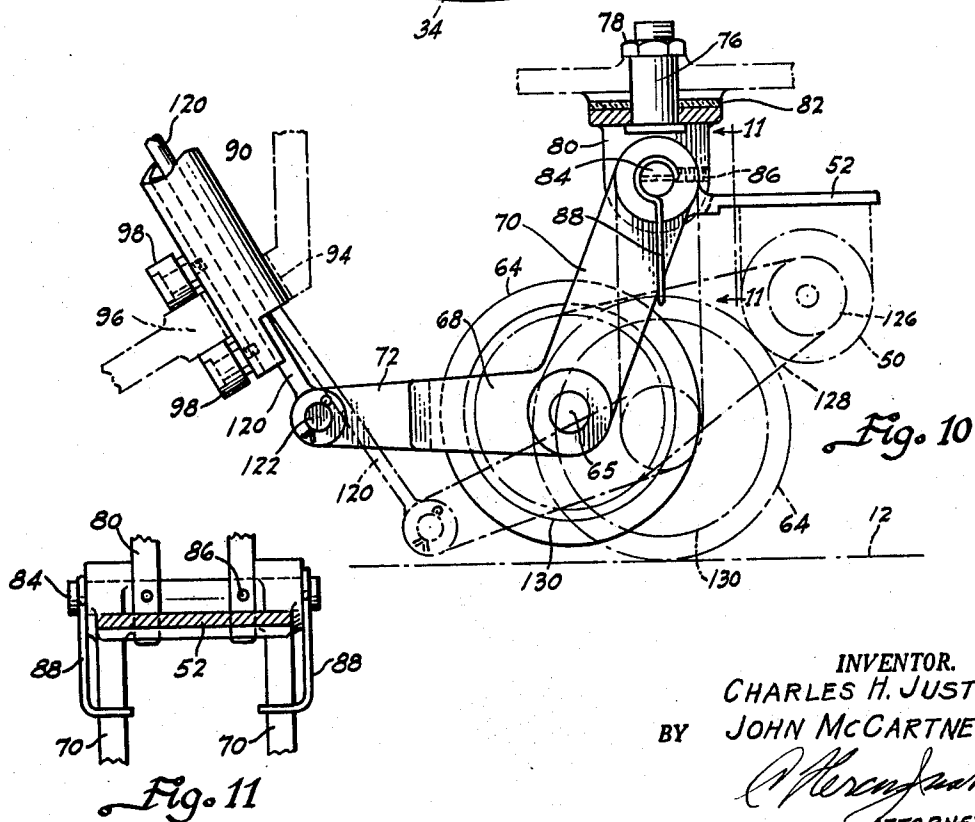


Fig. 10

Fig. 11

INVENTOR.
CHARLES H. JUST
BY JOHN MCCARTNEY
John McCartney
ATTORNEY

Aug. 2, 1966

C. H. JUST ETAL

3,263,765

MOBILE CHAIR UNIT

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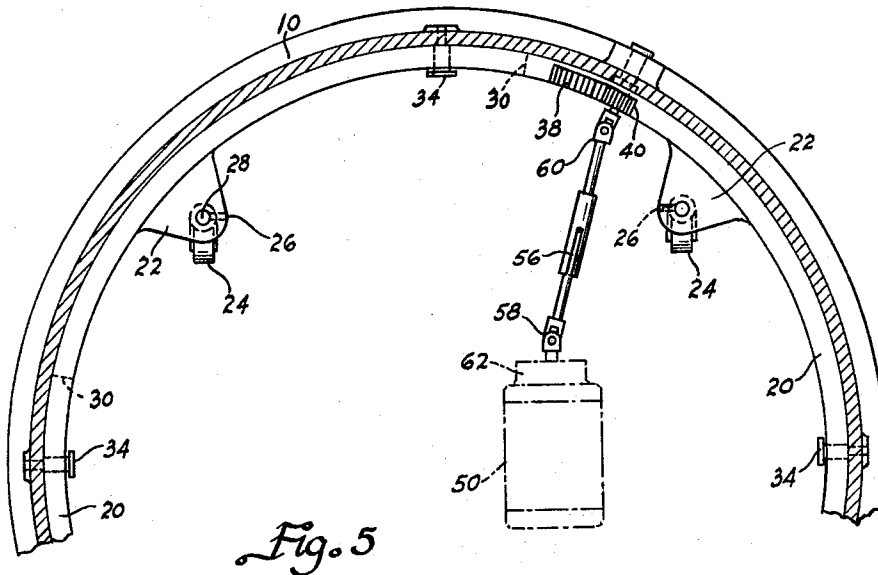


