

[54] **CONVERTIBLE FURNITURE
CONSTRUCTION**

[75] Inventor: **Jack E. Spence**, Collins, Miss.

[73] Assignee: **Durfold, Inc.**, Jackson, Miss.

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Related U.S. Application Data

[63] Continuation of Ser. No. 4,898, Jan. 22, 1970, abandoned.

[52] U.S. Cl. **297/111, 5/18 R, 5/41**

[51] Int. Cl. **A47c 1/028**

[58] Field of Search 5/17, 18, 21, 30,
5/41, 48, 43, 354, 355, 347, 363; 297/111,
375, 354

[56] **References Cited**

UNITED STATES PATENTS

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Primary Examiner—Francis K. Zugel

Attorney—Colton & Stone

[57] **ABSTRACT**

A mobile furniture construction employing multi-position adjustment means for the selective use of the same as an upright chair, a lounge chair, a chaise lounge and a cot. Three interconnected and distinct relatively adjustable framework components are adapted to support three cushion assemblies which cushion assemblies are functionally interconnected with each other and the framework components to provide a unit handled construction. Two of the framework components are adjustably supported directly on the third component for the various multi-position adjustments thus obviating the usual linkage interconnections employed with constructions of the general type under consideration.

4 Claims, 5 Drawing Figures

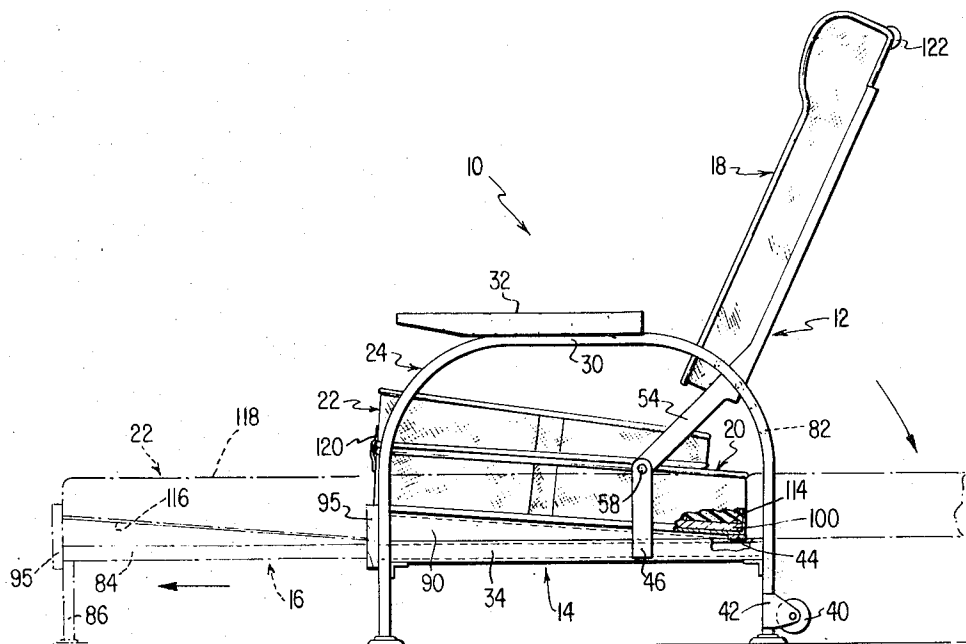


FIG. 1

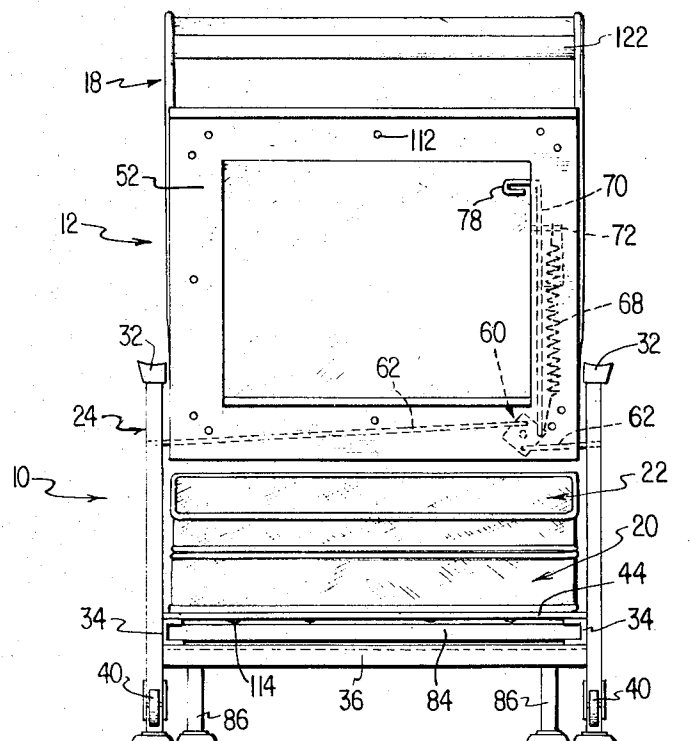
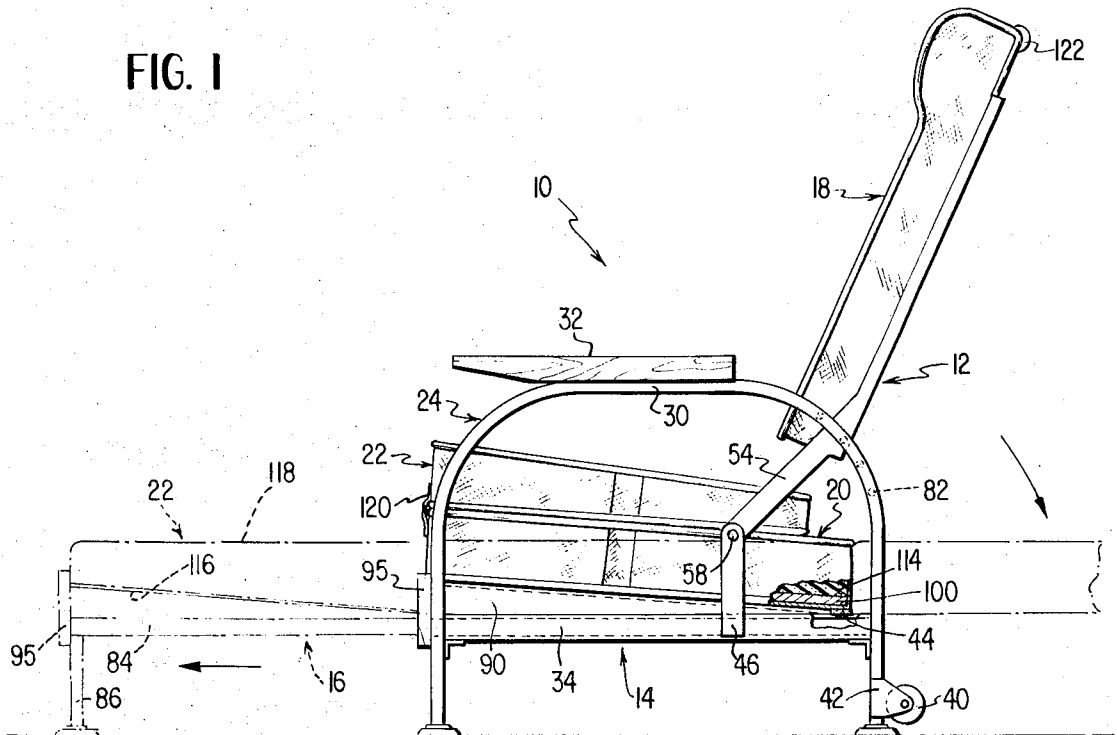


FIG. 2

BY

Colton & Stone

ATTORNEYS.

