

Feb. 5, 1963

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3,076,678

ELEVATING WHEEL CHAIR SEAT

Filed Dec. 19, 1960

2 Sheets-Sheet 1

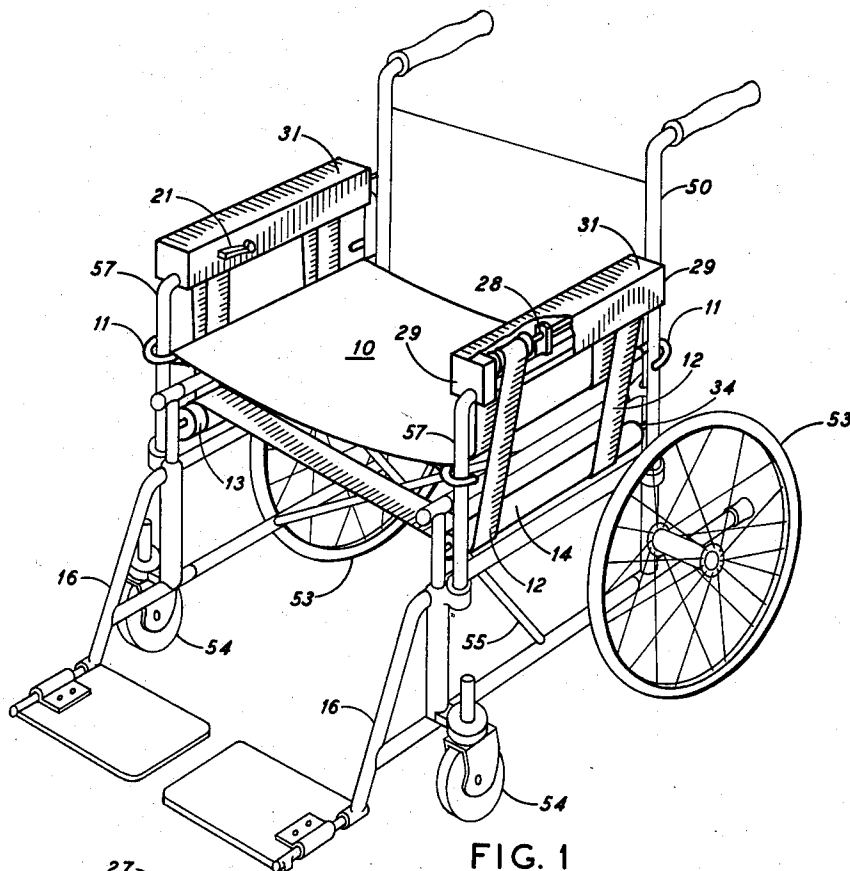


FIG. 1

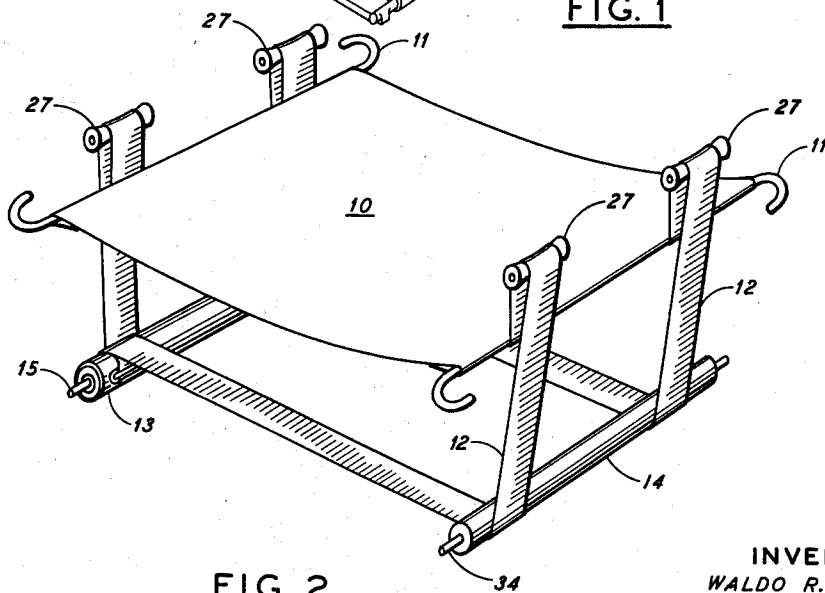


FIG. 2

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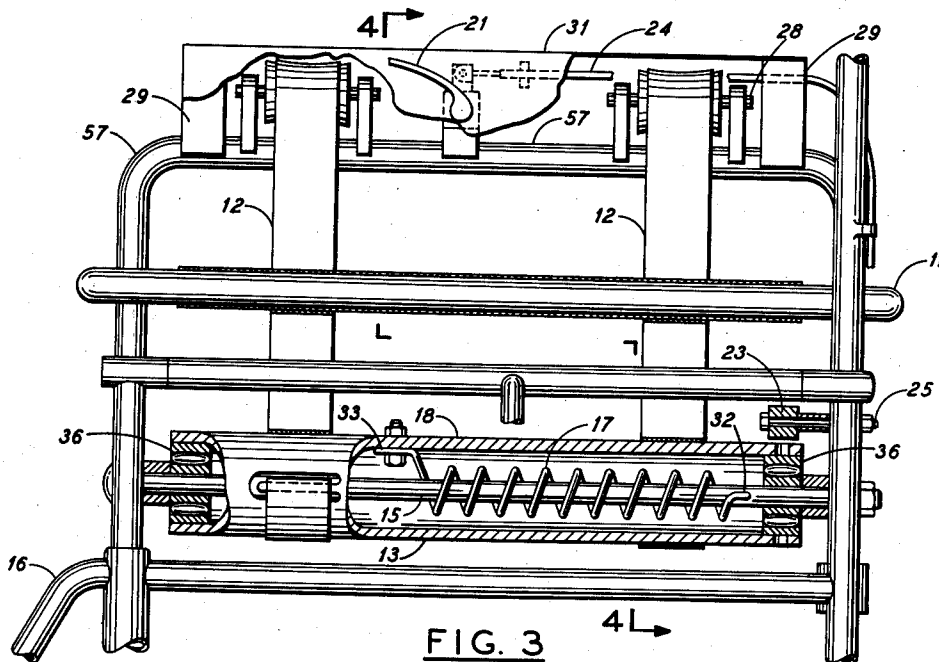


FIG. 3

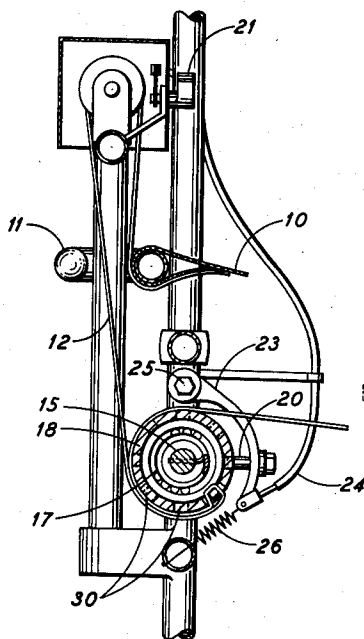


FIG. 4

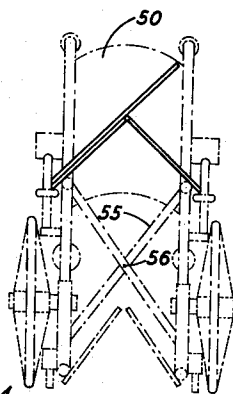


FIG. 5

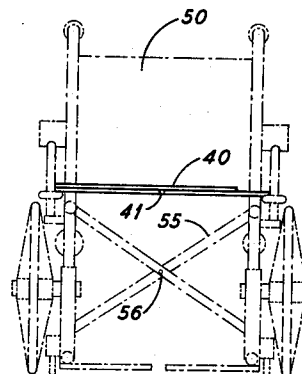


FIG. 6

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ELEVATING WHEEL CHAIR SEAT

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4 Claims. (Cl. 297—339)

The present invention relates to elevating wheel chair seats. More particularly, it relates to an elevating seat that can be operated by the occupant of the chair and which can be used as an integral part of a collapsible wheel chair.

