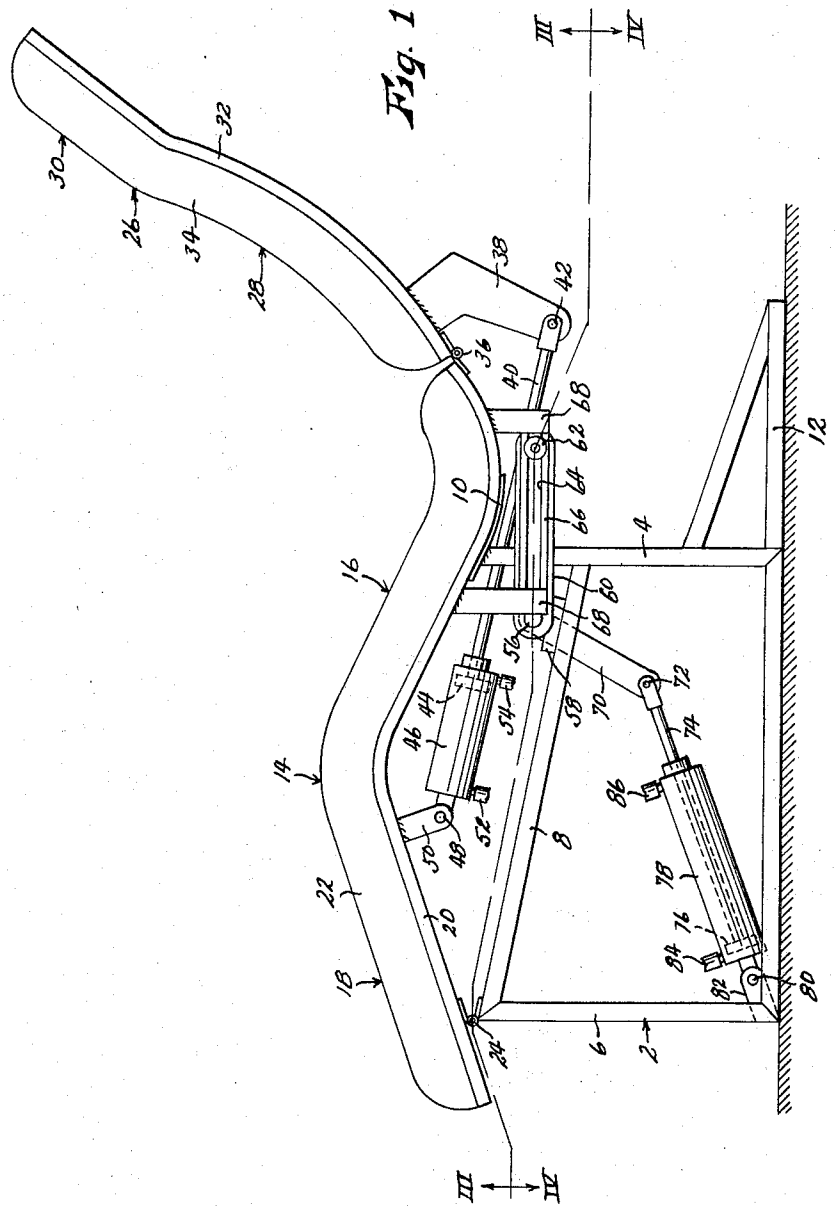
Aug. 29, 1967 C. T. KLEINSORGE 3,338,632

