

June 23, 1964

R. G. HEYL, JR., ETAL
INVALID CHAIR

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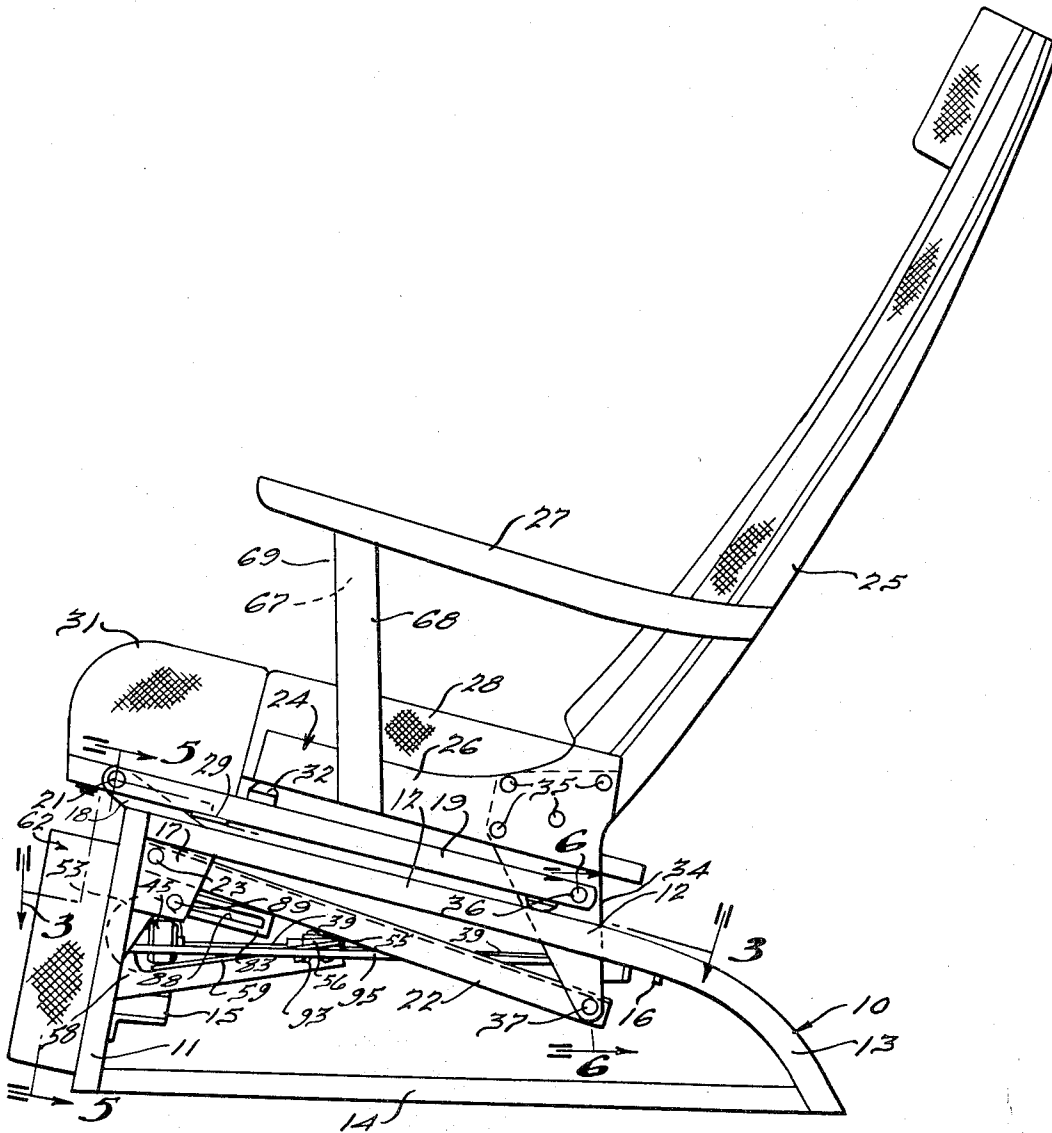


FIG. 1.