Fig. 5

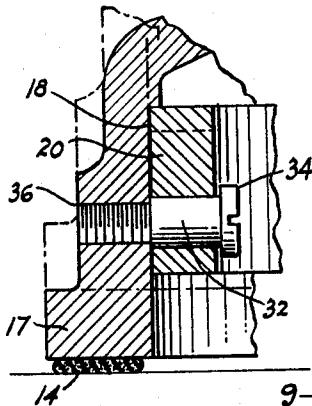


Fig. 6

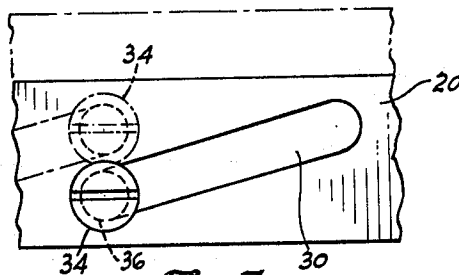


Fig. 7

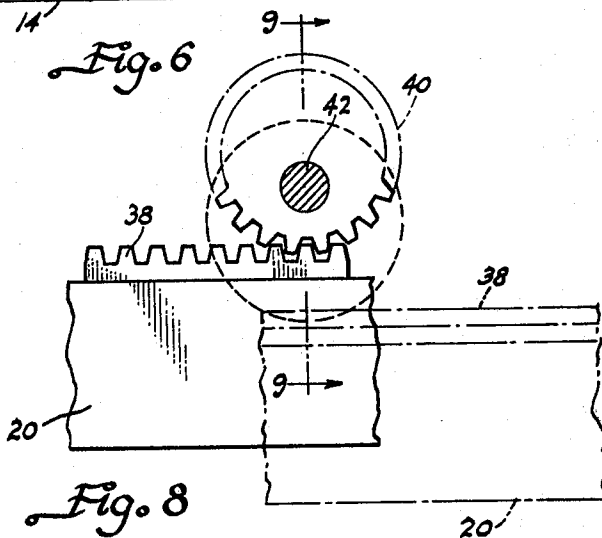


Fig. 8

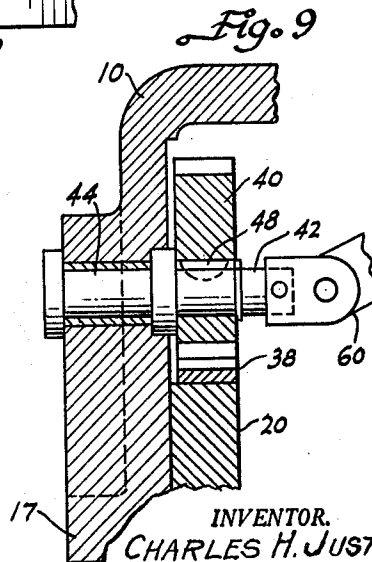


Fig. 9

INVENTOR.
CHARLES H. JUST
BY JOHN MCCARTNEY
ATTORNEY

Aug. 2, 1966

C. H. JUST ETAL
MOBILE CHAIR UNIT

3,263,765

Filed Sept. 5, 1963

4 Sheets-Sheet 4

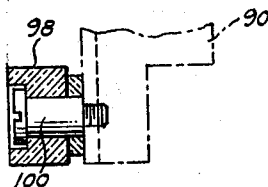
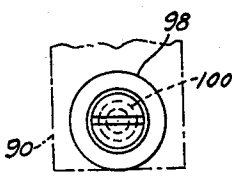
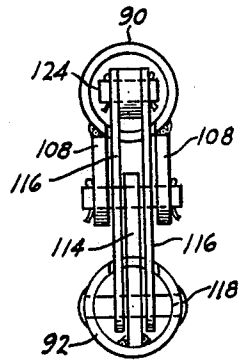
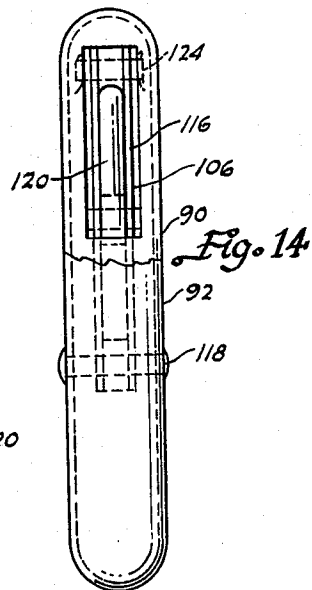
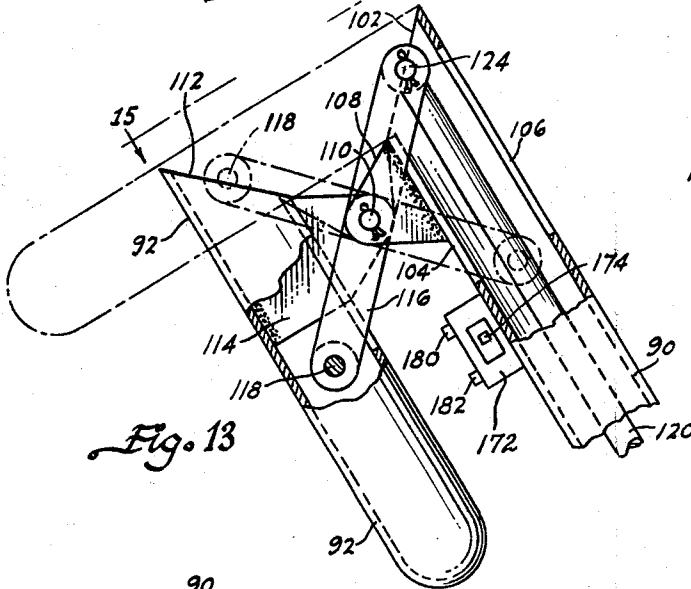
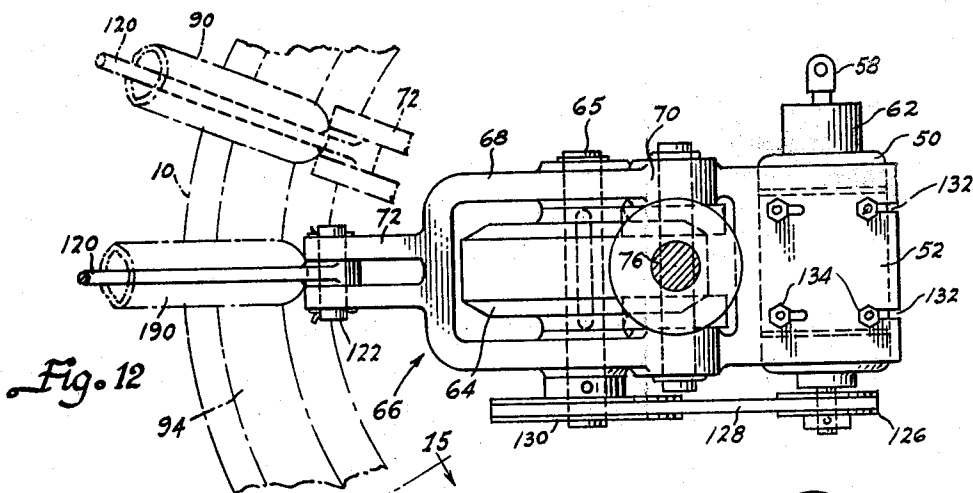