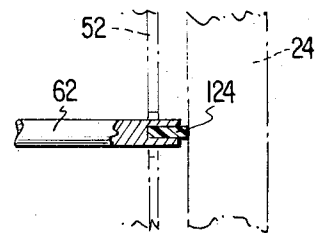
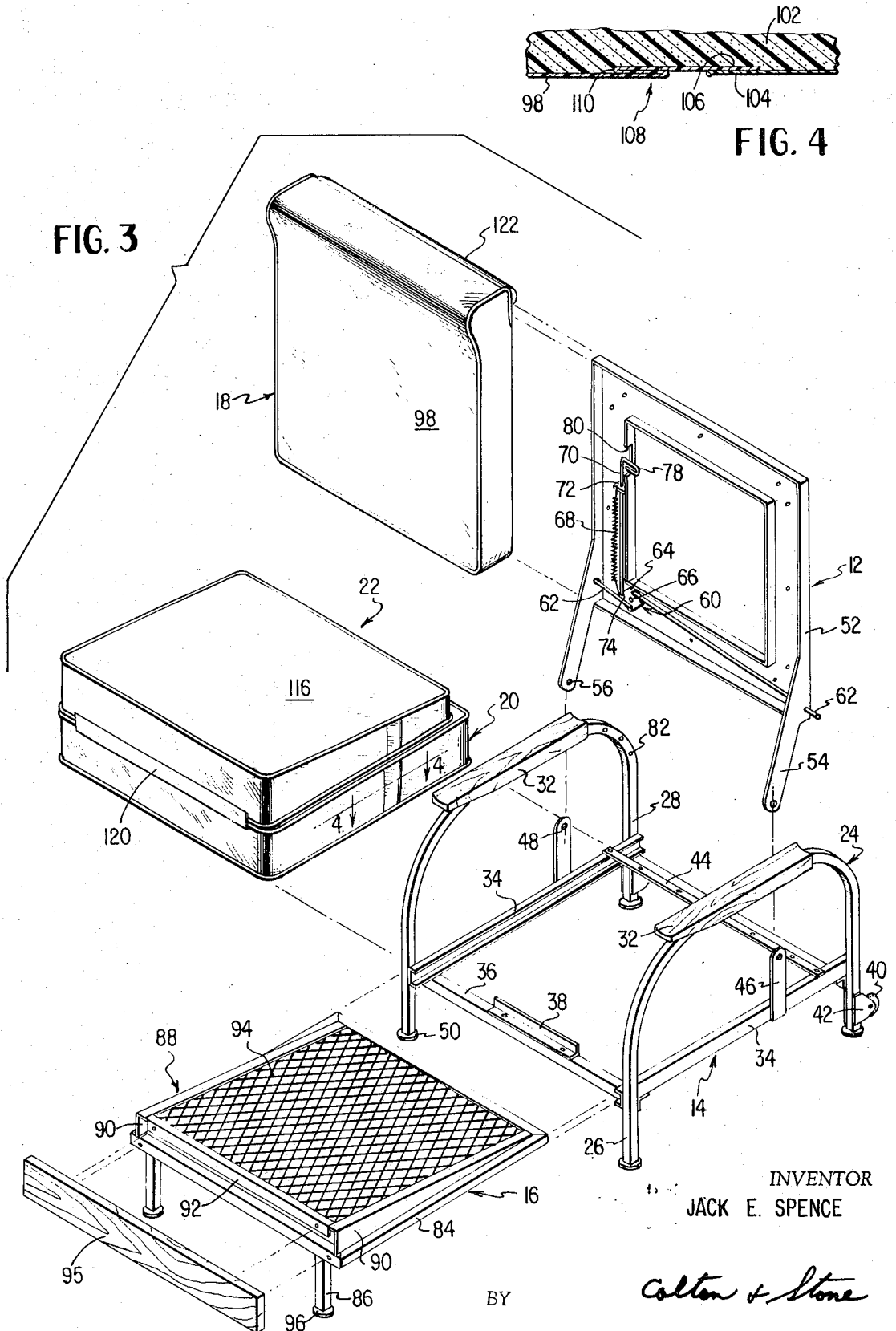


FIG. 5

INVENTOR
JACK E. SPENCE



INVENTOR
JACK E. SPENCE

Colton & Stone

ATTORNEYS

CONVERTIBLE FURNITURE CONSTRUCTION

CROSS REFERENCE TO RELATED APPLICATION

This is a continuation of application Ser. No. 4,898 filed Jan. 22, 1970, now abandoned.