INVENTORS
Russell G. Heyl, Jr.
Raymond C. Post
BY Robert G. Hogle
Harnes, Dickey & Perle
ATTORNEYS

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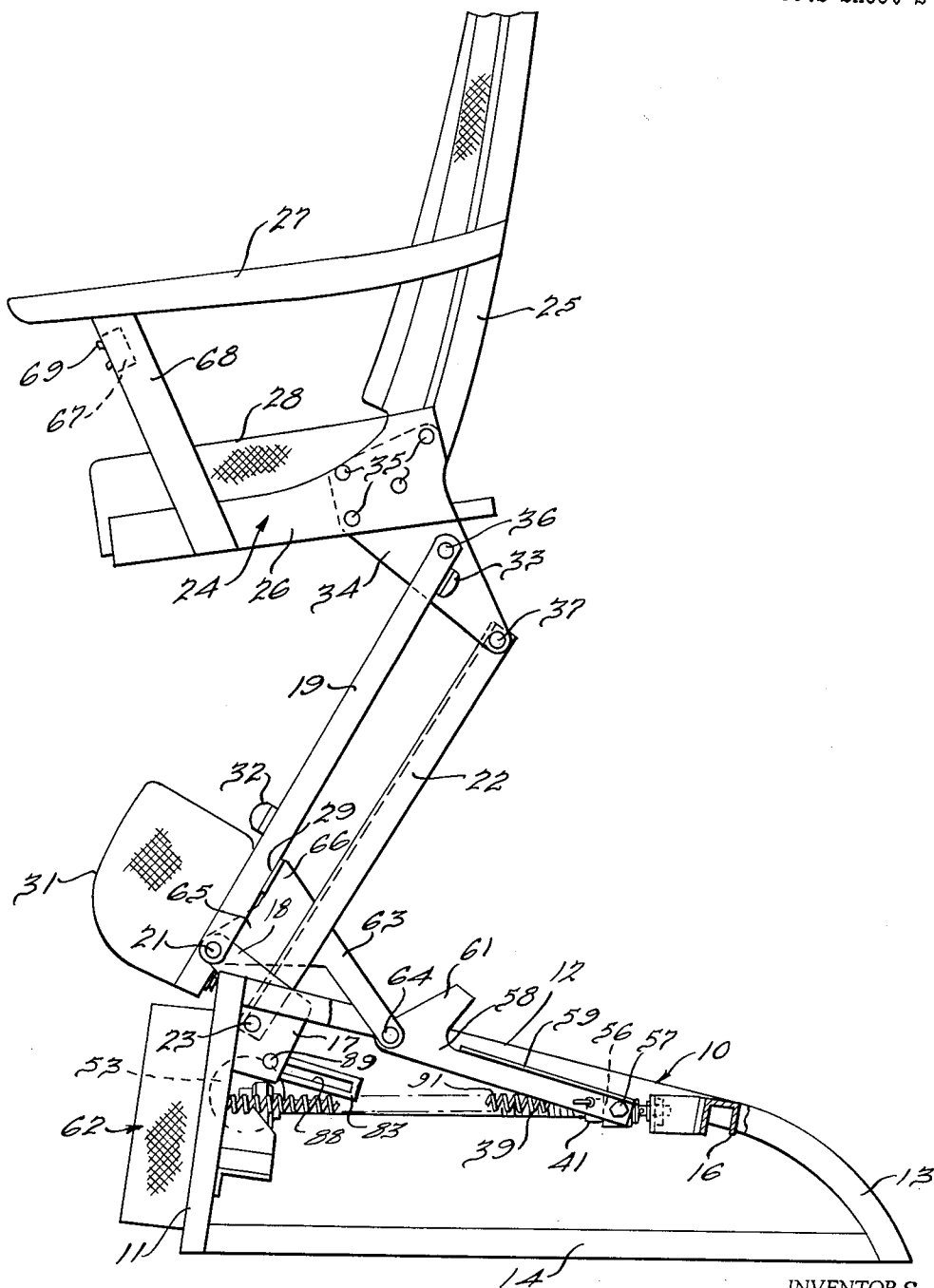


FIG. 2.

INVENTORS
Russell G. Heyl, Jr.
Raymond C. Fosh
Robert G. Logie
BY *Carroll, Dickey & Perle*
ATTORNEYS