Fig. 15

Fig. 16

Fig. 17

INVENTOR.
CHARLES H. JUST
BY JOHN MCCARTNEY
Charles H. Just
ATTORNEY

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3,263,765

MOBILE CHAIR UNIT

Charles H. Just, York, and John McCartney, Lancaster, Pa., assignors to The Dentists' Supply Company of New York, York, Pa., a corporation of New York
Filed Sept. 5, 1963, Ser. No. 306,753
15 Claims. (Cl. 180-19)

This invention relates to a mobile chair construction of a type suitable for use by dentists, barbers, beauticians and others under circumstances where it is desired to move the chair with a person sitting in it from one location to another within a room and even from one room to another. More particularly, the invention relates to such a chair which has a base normally resting upon the floor by gravity, but which can be rendered movable at will and then be easily turned or moved or propelled in any horizontal direction with a person still in the chair seat.

Briefly, the present invention comprises a chair seat and back supported for limited vertical movement upon a hollow base which is generally circular in plan view. The base is provided with a bottom peripheral rim which normally rests upon the floor by gravity and thus holds the chair stationary at any desired position. Within the bottom rim a set of casters is mounted together with self-contained power means for projecting and retracting the casters, thus to render the base and chair mobile at the will of the operator. When the chair is supported on the set of casters, it may be mechanically moved and steered by means of a propelling wheel which can be lowered into contact with the floor when required. An electric motor within the base is provided for rotating the propelling wheel. A tiller bar projecting from the base to a convenient position for the operator carries the controls for operating the motor, for raising and lowering the wheel and for swinging the wheel in a horizontal direction to effect the steering of the chair. Also mounted within the hollow base, neatly and compactly combined with the other mechanisms, are a pair of screws driven by a reversible electric motor for raising and lowering the chair seat relative to the base.

Thus, this invention provides a chair which can be stationary upon the supporting floor as is now customary in dentists' offices, barber shops and beauty salons, and so forth, but which has the added advantage that it can be easily moved with a person seated upon it to any cabinet, instrument, unit or area of operation. All of the mechanisms for rendering the chair mobile, for propelling the chair and for elevating the seat are neatly housed within the hollow base and are of a purely mechanical nature, as distinguished from hydraulic, fluid or electrical mechanisms. Hence, there is no need to supply fluid power lines, tubes, hydraulic cylinders, pumps or valves. All that is needed to operate the present invention is a simple electrical conduit extending from a wall or floor electrical outlet to the motor.

It is, therefore, an object of the invention to provide a chair particularly for use by dentists, barbers and beauticians, which chair is normally stationary upon the floor but which can be rendered mobile by lowering a set of casters for reaction against the floor to raise the base of the chair slightly above the floor.

It is another object of the invention to provide a power driven propelling wheel within the hollow base of a mobile chair.

It is another object of the invention to provide such a propelling wheel for a mobile chair which wheel can be controlled in rotation, elevation and direction by a tiller bar extending from the base to a position convenient to the operator.

It is still another object of the invention to provide a

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chair which can be rendered mobile at will, but which chair is provided within the base thereof with mechanism for raising and lowering the chair seat.

Still another object of the invention is to provide a base for a chair seat, table, or the like, which base can be rendered mobile at will and when in a mobile condition can be mechanically propelled in any horizontal direction over a floor surface.

A still further object of the invention is to provide a hollow base for a vertically movable chair seat, or the like, within which base are, compactly housed, various mechanisms for rendering the base mobile, for mechanically propelling the base, for steering the propelling means and for raising and lowering the chair seat, or the like.

Details of the foregoing objects and of the invention, as well as other objects thereof, are set forth in the following specification and illustrated in the drawings comprising a part thereof.

In the drawings:

FIG. 1 is a side elevation of a chair embodying the principles of the present invention.

FIG. 2 is a vertical, sectional view through the base of the chair on a larger scale than FIG. 1 with parts shown in elevation.

FIG. 3 is a vertical, sectional view taken at right angles to FIG. 2 with parts in elevation and showing, in dotted lines, the raised position of the seat-elevating mechanism.

FIG. 4 is a top plan view of the base shown in FIG. 1.

FIG. 5 is a fragmentary, horizontal sectional view illustrating certain parts for elevating the supporting ring for the casters.

FIG. 6 is a fragmentary, vertical sectional view of the caster supporting ring showing, in dotted lines, the raised position of the base.

FIG. 7 is a fragmentary, side elevation of FIG. 6.

FIG. 8 is a fragmentary, side elevation of the pinion and rack for operating the caster supporting ring and showing, in dotted lines, the pinion gear turned 180°.

FIG. 9 is a vertical sectional view taken on the line 9-9 of FIG. 8.

FIG. 10 is a fragmentary, vertical sectional view with parts shown in elevation of the propelling wheel and its associated mechanism and also showing, in dotted lines, the propelling wheel in its lower position in engagement with a floor.