It is a particular object of the invention to provide an integral, or substitute, seat for a wheel chair that is operable by the occupant to elevate himself to a height where he can work as through standing, but without adding greatly to the weight of the chair, or eliminating the collapsible characteristics of such chairs.

In a preferred embodiment of said invention, the conventional seat may be replaced by a seat supported in normal seat position by one or more straps or webs on rollers positioned adjacent arm rests for the chair. The webs are adapted to move the seat up and down when lengthened or shortened by a power shaft mounted below the seat to which the opposite ends of said webs or straps are secured. In application of the invention to a collapsible chair, the power shaft is mounted at one side of the chair, and an idler roller is rotatably mounted at the opposite side to guide straps anchored at the side of the seat away from the power shaft. Desirably, to maintain light weight for the chair, said power shaft includes spring means integral therewith capable of rotating said shaft only under a reduced load on the seat, as when the occupant partially lifts himself by use of his arms and hands on the arm support. The seat elevates under the user when he releases the power shaft to rotate under said spring action. Through suitable locking means, the position of the seat may be held at any desired height. Spring tension is overcome by the weight of the occupant upon release of the locking means, so that said spring is fully rewound when the seat is in its lowest position.

Wheel chair seats are conventionally placed at an elevation where the occupant can easily sit and rise. While such position is almost mandatory for these purposes, this elevation is frequently too low for the user to perform tasks that he is physically able to do, but which are normally performed in a standing position. Heretofore, it has been necessary to build special ramps to elevate a complete wheel chair, or the equipment to be used is specially constructed at a lower level for use by such persons. Examples of such task are household duties including dish washing at a sink, cooking on a stove of conventional height, entering elevated cabinets, opening an upper drawer in an office filing cabinet, raising a window, or sitting at a dining table of conventional height.

While it has been proposed heretofore to construct jacking or elevating mechanisms into wheel chairs, such equipment has added greatly to the weight of the chair. It must be installed and removed each time its use is required, if the chair is to be made collapsible; or the chair must be noncollapsible, so that it cannot be transported for use in different places, including home, office, school, or the like, as would be required where a person is incapacitated only in the use of his lower extremities.

It has also been proposed to make such seats operable by hydraulic means, but the danger of fluid leaks on rugs and floors, as well as weight, mechanical complexities, and cost of such units, has kept them from being adopted widely.

In accordance with the present invention, an elevating seat is raised or lowered by a combination of fabric or

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cloth-like straps, or webs, that are readily wound as a coil on a power shaft that can form a permanent part of the chair, but which does not interfere with the collapsible feature of a chair. Such combination adds only slightly to the weight of the chair, so that even standard wheel chairs can be readily handled when the seat assembly of the present invention is installed.

Further objects and advantages of the present invention will become apparent from the following detailed description of a preferred embodiment illustrated in the drawings, which form an integral part of the present specification.

In the drawings:

FIG. 1 is a front perspective view of a collapsible wheel chair to which the elevating seat of the present invention has been applied;

FIG. 2 is a perspective view of the elevating seat assembly per se in a raised position to illustrate the operative portions thereof when removed from the wheel chair, as in FIG. 1;

FIG. 3 is a partial side elevation view, partly in section, of one side of the wheel chair of FIG. 1 particularly illustrating the power shaft and lock-releasing mechanism therefor;

FIG. 4 is a partial sectional elevation view taken in the direction of arrows 4—4 in FIG. 3 further illustrating the anchoring of the support webs to the power shaft and the lock-releasing arrangement; and

FIGS. 5 and 6 are, respectively, the partially closed, and fully open, view of an alternate form of seat to which the invention can be applied.

Referring now to the drawings, and in particular to FIG. 1, a flexible elevating seat 10, made of cloth, such as canvas or plastic, is shown in the normal seating position on a collapsible, or portable, wheel chair 50. As is conventional in such collapsible wheel chairs, its primary structure includes a pair of opposed side frames 16 formed of tubular sections that are bent and joined together. Each side frame 16 is supported on a traction wheel 53 and a caster wheel 54.

For a more detailed description of one form of a collapsible wheel chair, to which the present invention is applicable, and that is particularly illustrated in the present drawings, reference is made to Jennings et al. Patent 2,486,015, issued October 25, 1949. As described in that patent, side frames 16 are connected together by a cross brace construction, indicated as 55, that pivots about a center bolt 56 to permit lateral movement of one side frame relative to the other. This motion, and the open and partially closed positions of the chair, are best understood from the phantom views shown in FIGS. 5 and 6.