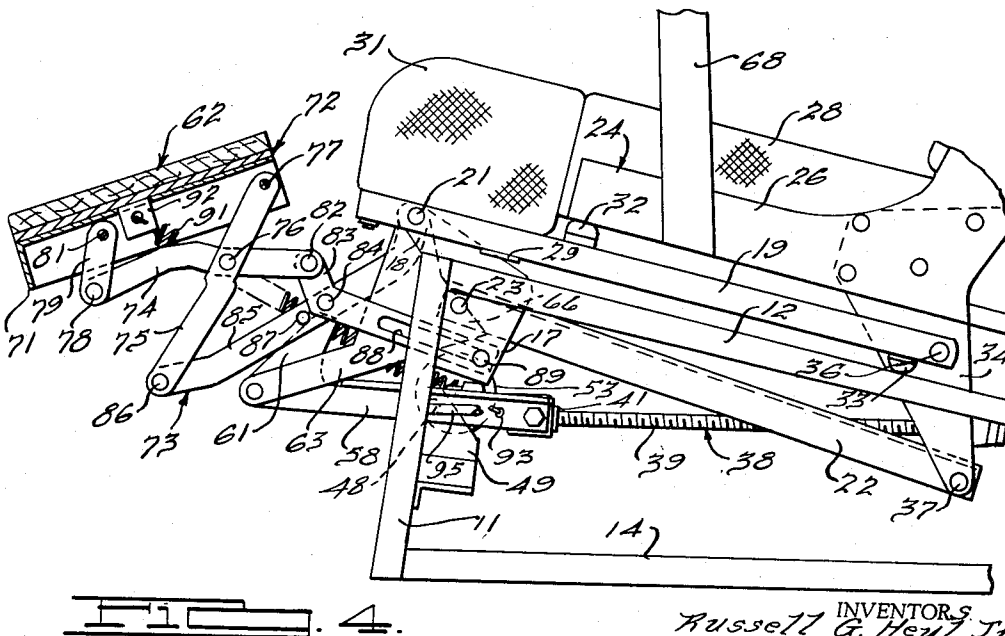
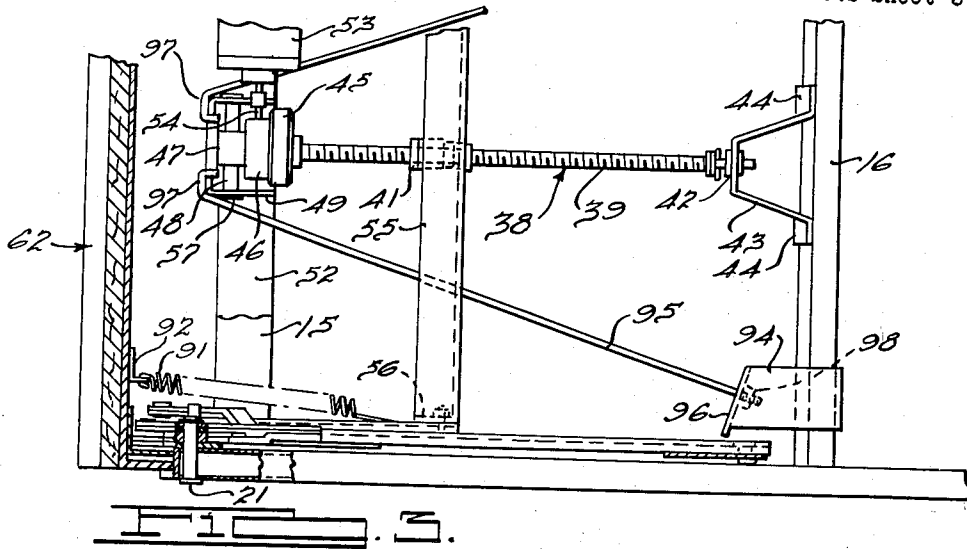
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4 Sheets-Sheet 3



INVENTORS
Russell G. Heyl, Jr.
Raymond C. Posh
Robert G. Logie
BY *Charles Dickey & Purcell*
ATTORNEYS

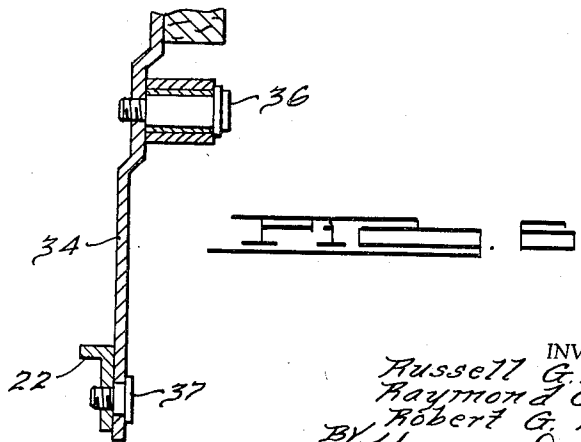
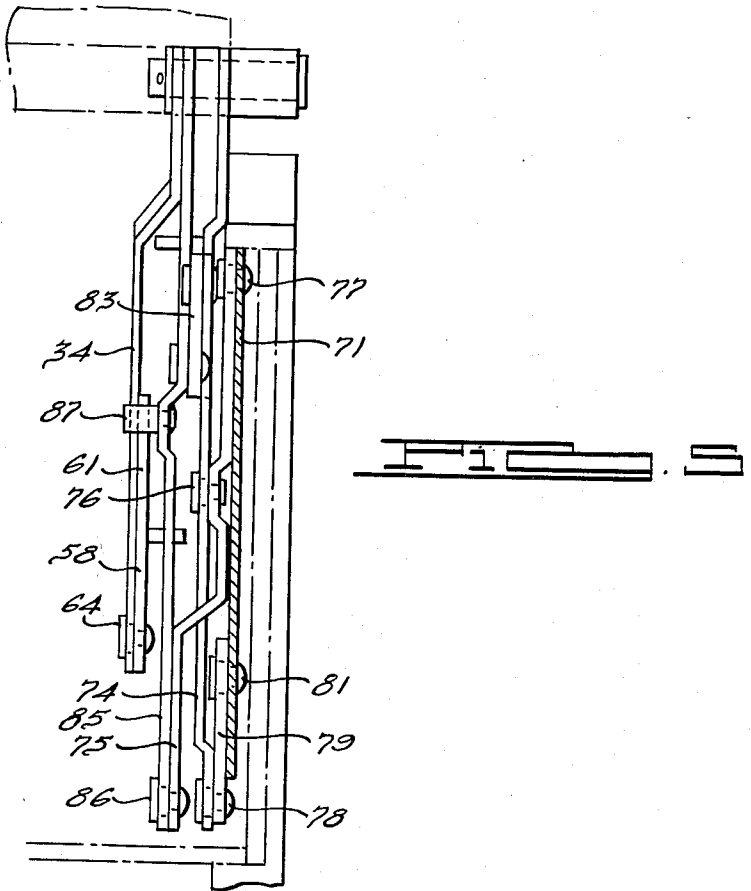
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4 Sheets-Sheet 4