BACKGROUND OF THE INVENTION

There are many areas of commercial and residential demand for a single piece of furniture which will provide the plurality of body supporting positions normally provided by a chair, a chaise lounge and a cot. Exemplary of such areas of demand are hospitals and other recuperative institutions, hotels, motels, and in various outdoor or sunbathing uses such as for patio and beach furniture. In the case of residential or general outdoor usage the primary concerns are normally the savings in cost represented by a single piece of furniture vis-a-vis a multiplicity of such pieces and/or the more ready portability and convenience of lesser bulk storage during off-season periods. In addition to the foregoing considerations, a far more compelling demand exists where the furniture is to be used in relatively small rooms where economic considerations dictate that floor space be kept to a minimum consistent with adequate furniture requirements. Institutional centers, such as nursing homes and particularly hospitals, are classic examples of commercial enterprises necessarily utilizing small rooms while yet requiring body supporting furniture of various types in addition to the patient's bed. Such furniture is required not only for visitors and persons in attendance on the patient but also for the patient's use in various stages of recovery.

Hospital usage of such furniture necessarily imposes a number of considerations which would be a lesser importance in other environments. Foremost among such considerations are the ability to maintain high standards of cleanliness with a minimum of effort while yet ensuring that the furniture will resist any deteriorating effects from the germicidal cleaners normally used in hospitals and the assurance of complete safety in usage such as, for example, in the case of a recuperating patient. It is also desirable that hospital furniture adapted for usage in the form of a chair by non-ambulatory patients be readily susceptible of emergency movement as in the case of a necessary evacuation such as fire, a natural disaster or a sitting patient requiring emergency treatment outside the room.

Prior convertible type lounge chairs have been deficient in one or more of the above respects and have, accordingly, failed to achieve widespread commercial success, particularly in the institutional field. One of the more common deficiencies relates to the cleaning of the various linkage mechanisms and spring structures associated with known convertible chairs such as typified by that disclosed in U.S. Pat. No. 2,155,490. While there is certainly no requirement for sterility in hospital furniture it must meet an unusually high standard of cleanliness at all times and the necessarily lubricated and overlapped relationship of adjustable linkage elements adjacent their pivot points provide natural collection areas for dust, dirt and other debris. Inasmuch as the overlapped, linked portions as well as the lubricant for such linkage connections are not susceptible of cleaning, any effort to thoroughly clean convertible furniture of the type previously known requires not only a substantially complete disassembly of the same but, also, that the linkage connections again be lubri-

cated. While this high state of cleanliness would not even be desirable in most instances of non-institutional usage it is a consideration of some importance in hospital maintenance where the usual practice has been to purchase very simple pieces of furniture which may be readily cleaned merely by wiping with a germicidal solution. Furthermore, complex linkage connections represent a substantial cost factor in the price of the furniture both from the standpoint of fabrication and assembly.

The prior use of covered foamed seat cushions to provide a flexible body support so that the usual cushion supporting springs may be omitted are, in many states, considered unacceptable for hospital usage. The reason for this is the necessary presence in each foamed cushion of a so-called "breather" opening through the outer impervious covering which allows the ingress and egress of air to and from the foam filled interior when a person's weight is placed upon or removed from the cushion. Such a "breather" opening alternately acts as a suction and pressure pump to draw ambient air along with any bacteria or other airborne materials such as scab fragments or the like into the cushion interior which will be expelled therefrom at some later time by the positive pumping action of a person's weight being placed on the cushion.

Convertible lounge chairs are subject to the same psychological barriers in the mind of the general public as are many other convertible or multi-purpose type devices since the same are frequently regarded as a compromise between cost and quality. This effect is, of course, heightened in devices of the type under consideration where physical comfort is the primary purpose of the convertible construction. It will be apparent that proper rest in the prone position is most efficaciously achieved by providing a generally flat surface whereas a generally horizontally positioned seat cushion is quite uncomfortable in a lounge chair tending to cause the occupant to slide downwardly in the chair when the back is inclined rearwardly. Such inconsistencies have contributed to some feeling that convertible furniture cannot provide the degree of comfort, in various modes, as is attainable with separate pieces of furniture.