RECLINING CHAIR

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Fig. 1



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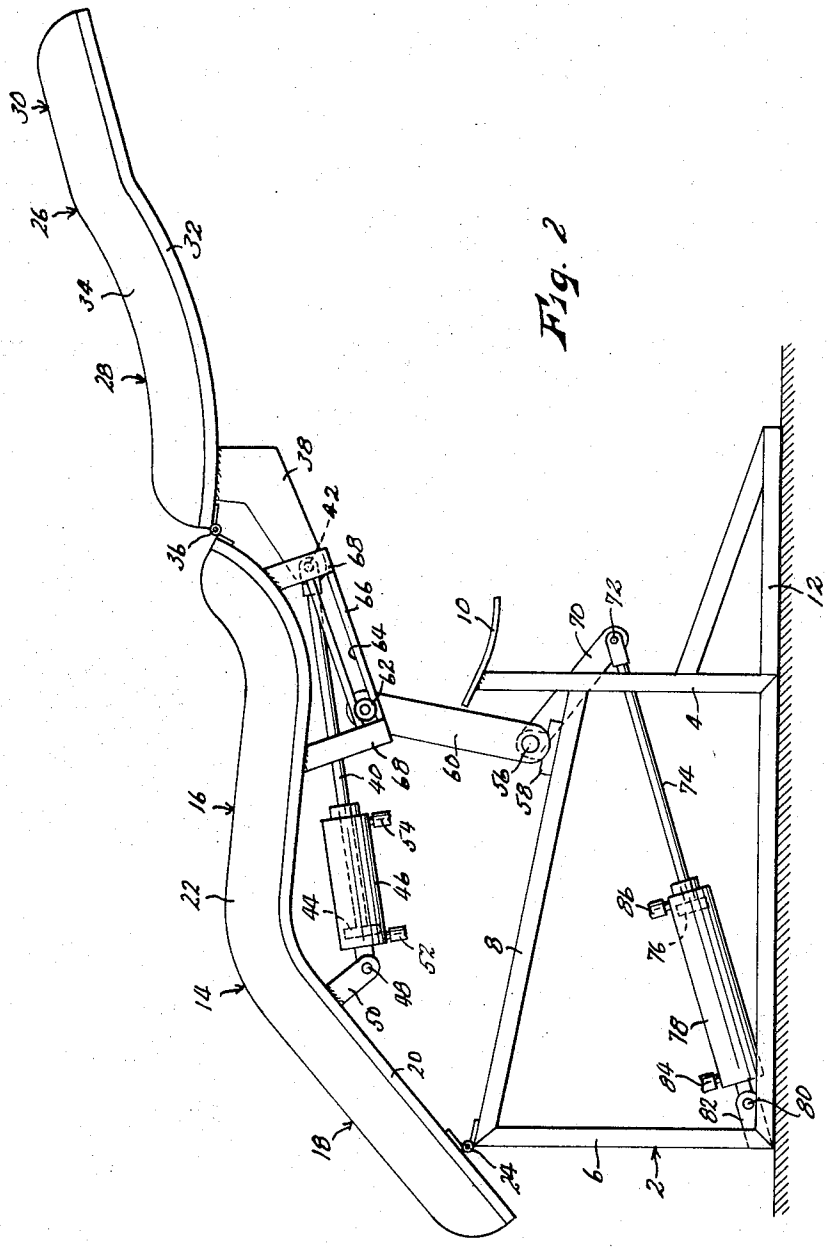


Fig. 2

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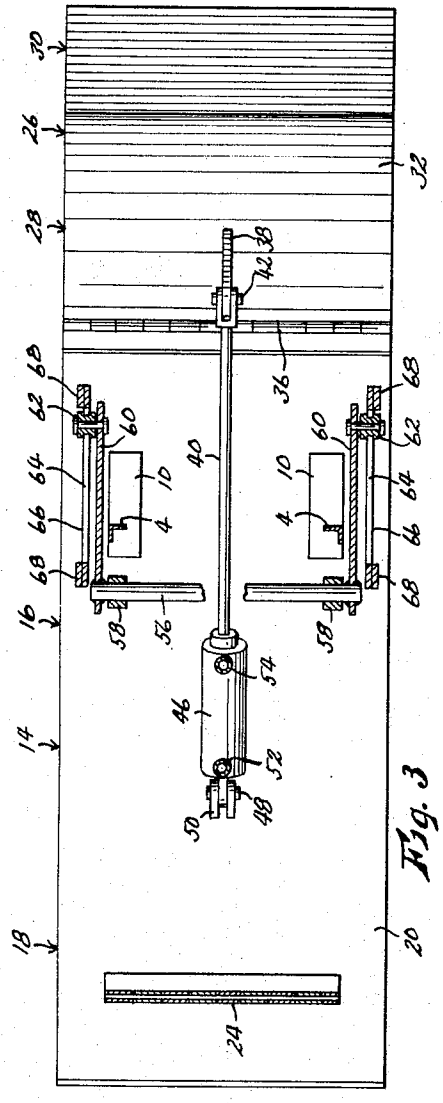