INVENTORS
Russell G. Heyl, Jr.
Raymond C. Post
Robert G. Wogie
BY *Carroll Dickey & Puse*
ATTORNEYS

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3,138,402

INVALID CHAIR

Russell G. Heyl, Jr., Birmingham, Raymond C. Posh, Garden City, and Robert G. Logie, Jr., Livonia, Mich., assignors to American Metal Products Company, Detroit, Mich., a corporation of Michigan

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16 Claims. (Cl. 297—69)

This invention relates to invalid chairs, and particularly to a chair which will seat or unseat a person from or to a standing position.

The chair of the present invention consists of a base, a chair frame, and a two-piece cushion, the front cushion section being secured to the base frame and the rear cushion section being carried by the chair frame. The chair frame carries the rear cushion section upwardly and forwardly to have it disposed above the front cushion section when a person is in standing position. The base frame supports a motor and a lead screw having a nut thereon which is secured to a transverse bar to the ends of which operating links are pivotally secured. A pair of parallel links is pivoted to brackets at each side of the front corners of the base frame and to brackets at the rear corners of the chair frame. The parallel links form a support for controlling the movement of the chair frame to and from raised and lowered positions. The front cushion section is secured adjacent to the pivot at the forward portion of the parallel links to a crossbar secured thereto. The rear cushion section supported by the chair frame is disposed above the front cushion section when the chair frame is in raised position and when moved rearwardly and downwardly onto the base frame is in alignment with the front cushion section which rotates rearwardly into engagement with the front edge thereof.

Rubber bumpers are secured on the top and bottom edges of the top pair of links at the front and rear portions thereof respectively. The front rubber bumpers are engaged by the forward portion of the chair frame and the rear bumpers engage the supporting base frame when the chair frame is in lowered position. A bell crank shaped lever is pivoted on the pivot for the upper pair of links and to the operating links at the ends of the transverse bar which is secured to the nut of the lead screw. An extending portion of the bell crank engages a cross brace on the under side of the top pair of links to permit the free swinging movement of the bell cranks forwardly away from the cross bar when the chair frame is in lowered position.

The chair frame has an armrest at each side on an upright of one of which a switch is mounted having an actuating element normally in "off" position but movable therefrom to two "on" positions for energizing the motor for rotation in either clockwise or counterclockwise direction. The motor rotates the lead screw to drive the nut thereon forwardly or rearwardly. When the nut is moved to the rear, it moves the bell cranks counterclockwise into engagement with the cross brace of the parallel links to pivot them upwardly to swing the chair frame upwardly and forwardly while maintaining it in substantially horizontal position. This movement of the chair frame slides the occupant forwardly while being engaged by the front edge of the cushion section when moved to standing position between the arms of the chair frame which offer additional support. When the switch is released, the occupant may then be steadied by a cane, walker, crutches or the like, if further assistance is required for moving away from the chair.

When the chair is to be occupied, the person backs against the front edge of the cushion sections, grasps the arm portions and moves the switch actuating element in

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the opposite direction to reverse the direction of rotation of the motor. The nut is driven forwardly on the lead screw as the parallel links move downwardly in a clockwise direction, moving the chair frame in an arc rearwardly and downwardly while the front cushion section rotates with the front end of the top pair of links to permit the person to be moved rearwardly and downwardly with the rear cushion section into seated position when the seat frame reaches lowered position. The switch actuating element is released at this point and the motor is stopped.