FIG. 11 is a fragmentary, vertical sectional view taken on the line 11-11 of FIG. 10.

FIG. 12 is a fragmentary plan view of the mechanism shown in FIG. 10.

FIG. 13 is a fragmentary side elevation with parts in section of the tiller bar and handle and also showing, in dotted lines, the positions of the handle when the propelling wheel is lowered.

FIG. 14 is a front elevation of the handle looking from the left side of the view shown in FIG. 13.

FIG. 15 is an end view of the tiller bar and handle looking in the direction of the arrows 15 of FIG. 13.

FIG. 16 is a fragmentary side elevation showing one of the guide rollers on the tiller bar.

FIG. 17 is a fragmentary, vertical sectional view of the roller structure shown in FIG. 16.

FIG. 18 is a fragmentary side elevation of the ball nut and screw for elevating and lowering the chair seat with respect to the base.

Referring to the drawings, and particularly to FIGS. 1 to 4 thereof, the base 10 comprising the present invention may be a metallic casting or may be made of any suitable material and is preferably of stepped conical shape to provide ample space for the housing of various mechanisms enclosed therein. The bottom peripheral surface of the base is adapted to engage any flat, hori-

zontal supporting surface, such as a floor 12, and, for this purpose, is provided with a ring 14 made of soft rubber or other suitable cushioning and, preferably, frictional material. Supported by and vertically movable with respect to the base 10 is a combination chair seat and back 16. It is to be understood that the showing in FIG. 1 of a particular chair seat and back is to be taken as exemplary only, since it is obvious that the base 10 may be employed to support various types of chairs or other analogous objects, such as operating or treatment tables and the like.

The mechanisms housed within the base 10 comprise a means for rendering the base mobile relative to the supporting surface or floor, a means for propelling and guiding the chair when it is so rendered mobile in any horizontal direction over the floor, and a means for elevating and lowering the seat with respect to the base. Each of these means and mechanisms will now be described in detail.

Mechanism for rendering the base mobile

As best seen in FIG. 2, the extreme lower rim portion 17 of base 10 has formed therein a channel 18 in which a ring 20 is slidably and rotatably fitted. At spaced positions around its inner side, the ring 20 is provided with a suitable number of bosses or lugs 22 for supporting casters 24. The casters may be mounted upon the lugs in any suitable manner, as by set screws 26 passing through the lugs 22 and engaging the caster pins 28, see FIG. 5. Between each of the lugs 22 the ring 20 is provided with an inclined slot 30 which receives the shank 32 of a fixed stud 34 threaded at 36 into the lower portion of base 10. Thus, if ring 20 is given a slight rotational movement, for example to the left, as seen in FIG. 7, the slots 30 will act as cams against stud 34 to lower ring 20, and the casters supported thereby, with respect to base 10 so that the casters will engage the floor and cause the base 10 with the chair seat 16 to be raised slightly above the floor. It will be evident that a slight rotational movement of the ring 20 in the opposite direction will lower the base until its bottom cushioning ring 14 again engages the floor and also will raise the casters out of engagement with the floor, thereby stabilizing the base in its position with respect to the floor.

The means for imparting the slight rotational movement in either direction to ring 20 comprises a rack 38 of limited length mounted on the upper side of ring 20 and in mesh with a pinion gear 40, best seen in FIGS. 5, 8 and 9. An eccentric bore in pinion 40 receives a stub shaft 42 which is rotatably mounted in bearings 44 in rim 17, as shown in FIG. 9. The pinion is held against longitudinal movement on stub shaft 42 by a split ring 46 and is fixed on said shaft to rotate therewith by a key 48.

Shaft 42 is rotated by a motor 50 mounted beneath a bracket or platform 52 supported within the base 10. Motor 50 has a low speed, double output drive shaft, one end of which is connected to stub shaft 42 by a shaft 54 rendered extensible by a pin and slot connection 56. A universal joint 58 joins shaft 54 to one output of the motor 50, while another universal joint 60 joins shaft 54 to stub shaft 42, see FIG. 5. Due to extensible shaft 54 and the universal joints 58 and 60, a limited amount of relative motion between motor 50 and stub shaft 42 is permitted, for a reason to be explained hereinafter. The motor 50 is provided with an overriding or friction-type clutch at 62 to permit said motor to continue in motion without damage to itself after the driven pinion gear 40 has been stopped when stud 34 reaches the end of slot 30 in either direction.

Rotation of pinion 40 by motor 50 will, through the rack 38, cause a rotational motion to be imparted to the ring 20. By reason of the camming action of slot 30, ring 20 will, in addition to rotation, simultaneously partake of a slight raising and lowering motion, depending

upon the direction of rotation of gear 40. When stud 34 engages an end of slot 30, the motion of ring 20, rack 38 and pinion 40 will be stopped, although the motor 50 may continue to rotate due to clutch 62. The length of the slots 30 and the size of gear 40 are so proportioned that the amount of motion permitted to ring 20 by slots 30 corresponds to one-half a revolution of gear 40. Due to the eccentric mounting of shaft 42 in pinion gear 40, the teeth of said pinion gear will remain in mesh with rack 38 during its combined horizontal and vertical components of motion, see FIG. 8. Thus, a half revolution of gear 40 in one direction will rotate the lower caster ring 20 and a half revolution of gear 40 in the opposite direction will rotate and raise caster ring 20 with respect to the base 10.