Fig. 3

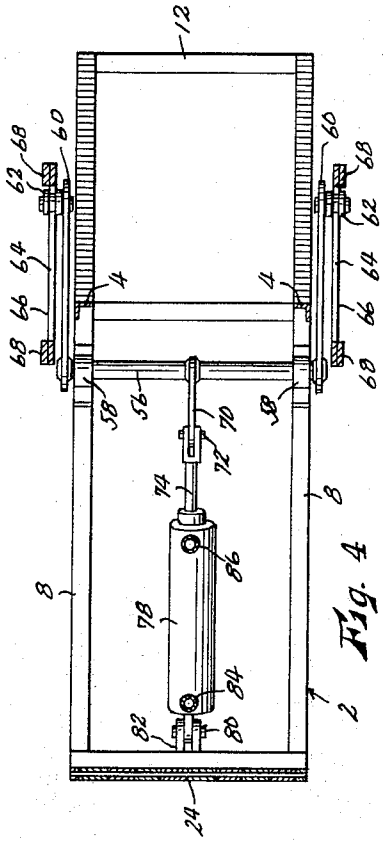


Fig. 4

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3,338,632

RECLINING CHAIR

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6 Claims. (Cl. 297—330)

ABSTRACT OF THE DISCLOSURE

This application discloses a dental chair having an integral seat and leg rest portion pivoted to a frame on a horizontal transverse axis adjacent the foot end thereof, an integral back and head rest portion pivoted to the rearward edge of said seat and leg rest, also on a horizontal transverse axis, and independently operable means for pivoting said seat and leg rest portion relative to said frame, and for pivoting said back and head rest portion relative to said seat and leg rest portion.

This invention relates to new and useful improvements in reclining chairs, and has particular reference to a reclining chair intended primarily for use as a dental chair, although it will be readily apparent that its use is not restricted to this application.

Most dental chairs, in addition to being adjustable in height, may also be reclined, for the convenience of the dentist by providing convenient access to the patient occupying the chair. Most commonly, the reclining motion is provided by tilting the entire chair about an axis adjacent the juncture of the seat and back rest portions thereof, or, as in a barber chair, tilting the back rest rearwardly and the leg or foot rest forwardly and upwardly with respect to the seat, which remains stationary. When reclining the chair in either of these manners, it has been commonly observed that the patient suffers a sensation of "falling" or "loss of balance." Since dental patients are commonly very tense and nervous anyway, the added trauma caused by the sensation of falling sometimes has highly undesirable results in the nature of extreme tension, nausea, and the like. It is always desirable from the dentist's point of view, that the patient remain as calm and relaxed as possible.

I have found through extensive experimentation, however, that if a chair is reclined in such a manner that the occupant's feet remain at substantially the same elevation throughout the movement, preferably also without flexure of his hip and knee joints, the falling sensation which otherwise would occur in many instances is greatly reduced and in most cases entirely eliminated, so that the occupant will remain relaxed even if he does not know in advance that the chair is to be reclined. My invention takes advantage of this discovery.

The principal object of the present invention, accordingly, is the provision of a reclining chair wherein the reclining movement may be accomplished without appreciable change of the vertical elevation of the occupant's feet, by virtue of the fact that the entire chair may be tilted about a horizontal transverse axis adjacent the foot end thereof.

Another object is the provision of a reclining chair of the character described having an integral seat and leg rest portion pivoted to a frame on a horizontal transverse axis adjacent the foot end thereof, an integral back and head rest section pivoted to said seat and leg rest, also on a horizontal transverse axis, and independently operable means for pivoting said seat and leg rest section relative to said frame, and for pivoting said back and head rest section relative to said seat and leg rest section.

Other objects are simplicity and economy of construction, efficiency and dependability of operation, and adaptability for use in a wide variety of applications.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the accompanying drawing wherein:

FIG. 1 is a side elevational view of a reclining chair embodying the present invention, showing the seat lowered and the back tilted forwardly,

FIG. 2 is a view similar to FIG. 1, but showing the seat elevated and the back reclined,

FIG. 3 is a sectional view taken on line III—III of FIG. 1, and

FIG. 4 is a sectional view taken on line IV—IV of FIG. 1.