An ottoman is supported at each end on a series of pivoted links of the pantograph type having a pin extending laterally in the path of movement of a projecting arm on the operating links. By operating the switch actuating element to drive the motor in the direction to lower the chair frame, the further forward movement of the operating links is permitted by the forward swinging movement of the bell cranks. The arms on the links engage the pins on the pantograph mechanisms and cause the ottoman to swing outwardly and upwardly forwardly of the seat cushion. When in this position, the switch actuating element is released and the motor stopped. When the ottoman is to be retracted, the switch actuating element is operated to a position to drive the motor to raise the seat. The initial movement of the nut rearwardly moves the operating links and the bell cranks toward the rear, permitting the pantograph mechanism to collapse and the ottoman to be returned to its nested position by springs which are attached thereto and to the operating links. At this point the switch actuating element is released and the chair will be in its normal seating position. The operation of the switch actuating element to the same position will drive the motor in the same direction to raise the seat frame and stand the occupant upright against the cushion sections.

Accordingly, the main objects of the invention are: to provide an invalid chair which raises the occupant to standing position and which lowers a person to seating position; to provide a chair having forward and rearward cushion sections, the forward section pivoting with the operating links as the rear section is carried upwardly and forwardly with the chair frame; to pivot parallel links at the front of each side of a base frame and at the rear of the chair frame by links advanced by a nut on a lead screw which swings the chair frame and raises the rear cushion section upwardly and forwardly above the front cushion section; to provide a chair frame which is movable on a base to advance a cushion upwardly and forwardly for standing an occupant upright and, by reversing the movement of the cushion section and chair frame, for seating a person, operated by a mechanism which when further advanced, after the chair frame and cushion are lowered, moves an ottoman upwardly and forwardly of the chair frame to any position retained by the motor when stopped, and, in general, to provide an invalid chair for standing or seating a person which is simple in construction, positive in operation and economical of manufacture.

Other objects and features of novelty of the invention will be specifically pointed out or will become apparent when referring, for a better understanding of the invention, to the following description taken in conjunction with the accompanying drawings, wherein:

FIGURE 1 is a view of an invalid chair of the present invention illustrated in seating position;

FIG. 2 is a view of the chair illustrated in FIG. 1 when in raised position;

FIG. 3 is a broken sectional view of the structure illustrated in FIG. 1, taken on the line 3—3 thereof;

FIG. 4 is a broken view of the structure illustrated in

FIG. 1, with the ottoman thereof in extended position;

FIG. 5 is an enlarged sectional view of the structure illustrated in FIG. 1, taken on the line 5—5 thereof, and

FIG. 6 is an enlarged sectional view of the structure illustrated in FIG. 1, taken on the line 6—6 thereof.

The chair of the present invention has a tubular base 10 embodying two side sections each comprising a front pillar 11 and a rearwardly sloping top rail 12 which is curved downwardly at 13 and joined to a side bottom rail 14. The two side sections are joined together at the front by an angle-shaped cross member 15 and at the rear end of the straight portion of the top rail 12 by a downwardly presented channel cross brace 16. Each front corner of the side sections has a plate 17 secured thereto with an upwardly and forwardly projecting arm 18 in extension thereof. A link 19 is secured by a pivot 21 at each side of the base to the outer side of the arm 18 while an angle-shaped link 22 is secured by a pivot 23 to each of the plates 17 on the inner side thereof.

A chair frame 24 is constructed of frame elements in the conventional manner to have a back section 25 and a seat section 26 interconnected by armrests 27 of conventional form. Spring, foam or other soft material is applied to the back section 25 and covered with upholstery material in the conventional manner. The seat section 26 has a rear cushion section 28 made from springs and/or padding material covered with trim material in the conventional manner. The top links 19 are interconnected at the front end by a cross brace 29 which supports a front cushion section 31 disposed in aligned relation to the rear cushion section 28 when the seat frame 24 is in lowered position, as illustrated in FIG. 1.

The links 19 have a rubber bumper 32 secured to the top forward edge in rear of the front cushion section 31 and a similar bumper 33 is secured to the bottom edge of the links 19 near the rear end thereof. A plate 34 is secured at each side of the seat frame below the back frame section by a plurality of screws 35. Each plate 34 has the rear end of the link 19 secured thereto by a pivot 36 and a similar pivot 37 connects the rear end of the links 22 to the lower ends of the plates. The links 19, 22 and the plate portions between the pivots 21 and 23 at the front and the pivots 36 and 37 at the rear form a parallelogram support. This support produces the rotation of the front cushion section 31 and the upward and forward movement of the chair frame 24 from the position illustrated in FIG. 1 to the position illustrated in FIG. 2 when an actuating mechanism 38 is operated.