Mechanism for propelling and guiding the chair

When the base 10 is supported above the floor on casters 24, it may be mechanically propelled by means of a power driven rubber-tired roller 64 keyed on a shaft 65 which is rotatably mounted on a carrier comprising a bell crank lever designated, as a whole, by reference numeral 66, see FIG. 12, the shaft 65 being supported at the apex of the angle of the bell crank. The bell crank lever comprises a pair of parallel arms 68 and another pair of parallel arms 70 arranged at an angle to arms 68, see FIG. 10. Motor platform 52 also is integral with or otherwise fixed to the arms 70. A pair of spaced lugs 72 extends outwardly from the ends of arms 68 of bell crank 66. A narrow partition or bar 74 extends horizontally across the interior of base 10 above the motor 50, see FIGS. 2 and 3. A headed stud shaft 76 extends downwardly through bar 74 and is held in position by a nut 78, as seen in FIG. 10. Supported on the headed end of shaft 76 is a saddle member 80 having a pair of depending ears. There is a Teflon washer 82 between the saddle 80 and the under side of bar 74 so that the saddle member is rotatable around shaft 76 without the need of special lubrication.

A short rod 84 is fixedly held in the depending ears of the saddle 80 by locking screws 86. As is well shown in FIG. 11, the upper ends of arms 70 are swingably supported on the projecting end of rod 84. Also supported adjacent the end of rod 84 is a pair of wire springs 88. The upper end of each wire spring is fixedly secured in rod 84, while the lower end of each spring is bent at right angles and engages under one of the arms 70, as is clearly shown in FIGS. 10 and 11. The wire springs 88 exert an upward (to the left, in FIG. 10) pressure on arms 70, thus tending to urge the bell crank lever 66 to its upper position shown in full lines in FIG. 10. Thus, it will be seen that bell crank lever 66 carrying the propelling wheel 64 can be raised and lowered a slight distance turning on rod 84 and can also be rotated around the stub shaft 76. The operator effects these movements of the bell crank lever through the medium of control means comprising a combined tiller bar 90 and handle 92, the latter being pivoted to the tiller bar.

The tiller bar 90 is an elongated tube having its lower end passing through an arcuate slot 94 formed in the base 10, see FIG. 4. The outer side of the arcuate slot serves as a track 96 which is engaged by a pair of guide rollers 98 rotatably mounted at the lower end of tiller bar 90 on headed pins 100, shown in detail in FIGS. 16 and 17.

The upper end of the tiller bar 90 terminates in a beveled edge 102. A slot 104 extends downwardly from the lower side of beveled edge 102 and diametrically opposite to slot 104 is a slot 106 terminating short of the top edge of the tiller bar 90. Welded or otherwise secured to tiller bar 90 at opposite sides of slot 104 is a pair of lugs 108 which form bearings for a pivot pin 110, all as shown in FIGS. 13 and 15.

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The upper end of handle 92 terminates in a beveled edge 112 complementary to beveled edge 102. Handle 92 is turnable on pivot pin 110 by means of a lug 114 welded or otherwise rigidly secured to the handle 92 and journaled on pin 110 between the lugs 108. Pin 110 also serves as a bearing for a pair of links 116, which are secured to handle 92 by a pin 118 and extend through slot 104 into the center of tiller bar 90, as shown in FIGS. 13 and 15. A rod 120 is pivoted between lugs 72 of the bell crank lever 66 on a pin 122 and extends freely within the tubular tiller bar 90 to the upper end thereof where it is pivotally mounted on the ends of links 116 by a pivot pin 124.

When the handle 92 is arranged parallel to the tiller bar 90, as shown in full lines in FIG. 13, rod 120 will be held in its upper position by links 116 and consequently arms 68 of bell crank lever 66 and the propelling wheel 64 will be in the raised position off the floor, as shown in full lines in FIG. 10. When the handle 92 is turned around pin 110 to the dotted line position of FIG. 13 with its beveled edge 112 in contact with beveled edge 102, then the rod 120 will be moved by links 116 to its lower position to bring the wheel 64 into contact with the floor. Slots 104 and 106 in tiller bar 90 provide clearance for the arcuate movement of pivot pin 124 and its associated parts during movement of the handle 92 from one position to the other. It will be evident that the handle 92 may also be used to swing the tiller bar 90, rod 120, bell crank lever 66 and propelling wheel 64 as a unit around the vertical stud shaft 76 for steering purposes. During the swinging movement, rollers 98 engaging the arcuate track 96 will guide and support the tiller bar 90. A limited swinging movement is sufficient for steering purposes. If it is desired to rotate the chair or turn it at a sharp angle, the propelling wheel 64 may be raised while the chair is manually rotated or turned on the casters 24.

Mechanism may be provided for mechanically driving the propelling wheel and this will now be described. As has been previously mentioned, motor 50 is provided with a double output drive shaft, one end of which is connected to drive shaft 54 furnishing power to the pinion gear 40. The other end of the double output drive shaft operates a gear box having an output shaft which carries a pulley 126 which drives a belt 128 which in turn drives a larger pulley 130 affixed to shaft 65 of the propelling wheel 64. It will be noted (see particularly FIG. 12) that platform 52, which supports the motor 50, is fixed to or integral with the arms 70 of the bell crank lever 66 and hence the motor 50 partakes of all the movements of the propelling wheel 64 without affecting the belt driving connection between the output shaft of the motor and the shaft 65 of the propelling wheel. As heretofore mentioned, the extensible shaft 54 and the double universal joint 58, 60 permit this limited amount of motion of the motor 50 without interrupting the driving connection between the motor and the stub shaft 42 carrying pinion gear 40. As best seen in FIG. 12, a plurality of bolts on motor 50 pass through slots 132 in platform 52. A plurality of nuts 134 serve to adjustably secure the bolts in the slots, whereby the position of the motor may be varied for controlling the tension of driving belt 128.