Like reference numerals apply to similar parts throughout the several views, and the numeral **2** applies generally to a floor-supported base or frame constructed of angle iron and being substantially rectilinear in form, and including a pair of rear standards **4**, a corresponding pair of front standards **6**, and a side bar **8** extending from the upper end of each front standard **6** to a point spaced below the top end of the corresponding rear standard **4**. Affixed to the upper end of each rear standard **4** is a cradle support **10**. Also, base **2** is provided with a rearward, floor-engaging extension **12** to give said base added stability against rearward tilting.

There is provided a combined seat and leg rest **14** including a seat rest **16** and a leg rest **18**, said seat and leg rests being disposed at an obtuse angle to each other and being integral with each other. Essentially, said seat and leg rest constitutes a relatively thin rigid backing plate **20** having its upper surface covered with suitable padding and upholstery **22**. The backing plate **20** of the seat and leg rest is pivoted to the upper ends of front base standards **6** by hinge **24**, said hinge being horizontal and transverse to the chair, and being disposed adjacent the front end of the seat and leg rest. When the rearward end of the seat and leg rest is otherwise unsupported, it rests by gravity in the cradle supports **10** of rear base standards **4**, as shown in FIG. 1.

There is also provided a back and head rest **26** having a contoured back rest **28** and head rest **30**, the back and head rests being integral, having a rigid backing plate **32** covered by padding and upholstery **34**. The lower edge of back section **28** is pivoted to the rearward edge of seat rest **16** by hinge **36**, hinge **36** being parallel to hinge **24**.

Affixed to the backing plate **32** of the back and head rest, adjacent the lower edge thereof, is a downwardly extending bracket **38**. To the lower end of said bracket the extended end of a piston rod **40** is pivoted at **42**. Said piston rod extends forwardly from said pivot, being affixed at its opposite end to a piston **44** operably mounted in a hydraulic cylinder **46**, which is in turn pivoted at **48** to a bracket **50** affixed to the backing plate **20** of seat and leg rest **14**. Piston **46** is double-acting, being provided with hydraulic connections **52** and **54** at respectively opposite ends thereof, whereby the back and head rest may be pivoted with respect to the seat and leg rest. Hydraulic connections **52** and **54** are flexible and are connected to suitable pumping apparatus, not shown, which could be mounted in the space beneath the chair, or could be placed in another room if the mechanical noises of the pump motor etc. were considered likely to produce nervous tension in the occupant of the chair. The control valves for the hydraulic system, also not shown, could be mounted in a position accessible to the chair occupant if desired, but in the case of a dental chair would probably be mounted in some position accessible only to the dentist.

Seat and leg rest **14** may be pivoted on hinge **24** by means including a horizontal transverse shaft **56** journalled in bearings **58** mounted on side bars **8** of base

2, just forwardly of rear base standards 4. Affixed to each end of shaft 56 is a rearwardly extending crank 60, at the rearward end of which a peripherally grooved roller 62 is rotatably mounted, the roller axis being parallel to shaft 56. Each roller has rolling engagement in a longitudinal slot 64 formed in a track bar 66 which extends forwardly and rearwardly beneath the seat rest. Each end of each of said track bars is rigidly affixed to the lower end of a post 68 the upper end of which is affixed to backing plate 20 of the seat rest. Affixed to shaft 56, intermediate the ends thereof, is a downwardly extending crank 70. The lower end of said crank is pivoted, as at 72, to the extended end of a piston rod 74. The opposite end of said piston rod is affixed to a piston 76 operably mounted in a hydraulic cylinder 78 which is in turn pivoted at 80 to a bracket 82 affixed in the lower front portion of base 2. Cylinder 78 is double-acting, being provided with hydraulic connections 84 and 86 respectively at opposite ends thereof, whereby seat and leg rest 14 may be pivoted on hinge 24. Hydraulic connections 84 and 86 may be connected to the same hydraulic power unit as cylinder 46, although it will be understood that the controls for the two cylinders are separate in order that they may be operated independently of each other.