The actuating mechanism 38 embodies a lead screw 39 having a nut 41 threaded thereon. The rear end of the lead screw, as illustrated more specifically in FIG. 3, has a cylindrical end extending into a bushing 42 secured in the web of a U-shaped bracket 43. The bracket has feet 44 thereon which are welded or otherwise secured to the channel-shaped cross brace 16. The forward end of the lead screw is supported in a bearing in the forward end of a speed reducing housing 45 disposed in extension of a worm gear housing 46 from which an apertured boss 47 extends. The boss 47 is pivoted on a stub shaft 48 secured to a U-shaped bracket 49 by shoulder screws 51. The U-shaped bracket 49 is welded or otherwise secured to the front angle-shaped cross brace 15 on a raised central flat portion 52 thereof. A motor 53 is supported on the flat portion 52 of the brace 15 with its shaft connected to a driving end 54 of a worm within the housing portion 46 having its thread in meshed relation with teeth of a worm wheel which is secured to the forward end of the lead screw 39 in fixed relation thereto. The motor is reversible so that it may be driven in either direction for rotating the lead screw both clockwise and counterclockwise.

The nut 41 of the lead screw is welded or otherwise secured to a flanged transverse bar 55 having end flanges 56. Shouldered screws 57, secured to the flanges 56, pivotally support an operating link 58 at each end of the

transverse bar 55. The narrow portion of the operating link 58 has a top flange 59 thereon to provide strength thereto. A projecting arm 61 at the front end of the links 58 moves an ottoman 62 outwardly of the frame 10 when the chair is in seating position. Bell crank shaped links 63 are joined to the forward end of the links 58 by pivots 64. An arm 65 on the bell crank shaped links 63 is connected to the pivots 21 while the projecting end 66 engages the cross brace 29 of the links 19 when the chair frame 24 is to be raised.

A switch 67 is secured within a post 68 of one of the armrests 27, having an operating button 69 which, if moved to one position, will cause the motor 53 to be driven in one direction of rotation and when moved to another position will cause the motor to be driven in the opposite direction of rotation. When the chair is in seating position, as illustrated in FIG. 1, and the button 69 is moved upwardly, the motor will be driven to drive the lead screw in a direction to move the nut 41 to the rear. This moves the operating links 58 and the bell crank links 63 to the rear and causes the projecting ends 66 thereof to engage the cross brace 29. This moves the links 19 and 22 counterclockwise and rotates the front cushion section 31 about the pivot 21 and raises the chair frame 24 upwardly and forwardly to the position illustrated in FIG. 2. This will raise and slide the occupant forwardly from the rear cushion section into standing position, braced by the cushion sections and the armrests 27.

When a seat is to be occupied, the occupant backs into a position to contact the cushion sections and grasps the armrests 27. The movement of the switch button 69 downwardly reverses the motor and the lead screw and advances the nut 41 toward the front of the chair. This moves the chair frame 24 rearwardly and downwardly, causing the occupant to slide rearwardly into seating position by the time the chair frame is lowered.

The ottoman 62 has a box-shaped metal element 71 supporting a padded trim panel 72 which is moved from vertical to horizontal position by pantograph supports 73 at each side thereof. Each support is of the well known type having a pair of crossed links 74 and 75 secured together by a pivot 76, with a link 75 secured by a pivot 77 to a wall of the box-shaped element 71 of the ottoman. The link 74 is connected by a pivot 78 to a link 79 which is secured by a pivot 81 to the same wall of the box-shaped frame 71. The opposite end of the link 74 is secured by a pivot 82 to a link 83 which is secured by a pivot 84 to a link 85 that is attached by a pivot 86 to the end of the link 75 opposite to that secured to the pivot 77. The link 85 has its opposite end secured on the pivot 21 and is provided with a pin 87 projecting inwardly into the path of movement of the operating arm 61 on the operating link 58. The link 83 has an elongated slot 88 extending over a stud 89 carried by the plate 17. It is to be understood that a pantograph support 73, just described, is mounted on each side of the frame 10 and connected to opposite sides of the box-shaped frame 71 of the ottoman 62. A pair of springs 91 has the hook at one end secured in apertures in lanced-out fingers 92 in the box-shaped frame 71 of the ottoman, the opposite ends being secured in an aperture 93 in the operating links 58.