It is the primary object of the invention to provide a convertible lounge chair of extremely simple construction involving, apart from the locking mechanism, only two moving parts in the supporting framework and both of which moving parts are readily accessible for cleaning. A simple position locking mechanism housed within a metal framework and an integral hinge connection between two cushions comprise the total moving parts. Only the position locking mechanism is not readily available for cleaning and it is housed almost totally within a housing structure.

It is among the further objects of the invention to introduce a single piece of furniture which is interconvertible between and provides the single unit type comfort of an upright chair, a lounge chair, a chaise lounge and a cot; to provide such a piece of furniture which is completely stable in all positions of usage and yet is immediately mobile in all except the full recline or cot position; to provide a furniture construction employing foam cushions having a "breather" opening defined by a more or less tortuous path for the purpose of reducing the ingress and egress of airborne materials to and from the cushion interior; and to provide an in-

terrelated cushion and framework geometry which avoids the necessity of compromising either the flat fully prone position in the cot mode or the rearwardly inclined seat position when utilizing the furniture as a lounge chair.

As in all convertible chairs it is necessary that the back, seat and foot portions assume various positions of relative adjustment and the manner in which these adjustments are effected in the absence of any relatively movable linkage mechanisms therebetween is an important aspect of the invention contributing both to the ready accessibility for cleaning and the integrated unit-handled construction which assures that the mobility feature will not be impaired in various positions of adjustment. This is achieved by the use of three separate rigid framework components defining, respectively, seat, foot and back supporting frameworks. The back framework is mounted on the seat framework for adjustable movement about a single fixed pivot axis defined by means rigid with the seat framework. The seat frame further includes a slideway formed integrally therewith on which the foot frame is adjustably mounted for linear reciprocatory adjustment. The full range of necessary

7 adjustments may be achieved merely by pivoting the back on the seat and sliding the foot on its seat supporting slideway.

Seat, back and foot cushions are so related and constantly interconnected with the furniture construction as to permit the full range of adjustment by merely pivoting one cushion through 180 degrees in addition to the aforementioned framework adjustments. More specifically, the back cushion is rigidly supported on the back frame while the seat cushion is securely attached adjacent one end thereof to the seat frame for limited vertical movement of the other end thereof to which other end is pivotally attached, by an integral or sewn hinge connection, the foot cushion for pivotal movement throughout 180° about the axis of the hinge connection into selective overlying relation to the seat cushion and foot frame. Mating wedge shapes on the foot frame and cushion permit the upper surface of the foot cushion to lie in a horizontal plane when the same overlies the foot frame and to be rearwardly inclined when pivoted 180° to overlie the seat cushion.

Each of the cushions are foam filled thus obviating the need for springs and the impervious coverings therefor are formed with overlapping flap portions to define the necessary "breather" openings into the foam filled interiors. Because of the way the flaps are arranged air is not pumped directly between the cushion exterior and interior but, rather, must follow a somewhat tortuous path as will be defined by the coating overlapped impervious material portions.

Each of the rear legs has rigidly secured to the rear surface thereof a wheel which, in the normal use position, is spaced above the floor or other supporting surface. Upon tilting the chair rearwardly, in any of the chair or lounge modes, these wheels come into contact with the floor while the front and rear legs are elevated thereabove about the fulcral axis defined by the wheels to permit the chair and a seated occupant to be readily wheeled to a different location, as in an emergency evacuation, by an attendant positioned behind the chair.

The locking mechanism which controls the back position adjustment is located in such a position as to be

inaccessible to a seated occupant to insure that no possible injury could occur to one attempting to make a back adjustment while seated such as in the case of a recuperating back injury patient, for example.