Because side frames 16 must move toward each other in the collapsed position (FIG. 5), seat 10 and its operating strap means, such as woven webs 12, in accordance with the invention, are desirably flexible so that they will fold with cross brace 55. Further, it will be noted that all of the operating elements for raising and lowering seat 10 are secured to side frames 16, and only the flexible or collapsible elements extend therebetween.

With the foregoing concept in mind, it will be apparent from FIGS. 1 and 2 that seat 10 is secured to the outer ends of tapes or straps 12. Desirably, straps 12 and seat 10 are connected through side-engaging rods 11 whose curved ends hook around the vertical portion of the tube that forms arm rest support 57. As best seen in FIG. 3, straps 12 in turn are supported on rollers 27 that may also be mounted on the arm rest support 57. Normally, arm rest support 57 is formed either integral with or removable from its side frame 16. In the present arrangement, rollers 27 are rotatable on rods 28 that mount on bearing blocks 30 located between end blocks 29

that support a sheet metal cover 31 that serves as a substitute arm rest on support 57.

With this construction, it will be understood that separate power means may be used for each strap 12, to raise and lower seat 10, or a pair of straps on each side may be lengthened or shortened by two power-driven roller means. However, to reduce the cost of such an elevating seat, only a single driven member, namely power roller 13, supplies this motive power to all four ends of straps 12. For this purpose, straps 12 on right side member 16 (as seen in FIG. 1) pass over an idler roller 14. Idler roller 14 is suitably journaled on a rod 34 that extends between the front and rear vertical members forming side frame 16. It will be noted that the position of idler roller 14 is below the normal or conventional wheel chair seat height. The opposite ends, or if formed as two continuous straps, the centers, of straps 12 are anchored to a drive roller 13 that is similarly journaled on rod 15 supported by the opposite side frame 16 below the normal seat elevation.

While drive roller 13 may have a self-contained motor means of any suitable type, in the present embodiment and as best seen in FIGS. 3 and 4, the motive means is a coil spring 17 that is anchored at one end 32 to rod 15 by a hole drilled therein. Coil spring 17 is secured at its opposite end 33 by a bolt and nut 35 to the tube 18 that forms the surface of roller 13. To maintain friction between rod 15 and tube 18 as small as possible, needle bearings 36 are used at the ends of roller 13. Motive power spring 17 can be made sufficiently stiff to raise seat 10 while fully loaded, as by a user sitting thereon, but to keep the total weight within reasonable bounds, spring 17 is designed to lift only slightly more than the weight on seat 10 and overcome friction such as that produced by binding of the hook ends of rods 11 on the vertical members of side frames 16. With such an arrangement, a user not handicapped in his or her arms, as is most frequently true of those able to use portable or collapsible wheelchairs for work in an office or at home, can lift himself on the arm rests 31 while releasing roller 13 by means of lever 21 from its wound-up condition for coil spring 17 so that seat 10 will rise beneath him. Lever 21 pulls cable 24 against spring 26 to pivot curved bar 23 about pin 25. This motion releases detent pin 20 that engages any one of a plurality of holes 30 in the end of tube 18. Release of lever 21 permits pin 20 to lock in a hole 30 when seat 10 is elevated. The weight of the user is then adequate to rewind spring 17 when lever 21 is again operated. Obviously, roller 13 can be stopped in any intermediate position. By virtue of the position of bar 23 and detent pin 20, roller 13 will support a fully loaded seat 10 in any position.

In the embodiment shown in the drawings, the power shaft and idler roller are fixed to side frames 16, as by drilling through the vertical posts. It will be apparent that bearing blocks can be clamped to these posts, so that no modification of the basic chair is needed. Such a structure is desirable where the wheel chair is rented for a short time, rather than purchased by the user. Further, by this arrangement, a single design can be used on many different styles of wheel chairs, whether portable or not. Where there is no cross brace for separating side frames 16, as in noncollapsible chairs, it will be obvious that a single wide web or band, up to the width of seat 10, can be used in place of the two separate straps 12.