Mechanism for elevating and lowering the chair seat

The chair seat and back 16 are supported on a pillar 136 mounted for vertical movement through the top of base casting 10 and is fixed to the center of a transverse member 138 which preferably is an inverted channel and extends horizontally within the base 10 above partition bar 74 and at right angles thereto, see FIGS. 2 and 3. A gear head, brake-type motor 140 secured to the inner wall of base 10, as best seen in FIG. 2, drives a short vertical shaft having thereon a double pulley 142. Pulley 142 drives a first belt 144 which in turn drives a pulley

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146 fixed to the lower end of a vertical sleeve 148 turning in bearings 150 which are supported on the inner wall of base casting 10, see FIGS. 3 and 18. Double pulley 142 drives a second belt 152 which in turn drives a pulley 154 fixed to the lower end of a vertical sleeve 156 similar to sleeve 148. Likewise, sleeve 156 turns in bearings 158 secured to the inner wall of base casting 10 opposite to bearings 150, see FIG. 3.

A conventional ball nut 160 is affixed to the upper end of sleeve 148. Within the ball nut 160 is a screw shaft 162 which is affixed to one end of the channel member 138, as by a bolt and nut 164. As is well known, mating helical grooves are formed in the ball nut 160 and screw shaft 162 of a size complementary to the diameter of the balls comprising the helical row of balls contained in the ball nut 160, whereby approximately one half of each of the balls is disposed respectively within the groove in the nut 160 and the groove in the screw shaft 162. As the nut 160 is rotated by driven sleeve 148, the row of balls is fed from one end of the nut to the other through the medium of by-pass tube 166 which is secured on the nut 160. The movement of the balls through the tube 166 for reception by the mating grooves in the nut 160 and screw 162 will be in one direction when the screw 162 is being elevated and in the opposite direction when the screw is being lowered. In like manner, a similar ball nut unit 168 is affixed to the upper end of sleeve 156 and is associated with a screw 170 depending from and fixed to the other end of channel member 138. It will be obvious that when motor 140 is rotated in one direction, the pillar 136 carrying seat 16 will be elevated and that when the motor 140 is rotated in the reverse direction, the pillar 136 will be lowered.

It is desirable that pillar 136 move in the vertical center line of the base 10. It is also preferable that pivots 76 and 84 around which the bell crank lever 66 swings be located in the vertical center line of the base 10. This advantageous arrangement is attained in the present case because of the specific arrangement of the supporting and driving means for pillar 136, combined with the specific arrangement of the supporting and driving mechanism for the bell crank lever 66 and the wheel 64. Due to this compact arrangement, which is best shown in FIGS. 2 and 3, and wherein the channel member 138 is at right angles to and above the partition bar 74, all the aforementioned elements can be housed within the compact hollow base 10.

Motor control arrangement

The operation of motors 50 and 140 in either of their directions of rotation is controlled preferably from a single switch box 172 which, for convenience, may be mounted upon the rear side of the tiller bar for ready engagement by the hand of the operator. If preferred, however, the switch 172 can be mounted on the back of chair seat 16.

The specific control means for motor 140 preferably comprises an exemplary double throw switch 174 which controls motor 140 for either desired rotary direction. Switch 174 may, for convenience, be marked UP, OFF and DOWN. The motor 140 will continue to operate in the selected direction as long as the switch is held in the UP or DOWN position, but immediately upon movement of the switch to OFF position, the motor will stop. The present construction also includes upward movement-limiting switch means, such as electric switch 176 shown in FIG. 2 and located within the upper portion of hollow base 10 in a position to be engaged by a detent 178 carried by the cross channel member 138. A similar downward movement-limiting switch 176' may be mounted in a lower portion of the base 10 in position to be engaged by the detent 178 when the seat supporting pillar 136 reaches the lower limit of its travel. Should the elevating or lowering of the chair seat continue to either

its upper or lower extreme position, the appropriate safety limit switch will be engaged by detent 178 and automatically disconnect the motor circuit and thereby prevent any damage to the motor or to the driving mechanisms.

The specific control means for double output motor 50 comprises a pair of switches 180, 182 mounted in switch box 172. Switch 180 may be marked FORWARD and OFF, while switch 182 may be marked REVERSE and OFF. When switch 180 is moved to the FORWARD position, the motor 50 will turn in a direction to lower or project the casters 24 and simultaneously rotate the propelling wheel 64 in a direction to move the chair forwardly with respect to the operator. This is the position of FIGS. 2 and 3, wherein the casters 24 support the chair for movement over the floor 12 and the wheel 64 is out of contact with the floor. When switch 180 is moved to the OFF position, the motor will stop, leaving the casters projected. When switch 182 is moved to the REVERSE position, the motor 50 will turn in a direction to retract the casters within the base 10 and simultaneously rotate the propelling wheel 64 in its REVERSE direction. When switch 182 is moved to the OFF position, the motor will stop, leaving the casters projected. While motor 50 has been shown as performing the aforementioned double function, it is obvious that, if desired, a separate motor and mechanism with separate controls can be provided to project and retract the casters entirely independently of the specific means for rotating the propelling wheel 64.