Although the advantages of the invention as applied to residential and general commercial usage will be readily appreciated from the foregoing discussion and particularly as regards ready portability and convenience of compact storage; the following detailed description and discussion of one specific embodiment will be directed to the hospital environment where the invention finds its greatest application.

DESCRIPTION OF THE DRAWINGS

The manner in which the aforesaid objects and advantages are achieved will become more apparent from the following detailed description and the accompanying drawings wherein

FIG. 1 is a side elevational view, with parts broken away, illustrating a convertible lounge chair wherein the lounge chair mode is shown in solid lines and the manner of converting the same to chaise lounge and cot modes is indicated in phantom lines;

FIG. 2 is a rear elevational view of the convertible lounge chair illustrating, in phantom lines, the back frame locking mechanism;

FIG. 3 is an exploded perspective illustrating the various components thereof;

FIG. 4 is a fragmentary sectional view taken along the line 4—4 of FIG. 3; and

FIG. 5 is a partly sectioned detail view of a part of the locking mechanism.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The convertible lounge chair 10 includes rigid, relatively adjustable back, seat and foot supporting frameworks 12, 14, 16 adapted to support back, seat and foot cushions 18, 20, 22. Seat frame 14 includes a pair of inverted, generally U-shaped structural members 24 whose downward vertical extensions define front and rear legs 26, 28 merging with upper generally horizontal section 30 to which arm rests 32 are secured. Channel members 34 are rigidly secured in bridging relation to front and rear legs 26, 28 and define a slideway for the selective slidable adjustment of foot frame 16 relative thereto. The seat frame is further rigidified by cross braces 36 secured thereto as by welding or the like and presenting a foot frame stop 38 on the upper surface of the front cross brace. Wheels 40 are journaled rearwardly of rear legs 28 and above the lower ends thereof in wheel supports 42 rigidly secured to the rear legs. A metal cushion connecting strap 44 bridges channel members 34 rearwardly of a pair of brackets 46 rigidly upstanding from the channel members and having aligned pivot openings 48 therein defining a fixed pivot axis. Conventional glides 50 may be secured to each of the legs as desired to complete the seat framework assembly.

Back framework 12 consists of a generally rectangular channel shaped frame 52 having integral depending arms 54 containing pivot openings 56 adapted to cooperate with seat bracket openings 48 for the reception of pivot pins 58. Housed within the channel sectioned frame part 52 is a back framework adjusting and locking mechanism 60 including locking rods 62 pivotally attached at one end thereof to opposite corners of a

square pivot plate 64 on opposite sides of a pivot pin 66 by which the plate is supported on frame 58. The other ends of locking rods 62 extend through opposite sides of channel frame 58 for the selective retraction and extension thereof by a spring 68 and a manual manipulating rod 70. Manipulating rod 70 extends through a guide bracket 72, rigid with channel frame 58, and is pivotally connected to a corner 74 of plate 64 intermediate the locking rod pivot points. Tension spring 68 interconnecting plate corner 74 and bracket 72 serves to bias the locking mechanism about pivot 66 to the extended locking position shown in FIGS. 2 and 3 until the spring bias is overridden by the manual depression of rod handle 78 extending through a cutout 80 in frame 58. The outwardly extending ends of rods 62 are adapted for selective positionment in any of holes 82 in members 24.

Foot framework 16 includes a generally horizontally disposed open rectangular frame 84 having front legs 86 and the side members of which are sized to be slidably supported in the facing channels 34 of seat frame 14. A wedge frame 88, sized for reception between channels 34, is defined by a pair of wedge shaped structural members 90 rigidly secured to frame 82 and cross braced at their forward ends by a brace angle 92 or the like. A grid-like cushion supporting framework 94 such as expanded metal or the like is rigidly secured adjacent the upper portions of the wedge shaped members 90, the angle 92 and the rear cross member of frame 84 to define an upwardly and forwardly inclined foot cushion supporting surface. The foot frame may further include a wooden molding 95 and conventional plastic glides 96 for legs 86.