FIGS. 5 and 6, in addition to illustrating the open and partially closed positions of wheel chair 50, also show a different seat arrangement 40. As there seen, stiff seat 40, made, for example, from wood or plastic, includes a pivoted center point 41 that permits seat 40 to hinge at the left side and swing upwardly to the position shown in FIG. 5. In the chair's fully opened position, as in FIG. 6, seat 40 locks due to its inherent stiffness at the normal seat position. Such a rigid seat is desirable where the user's hip cannot be subjected to pressure.

As indicated before, other motive means, such as a gear-reduced electric motor drive, can be used to elevate or lower seat 10. However, desirably the unit is self-contained, including its power source, such as batteries to maintain full portability and freedom of movement for the chair.

While various modifications and changes in the structural details of the apparatus will become apparent from the foregoing description, all such modifications and changes falling within the scope of the appended claims are intended to be included therein.

I claim:

1. An elevating seat for a collapsible wheel chair or the like wherein a sling seat is supported along two opposite edges by side supports that include arm rests, a pair of shafts mounted on said side supports and laterally displaced from the edges of said sling seat, at least one of said shafts comprising a spring-winding roller member, a pair of strap members, each of said strap members having one of its ends anchored to said roller member and the other end secured to one of said two edges of said seat, said roller member being biased by the spring of said roller member to maintain said seat in an elevated position under no load and to be rewound by the weight of an occupant when in its normal position, and latch means operable by an occupant of said chair to release and to hold said seat in a plurality of positions between its normal position when said spring is rewound and its elevated position with said spring unwound.
2. An elevating seat for a wheel chair or the like comprising a seat member, a pair of strap means having one of their ends engaging opposite edges of said seat member, a pair of roller means supported by the wheel chair above normal seat height of said chair, a pair of rotatable shafts supported by said wheel chair below normal seat height, one of said rotatable shafts including an inner stationary shaft, a hollow, outer concentric shaft rotatable relative to said stationary shaft, and coil spring means interconnecting said stationary and said concentric shafts, said strap means being supported by said roller means to suspend the seat member therebelow and said strap means passing over said rotatable shafts with the opposite ends thereof anchored to said outer concentric shaft, and latch means for engaging said outer concentric shaft to prevent rotation thereof whereby upon release of said latch means said seat will elevate under rotation of said outer concentric shaft by said spring means when no load is present and rewind said spring means when load is applied to said seat.
3. A self-elevating seat for a wheel chair operable by the occupant thereof, said wheel chair including a pair of side arm supports, a pair of side arms, and means for supporting a seat below said side arms, which comprises a pair of rollers mounted on said side arm supports, a pair of strap means engaging the sides of said seat adjacent said side arm supports and frictionally engaging said rollers to support said seat therebelow, an idler shaft mounted on one of said side arm supports and a power shaft mounted on the other said side arm support, motive means integral with said power shaft for rotating said shaft, said strap means frictionally engaging said idler shaft and passing below said seat so that the other ends thereof are anchored to said power shaft for winding thereon, means positioned on one of said side arm supports and operable by the occupant for energizing said motive means to elevate said seat, and brake means for preventing rotation of said power shaft and movement of said seat when at elevated and intermediate positions under full load.
4. A self-elevating seat for a wheel chair operable by the occupant thereof, said wheel chair including a pair of side arm supports, a pair of side arms, and means for supporting a seat below said side arms, which comprises a pair of rollers mounted on said side arm supports below said side arms, a pair of strap means engaging

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the sides of said seat adjacent said side arm supports and frictionally engaging said rollers to support said seat therebelow, an idler shaft mounted on one of said side arm supports below said seat support means and a power shaft mounted on the other said side arm support below said seat, motive means integral with said power shaft for rotating said shaft, said strap means frictionally engaging said idler shaft and passing below said seat so that the other ends thereof are anchored to said power shaft for winding thereon, means positioned on one of said side arm supports and operable by the occupant for

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energizing said motive means to elevate said seat under a reduced loading condition on said seat, and brake means for preventing rotation of said power shaft and movement of said seat when at elevated and intermediate positions under full load.

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2,486,015	Everest et al.	Oct. 25, 1949
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