When the occupant desires to use the ottoman when the chair frame is in the seating position of FIG. 1, the movement of the switch button 69 downwardly will drive the motor to rotate the lead screw for driving the nut further forwardly, and in view of the fact that the bell crank links 63 can move away from the cross brace 29 of the links 19, the operating links 58 are free to move forwardly until the operating arms 61 thereof engage the inwardly projecting pins 87 on the links 85. This advances the link 85 forwardly and swings all of the links from nested position within the box-shaped frame 71 to the outward position illustrated in FIG. 4. The link 83 moves forwardly a maximum position controlled by the stud 89 which

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extends within the slots 88 of the links. Any position therebetween will be maintained when the motor is stopped by the nut on the lead screw. By moving the switch actuating element 69 of the switch 67 to the position for raising the chair frame 24, the motor will be reversed to drive the nut to the rear, permitting the springs 91 to return the ottoman to nested position, as illustrated in FIGS. 1 and 2. The switch is released at this point unless the occupant desires to be raised to standing position, in which case the holding of the switch in the position for retracting the ottoman will continue to drive the nut 41 to the rear on the lead screw 39, thereby moving the chair frame to raised position, as illustrated in FIG. 2. For reinforcing the brace, a pair of bracing plates 94 is secured to the cross brace 16 and a pair of rods 95 has threaded ends extending in an aperture in a flange 96 of the plates 94, with the opposite ends containing hooks 97 which project into apertures in the U-shaped bracket 49 and are drawn thereinto by a nut 98.

A rugged, foolproof invalid chair has been provided by the present invention, one which securely braces the occupant when being raised from the chair frame by a front cushion section which engages the rear portion of the occupant's legs when in seating position and when the occupant is being moved to raised position. The occupant is further braced by the rear cushion section of the chair frame as it swings in an arc upwardly and forwardly while being retained in substantially horizontal position. When reaching the standing position, the occupant releases the switch and is in stable standing position while being braced by the cushion sections and the arms of the chair frame. When it is desired to occupy the seat, the person backs up into engagement with the cushion section and operates the switch in the reverse direction to reverse the operation of the motor and lower the chair frame while it is retained in substantially horizontal position. Upon reaching seating position, the switch actuating element is released, or if it is desired to employ the ottoman, the switch is retained closed so that further advancement of the nut 41 will carry the ottoman outwardly along with the legs of the occupant. With this arrangement, the only circuit required is that to the motor from the switch which produces the energization of the motor and its rotation in either direction, depending upon whether the actuation element of the switch is moved upwardly or downwardly from the central "off" position.

What is claimed is:

1. In a chair, a base frame, power operating means supported by said base frame, a chair frame, a rear section of a seat cushion carried by said chair frame, means interconnecting only the opposite ends of the chair frame and said base frame, said interconnecting means being actuated by said power operating means for raising said chair frame from said base frame, and a front cushion section carried by and movable with said interconnecting means whereby said cushion sections may be spatially separated.

2. In a chair, a base frame, a pair of parallel spaced links at each side of the base frame pivoted only at the forward end to said base frame, a chair frame pivotally connected only at the rear ends of said parallel links, and power means connected to said links for raising said links and moving said chair frame angularly away from said links.

3. In a chair, a base frame, a pair of parallel spaced links at each side of the base frame pivoted only at the forward end to said base frame, a chair frame pivotally connected only at the rear ends of said parallel links, power means on said base frame for raising said links and moving said chair frame angularly away from said links, a leg rest at the front end of said base frame, pantograph supports at each side of said leg rest connected to said base frame, and means on said pantograph support engageable by the power means when the chair frame is in lowered position for actuating said pantograph supports

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outwardly and moving said leg rest forwardly of the base frame.

4. In a chair, a base frame, drive means supported by said base frame embodying a lead screw and a nut, a chair frame having a rear cushion section, a support for said chair frame actuated to raised and lowered positions by said nut when the lead screw is driven in one or the other direction whereby said support is inclinable away from both said base and chair frames, and a front cushion section supported on said support in alignment with the rear cushion section when the chair frame is in lowered position.

5. In a chair, a base frame, drive means supported by said base frame embodying a lead screw and a nut, a chair frame having a rear cushion section, a support for said chair frame actuated to raised and lowered positions by said nut when the lead screw is driven in one or the other direction whereby said support is inclinable away from both said base and chair frames, a front cushion section supported on said support in alignment with the rear cushion section when the chair frame is in lowered position, a leg support, means movably securing said leg support on said base frame, and means on said securing means engaged by the drive means when advanced beyond chair frame lowered position for extending said leg support forwardly of the base frame.

6. In a seat, a base frame, a motor on said frame, a parallelogram support pivoted to only one end of the frame, power means driven by said motor, link means interconnecting said support with said power means, a chair frame pivotally supported only at one end to the parallelogram support and maintained in controlled position when raised and lowered, a rear cushion section on the seat frame, and a forward cushion section on said parallelogram support which moves into aligned relation with the rear cushion section when the seat frame is lowered.