The necessity for seat supporting springs is obviated by the use of polyurethane foam filled cushions encased by an impervious expanded vinyl covering 98. The back and seat cushions 18, 20 are backed by rigid supports 100, such as plywood or the like, encased within the outer covering. Foot cushion 22, since it alternately serves as a foot cushion and auxiliary seat cushion as indicated by the phantom and solid line positions of FIG. 1, does not include a rigid backing and is entirely flexible. The foam filled interior 102 of the back and seat cushions are desirably of a common density, such as 1.3 for example, while the foam comprising the foot cushion interior is of a greater density, such as 1.5 for example. The reason for the density differences will be apparent from the fact that in the cot mode a somewhat softer seat portion is desirable than when the device is being used as a lounge chair where a firmer seat is desirable. Each of the seat cushions includes "breather" openings to the foam filled interior defined by overlapped flap portions 104, 106. As illustrated in FIG. 4, the fold area 108 prohibits the passage of air at the dead end area of reentrant folds 110 while the overlapped flaps 104, 106 may undergo relative movement toward and away from the foam filled interior. Thus, when a person's weight is placed upon a cushion the air pressure build-up inside covering 98 tends to force both flaps 104 and 106 outwardly together and the expelled air must follow a somewhat tortuous path around one end of flap 106. More importantly, upon removal of weight from the cushion the reduced pressure interior tends to suck both flaps inwardly and into tight face to face contact so that the ingress of air is much slower and through relatively small restricted spaces when compared with the normally

large screen covered openings which open directly into the interior of conventional foam filled cushions.

The back cushion is rigidly secured to back frame 12 by suitable fasteners 112 extending into the plywood backing.

Seat cushion 20 is secured along the lower rear edge thereof to cushion connecting strap 44 by suitable fasteners 114 extending into plywood backing 100 as best shown in FIG. 1. Strap 44 is sufficiently flexible about its longitudinal axis to permit the seat cushion which is rigidly secured thereto to undergo the slight relative angular movement necessary to move between the solid and dotted line positions of FIG. 1 wherein it rests upon the channel members 34 and supporting surface 94, respectively.

Foot cushion 22 has a wedge shaped surface 116 whose slope is substantially equal to that of the cushion supporting surface 94 so that in the foot frame extended position indicated by phantom lines in FIG. 1, the upper or foot supporting surface 118 is substantially horizontal. An integral or separate sewn hinge 120 interconnects one edge of foot cushion surface 118 with the forward upper edge of the seat cushion so that the seat and foot cushions are interconnected with the seat frame and it is only necessary to pivot cushion 22 about hinge 120 to alternately expose opposite surfaces 116, 118 thereof for use in the various chair adjustments involving foot frame 16.

Additional anti-marring features that may be included are the polyvinylchloride bumper 122 (FIG. 1) secured to the upper rear edge of the back cushion and a plastic insert 124 (FIG. 5), such as Teflon or the like, received within counterbored ends of locking rods 62. Bumper 122 is particularly advantageous in protecting the surface finish of a wall against which the chair may be positioned or moved.

The manner in which the chair may be converted to various of its body supporting positions will be readily apparent from an inspection of FIG. 1 and the phantom line illustrations therein. In order to convert from the lounge chair mode of FIG. 1 to the chaise lounge mode it is only necessary to slide foot frame 16 outwardly as indicated by the horizontal arrow in FIG. 1 until such time as the rear cross member of frame 84 engages stop member 38 and pivot foot cushion 22 counterclockwise to the dotted line position about hinge 120. In the event a back adjustment is desired or to convert to the cot mode it is merely necessary to depress handle 78 to retract locking rods 62 from an aligned pair of openings 82 after which time the handle 78 may be released when the locking rods are adjacent the desired pair of adjustment openings 82 or when the back has reached the fully declined position as indicated by the phantom lines in FIG. 1. As the foot frame is pulled outwardly seat cushion 20 drops to the lower horizontal position indicated by the phantom lines in FIG. 1. Similarly, when the foot framework is again pushed inwardly to the solid line position of FIG. 1, seat cushion 20 pivots upwardly to the solid line position. This relative pivoting movement of seat cushion 20 is permitted by the flexibility of cushion supporting strap 44 as previously explained. In the event that a natural disaster or other emergency requires immediate mobility for a nonambulatory patient seated in the convertible chair in any position other than the cot mode, it is merely necessary for an attendant to press downwardly on the rear portion of the back frame and elevate the chair

about a fulcral axis defined by wheels 40 whereupon the patient may be readily wheeled to a different location. The unit handled construction of the lounge chair makes possible the immediate mobility of the same in all of its adjusted positions, except for the cot mode, since even in the chaise lounge position the foot frame will be securely supported on the seat frame as the same is tilted rearwardly.