Operation

In operation, assuming that the chair is resting with its peripheral positioning ring 14 on the floor and assuming that the operator wishes to move the chair in a horizontal direction over the floor, the operator first actuates switch 180 to the FORWARD position. The motor 50 then commences to rotate, driving the shaft 54 at one end and pulley 126 at the other end of the motor. Shaft 54, through pinion 40 and rack 38, rotates ring 20 carrying casters 24 within channel 18 of the base 10. During this rotary movement of ring 20, the ring will be lowered with respect to base 10 because of the action of cam slots 30 against studs 34 which are fixed to rim 17, see FIG. 7. When the studs 34 engage the upper ends of slots 30, the motion of ring 20, rack 38, gear 40 and shaft 54 will stop, but the motor 50 can continue to run because of the action of the overriding clutch mechanism 62. At this time, pinion gear 40 has turned one half a revolution, casters 24 are in engagement with the floor and base 10 is slightly raised above the floor.

While the rotation of the ring 20 has been taking place, pulley 126, through belt 128, has been rotating wheel 64 in the forward direction, but no motion will be imparted to the chair because wheel 64 is in the raised position off the floor. At this time, the chair is in a mobile condition on its casters and may be rotated or moved along the floor in any desired direction. If it is desired to move the chair by power means, the operator turns handle 92 from its lower position to its upper position at right angles to the tiller bar 90, as shown in dotted lines in FIG. 13, and this may be done simultaneously with lowering the casters. This movement of the handle 92 will, through the long rod 120, lower the bell crank lever 66 and wheel 64 into contact with the floor. Rotation of wheel 64 by motor 50 is in a direction to propel the chair forwardly with respect to the operator.

The operator can steer the chair by swinging the handle 92 to the right or left, thereby turning the wheel 64 about central stud shaft 76. During the up, down and steering motions of propelling wheel 64, the driving relation between motor 50, belt 128, pulley 130 and wheel 64 is maintained because motor platform 52 is integral with arms 70 and consequently motor 50 partakes of all the movements imparted to wheel 64 by the operator. During these small movements of motor 50, its

driving connections to stub shaft 42 are maintained through the action of the pin and slot connection 56 and the double universal joint 58, 60.

When the chair has reached the desired location, the operator moves switch 180 to the OFF position to stop the motor 50 and he also raises wheel 64 off the floor by returning the handle 92 to its lower position. Springs 88, acting against arms 70, assist in returning the wheel 64 to its upper position, especially after links 116 pass through their center position.

To stabilize the base on the floor, the operator actuates switch 182 to the REVERSE position. The motor 50, shaft 54 and pulley 126 then operate in the reverse direction to that for lowering ring 20. Shaft 54 causes ring 20 to rotate in the reverse direction and during this rotary movement of ring 20, the ring will be raised with respect to the base 10 because of the action of cam slots 30 on studs 34, thus retracting the casters within the base 10 and permitting the base to rest upon the floor. When studs 34 reach the bottom ends of slots 30, the ring 20 and shaft 54 will stop, but the motor 50 will continue to rotate due to the action being permitted by the overriding clutch mechanism 62. However, movement of switch 182 to the OFF position will stop the motor. During this reverse rotation of motor 50, the propelling wheel 64 will be idly rotating in the reverse direction, but nothing will happen, because the wheel 64 is at this time held off the floor by handle 92.

If at any time the operator wishes to raise or lower the seat and back 16 with respect to the base, he actuates the double throw switch 174 to the UP or DOWN position, depending upon the desired direction of movement. As long as the switch is held in this position, the motor 140 will continue to raise or lower the seat 16, as the case may be, through the action of screws 162 and 170, as explained above. As soon as the switch 174 is moved to the OFF position, the circuit to the motor is cut off and the motion of the seat 16 will stop. If the seat 16 reaches the limit of its travel in either direction before the switch 174 is returned to the OFF position, the upper limit switch 176 or the lower limit switch within the base 10 will be engaged by the detent 178 to break the motor circuit and thus stop the motor and driving mechanism before any damage occurs.

While the invention has been described and illustrated in its preferred embodiment, it should be understood that the invention is not to be limited to the precise details herein described and illustrated, since the same may be carried out in other ways falling within the scope of the invention as claimed.

We claim:

1. Mobile supporting means for a chair comprising in combination, a base having a bottom rim normally engageable with a floor, means on said base to support and be connected to a chair seat, ring means mounted for limited rotation and vertical movement within and relative to the rim of said base, a plurality of casters supported on said ring means and normally positioned thereby with the rims of said casters above said bottom rim, a plurality of inclined cam slots spaced around said ring means, a plurality of studs fixed to said base, one of said studs extending through each of said cam slots whereby when said ring means is rotated in one direction the cam slots react on the studs to lower said casters to render said base mobile and when said ring means is rotated in the opposite direction the cam slots react on the studs to retract the casters within said base, thereby permitting said bottom rim again to engage the floor, reversible power means carried by said base and interconnected to said ring means for rotating said ring means in either direction, and means to control said reversible power means to render said base mobile at will.

2. The mobile supporting means set forth in claim 1, wherein said reversible power means comprises a driven shaft, a pinion gear on said shaft and a rack fixed to said ring means and in mesh with said pinion gear, whereby

rotation of said pinion gear in either direction will rotate said ring means.

3. The mobile supporting means set forth in claim 2, wherein said pinion gear is eccentrically mounted upon said driven shaft and said pinion gear will remain in mesh with said ring means during all movements of said ring means.

4. Mobile supporting means comprising a chair base having a substantially continuous bottom peripheral rim normally engageable with the floor, means on the upper portion of said base to receive and be connected to a chair seat to be supported thereby, a plurality of casters mounted for vertical movement within said base adjacent the periphery thereof and normally positioned with the rims thereof above said bottom rim, reversible power means carried within said base and interconnected to said casters, said power means being operable when moved in one direction to lower said casters simultaneously and equally for reaction against the floor to raise said base slightly above said floor, thereby rendering said base mobile with respect to said floor, and operable in the opposite direction for retracting said casters within said base, thereby permitting said bottom rim again to engage the floor, control means for said reversible power means for rendering said base mobile at will, a carrier mounted for vertical movement in said base, a propelling wheel journaled in said carrier, a motor for rotating said wheel, and control means including a handle for lowering and raising said carrier to bring said wheel into contact with the floor or for lifting said wheel above the floor at will.