7. In a seat, a base frame, a motor on said frame, a lead screw on said frame driven by said motor, a nut on said lead screw, a parallelogram support pivoted only on the front end of the frame, link means interconnecting said support with said nut, a chair frame supported only at the rear of the parallelogram support and maintained in substantially horizontal position when raised and lowered, a rear cushion section on the seat frame, a forward cushion section on said parallelogram support which moves into aligned relation with the rear cushion section when the seat frame is lowered, an ottoman on the forward end of said base frame, a pantograph support means connecting the ottoman to said base frame, and means on said pantograph support means engageable by said link means after the seat is lowered for advancing said ottoman to forward position.

8. In a seat, a base frame, a motor on said frame, a lead screw on said frame driven by said motor, a nut on said lead screw, a parallelogram support pivoted on the front end of the frame, link means interconnecting said support with said nut, a chair frame supported on the parallelogram support and maintained in substantially horizontal position when raised and lowered, a rear cushion section on the seat frame, a forward cushion section on said parallelogram support which moves into aligned relation with the rear cushion section when the seat frame is lowered, an ottoman on the forward end of said base frame, a pantograph support means connecting the ottoman to said base frame, means on said pantograph support means engageable by said link means after the seat is lowered for advancing said ottoman to forward position, a circuit to said motor, and a switch on said chair frame having two directions of operation from "off" position for connecting the motor for operation in one direction and for connecting the motor for operation in the opposite direction.

9. In a seat construction, a base frame, a set of parallel arms secured to each side of the base frame at the front

end thereof, of chair frame connected to the rear ends of each set said parallel arms, a front section of a seat cushion mounted on the front portion of the upper parallel arms and fixed for movement therewith, a rear cushion section mounted on the chair frame, a motor driven lead screw carrying a nut mounted on said frame, and links on said nut operating said chair frame to raised and lowered positions whereby said rear seat section is angularly inclinable and spatially separable relative to said front seat section.

10. In a seat construction, a base frame, parallel arms secured to each side of the base frame at the front end thereof, a chair frame connected to the rear ends of said parallel arms with the arms in substantially parallel relation, a front section of a seat cushion mounted on the front portion of the upper parallel arms, a rear cushion section mounted on the chair frame, power means mounted on said frame, links on said power means operating said chair frame to raised and lowered positions, and bumpers on the top and bottom at the forward and rearward ends of the top pair of parallel arms, the forward bumper being engaged with the chair frame, the rearward bumper engaging the base frame.

11. In a seat construction, a base frame, parallel arms secured to each side of the base frame at the front end thereof, a chair frame connected to the rear ends of said parallel arms with the arms in substantially parallel relation, a front section of a seat cushion mounted on the front portion of the upper parallel arms, a rear cushion section mounted on the chair frame, power means mounted on said frame, and articulated links pivotally connected at one end to said nut and at the other end to said parallel arms, the links having an extending portion engageable with said parallel arms which is movable therefrom when the chair frame is in lowered position.

12. In a seat construction, a base frame, parallel arms secured to each side of the base frame at the front end thereof, a chair frame connected to the rear ends of said parallel arms with the arms in substantially parallel relation, a front section of a seat cushion mounted on the front portion of the upper parallel arms, a rear cushion section mounted on the chair frame, articulated links pivotally connected at one end to said nut and at the other end to said parallel arms, the links having an extending portion engageable with said parallel arms which is movable therefrom when the chair frame is in lowered position, an ottoman, pantograph support means for connecting the ottoman to the front of the base frame, and means engaged by the links having the extended portion

for moving said pantograph support means and said ottoman forwardly of the base frame.

13. In a chair, a chair frame having a seat, a cushion on said seat, said cushion being divided into a front section and a rear section, and means for pivoting said front section forwardly as said rear section is moved upwardly and forwardly above said front section.

14. In a chair, a base frame, a chair frame, a parallelogram support device including one end articulated only to said chair frame and another end articulated only to said base frame, and drive means for pivoting the entire parallelogram support about its point of articulation to said base frame for moving said chair frame away from both said parallelogram support and said base frame.

15. In a chair, a base frame, a parallelogram support device articulated at each side of the base frame, a chair frame pivotally supported on one end of the parallelogram support device, a lead screw having a nut thereon, and operating mechanism driven by said nut for pivoting said parallelogram support device about its point of articulation to said base frame whereby said entire device is angularly inclinable relative to both said base and said chair frames.

16. In a chair, a base frame, power operating means supported by said base frame, a chair frame, a linkage device articulated at one end to said chair frame and at the other end to said base frame, said power means being drivingly articulated to said linkage device whereby actuation of said power means is adapted to pivot said entire linkage device about its points of articulation to said base frame and pivot said chair frame relative to the linkage device.

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