I claim:

1. A multi-purpose body support structure selectively adjustable among chair, chaise lounge and bed positions, comprising: a rigid seat supporting framework including means defining a fixed pivot axis and a slide-way; a rigid back supporting framework mounted for adjusting movement throughout a single path of arcuate movement defined by said pivot axis; means for locking said back supporting framework in a plurality of adjusted positions along said path of arcuate movement; a back cushion affixed to said back supporting framework for movement therewith throughout a path of arcuate movement; a seat cushion supported in overlying relation to said slideway; means for raising and lowering the outer end of said seat cushion; said last named means comprising a generally wedge-shaped foot supporting framework including floor engaging means extending downwardly from the larger wedge-shaped end thereof; said foot supporting framework being slidably engageable with said slideway for adjustment between a first extended position with the smaller wedge-shaped end thereof supported by said slideway and the larger end supported by said floor engaging means and a second retracted position underlying said seat cushion wherein said foot supporting framework is supported on said seat supporting framework and the outer end of said seat cushion is upwardly inclined and supported on the upper surface of said foot supporting framework; and a foot cushion adapted to be supported on said foot supporting framework in the extended position of the same and on the seat cushion in the retracted position of the foot supporting framework.

2. The body support structure of claim 1 including front and rear legs rigid with said seat supporting

framework; and wheel means rigidly mounted on said structure upwardly and rearwardly of the lower ends of said rear legs.

3. The body support structure of claim 1 wherein said seat and foot cushions lie substantially outside the path of arcuate movement of said back cushion at all positions thereof whereby said body support structure may be converted from a chair to a chaise lounge and vice versa without declining said back supporting framework and back cushion.

4. A multi-purpose body support structure capable of movement between a chair position providing an occupant entry, a chaise lounge position and a substantially horizontal bed position comprising a rigid seat supporting framework including means defining a fixed pivot axis and a slideway; a rigid back supporting framework mounted for adjusting movement throughout a single path of arcuate movement defined by the pivot axis; means locking the back supporting framework in a plurality of adjusted positions along the path of arcuate movement; a back cushion affixed to the back supporting framework for movement therewith; a rigid foot supporting framework mounted for adjusting movement throughout a single linear path of movement defined by the slideway; a seat cushion affixed to the seat supporting framework for upward movement adjacent the occupant entry to provide means for receiving the foot supporting framework between the seat supporting framework and the seat cushion in the chair position and a foot cushion pivotally connected to the seat cushion adjacent the occupant entry for movement between positions juxtaposed to the seat cushion and juxtaposed to the foot supporting framework, the foot cushion and foot supporting frameworks being wedge-shaped in side elevation and having the large ends thereof adjacent the occupant entry when in the chair position; and said body support structure further comprising means for moving the seat cushion upon sliding the foot supporting framework, the moving means comprising the wedge provided by the foot supporting framework.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,767,258 Dated October 23, 1973

Inventor(s) Jack E. Spence

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 34, "a" should read --of--.

Column 3, line 14, "iO" should read --in--.

Column 3, the sentence commencing in line 23 and extending through line 27 should read as follows:

--The full range of necessary adjustments may be achieved merely by pivoting the back on the seat and sliding the foot on its seat supporting slideway.--

Column 3, line 53, "tortous" should read --tortuous--.

Column 6, line 65, "nonlambulatory" should read --non-ambulatory--.

Column 7, line 19, "bach" should read --back--.

Signed and sealed this 26th day of March 1974.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

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