5. The mobile supporting means set forth in claim 4, wherein said carrier is swingable about a vertical axis for steering said propelling wheel when it is in contact with a floor.

6. The mobile supporting means set forth in claim 4, wherein said carrier is a lever pivoted to turn on a horizontal axis and said power means is a motor supported on a bracket which is integral with said lever, whereby the motor moves in unison with said propelling wheel.

7. A mobile chair unit comprising in combination, a chair seat, a base having a bottom rim normally engageable with a floor, pillar means mounted on said base connected to and supporting said chair seat, a plurality of casters mounted for vertical movement in said base and normally positioned above said bottom rim, reversible power means carried by said base and interconnected to said casters and operable in one direction to lower said casters for reaction against the floor to raise said base slightly above said floor, thereby rendering said base mobile with respect to said floor and operable in the opposite direction for retracting said casters within the base, thereby permitting said bottom rim again to engage the floor, control means for said reversible power means operable to render said base mobile at will, horizontal pivot means mounted in said base, a bell crank lever mounted to swing on said pivot means, a propelling wheel journaled in said bell crank lever, a motor for rotating said wheel, and control means for said wheel including a handle for lowering and raising said lever to bring said wheel into contact with the floor or for lifting said wheel above the floor at will.

8. The mobile chair unit of claim 7, wherein the control means for said wheel includes a tiller bar with its lower end mounted on said base and having said handle pivoted to its upper end, a long rod pivoted to said bell crank lever and extending along said tiller bar, a link connecting said handle and the upper end of said long rod, whereby when said handle is turned with respect to said tiller bar the bell crank lever may be lowered and raised.

9. The mobile chair unit of claim 7, further including a horizontal member extending across the interior of said base, a vertical stud shaft turnable in said horizontal member and means for supporting said pivot means from

said stud shaft, whereby said bell crank lever is swingable about said stud shaft for steering said chair when said propelling wheel is in contact with the floor.

10. The mobile chair unit of claim 7, wherein said pivot means is supported to pivot relative to a vertical stud shaft and wherein said control means for said wheel includes an arcuate slot in said base provided with a track along one edge thereof, a tiller bar having rollers at its lower end in engagement with said track, said handle being pivoted to the upper end of said tiller bar for lowering and raising said bell crank lever by movement thereof about the axis of said horizontal pivot means and said handle and tiller bar being swingable in a horizontal plane along said track and about said vertical stud shaft for steering said chair when said propelling wheel is in contact with a floor.

11. The mobile chair unit of claim 7, further including a spring secured to said horizontal pivot means and engaging said bell crank lever to urge said lever towards its upper position.

12. The mobile chair unit of claim 7, wherein a transverse member extends across the interior of said base directly above said pivot means, the lower end of said pillar being affixed to said transverse member intermediate the ends thereof, a vertically movable screw means at each side of said bell crank lever, each said screw means being connected to a respective end of said transverse member, a reversible electric motor carried by said base and operable reversibly to move said screw means vertically simultaneously to effect either upward or downward movement of said transverse member.

13. A mobile chair unit comprising in combination, a chair seat, a base normally engageable with a floor by gravity, a vertical pillar carried by said base and connected to and supporting said chair seat, means supported movably within said base and operable to render said base mobile relative to a floor surface at will, a member extending transversely across the interior of said base, a vertical stud shaft supported by said member and axially rotatable relative thereto, a saddle member attached to said stud shaft, a short horizontal pivot secured to said saddle, a bell crank lever pivoted to turn on said short horizontal pivot and also turnable around said stud shaft, a propelling wheel journaled in said bell crank lever, a motor for rotating said wheel, switch means for controlling said motor, a combined tiller bar and handle mounted on said base and interconnected to said bell crank lever for lowering said lever to bring said wheel into contact with the floor and also for raising said lever to lift said wheel above the floor at will and for swinging said lever about said vertical stud shaft to steer said wheel, another transverse member extending across the interior of said base above and crosswise relative to said first mentioned transverse member, the lower end of said vertical pillar being attached to said another transverse member over said vertical stud shaft, elevating means fastened to each end of said another transverse member and depending therefrom respectively at opposite sides of said propelling wheel, and a reversible electric motor operable to move said elevating means in opposite vertical directions for elevating and lowering said seat.

14. The mobile chair unit of claim 13, wherein the vertical pillar and the vertical stud shaft lie substantially in the vertical center line of the base.

15. In a chair of the class described, in combination, a mobile hollow base of inverted substantially cup-shaped design, mobile means supported for vertical movement relative to said base and selectively operable to be projected below and elevated above the bottom surface of said base to render the base stationary or mobile respectively relative to a supporting floor surface, a bell crank lever mounted for vertical movement about a horizontal shaft within said hollow base, a motor and a propelling wheel mounted at spaced positions on said bell crank lever, a mechanical driving connection between the motor

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and the propelling wheel, and means for moving the bell crank lever about the horizontal shaft to bring the wheel into and out of contact with a floor while preserving said driving connection.

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BENJAMIN HERSH, *Primary Examiner.*

A. HARRY LEVY, *Examiner.*

J. A. PEKAR, *Assistant Examiner.*