In use, it will be seen that when seat and leg rest is elevated to the position shown in FIG. 2, by extension of piston rod 74, and when back and head rest 26 is pivoted forwardly to the position relative to the seat and leg rest shown in FIG. 1, by extension of piston rod 40, the chair is in a substantially normal, upright position. Then, by retracting piston rod 74, the entire chair is pivoted as a unit about hinge 24 to the rearwardly inclined position shown in FIG. 1. Moreover, the reclining movement is accomplished without appreciable change in the vertical elevation of the occupant's feet. As previously discussed, this prevents in a large measure an sensation of falling or loss of balance which the occupant might otherwise experience, and this advantage is further enhanced by the fact that the occupant's hips and knees are not flexed during the reclining movement. Thus the occupant remains relaxed and does not tense or "cringe," which is extremely important particularly if the occupant is a dental patient. Back and head rest 26 may of course be still further reclined, as shown in FIG. 2, by retracting piston rod 40, if this is the position desired. Pivoting of the back rest relative to the seat rest should, however, be accomplished while the seat rest is stationary, so that the entire lower half of the occupant's body, as well as his feet, can remain stationary while the back rest pivots. This has been found to be a further aid in preserving the occupant's sense of equilibrium, and hence in preventing muscular tension. Cylinder 78 also provides means for adjusting the general elevation of the chair, as may be necessary for dental patients of varying heights, cylinder 46 then serving to provide the desired angle of inclination of the back rest at any elevation of the seat rest.

It will be seen that in order to permit the desired unitary movement of the chair about hinge 24, and at the same time providing for adequate vertical movement of the seat rest without excessive tilting thereof, and conversely to provide the desired degree of tilting of the seat without excessive vertical movement thereof, hinge 24 must be disposed well above the floor line. Experiment has shown that it should be approximately at the same elevation as the portion of the seat rest supporting the occupant's hips, when said seat rest is in its lowermost position, as illustrated in FIG. 1. This elevation of hinge 24 necessitates an obtuse angle between seat rest 16 and leg rest 18 as shown, and in an elevation of the occupant's legs. Thus the chair assumes the configuration of an ordinary "contour chair." This is considered to be highly desirable, since contour chairs are of course extremely comfortable and conducive to relaxation, and for this reason alone have been adapted in other dental chairs not possessing the operational advantages of the present chair.

It will be understood of course that only the basic operative portions of the chair are shown, and that it could be provided with arm rests and decorative panels enclosing base 2, whereby to provide an attractive, inviting piece of furniture. Further, nearly all of the drill hoses, vacuum hoses, and other dental instruments required by a dentist could be mounted on the rear surface of the back rest so as to be readily accessible to the dentist, but not visible to the patient. This would be further conducive to relaxation of the patient, as it would eliminate the equipment columns which usually stand adjacent a dental chair, these columns often being called "metal monsters" and constituting a definite psychological stumbling block to many dental patients.

While I have shown and described a specific embodiment of my invention, it will be readily apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention as defined by the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. A reclining chair comprising:
   (a) a floor-engaging base,
   (b) leg and seat rests constituting a unitary structure,
   (c) means connecting the lower end portion of said leg rest to said base for vertical pivotal movement,
   (d) back and head rests constituting a unitary structure,
   (e) means connecting the adjoining edges of said seat and back rests for relative pivotal movement on an axis parallel to the pivotal connection of said leg rest to said base,
   (f) a first operating means carried by said base and operable to pivot all of said rests about the pivotal connection of said leg rest to said base, and
   (g) a second operating means carried by said seat and leg rest structure and operable to pivot said back and head rest structure relative thereto.

2. A reclining chair as recited in claim 1 wherein said first operating means comprises:
   (a) a pair of longitudinally slotted track bars affixed to said seat rest and disposed therebeneath to extend transversely to said pivotal connection,
   (b) a horizontal transverse shaft carried rotatably by said base,
   (c) a pair of cranks fixed to said shaft and extending therefrom respectively adjacent each of said track bars,
   (d) a roller rotatably mounted at the outer end of each of said cranks and engaged in the slot of the associated track bar for movement longitudinally of said slot,
   (e) a third crank affixed to said shaft, and
   (f) power means carried by said base and operable to oscillate said third crank.

3. A reclining chair as recited in claim 2 wherein said power means constitutes a hydraulic ram interconnecting said base and the free end of said third crank.

4. A reclining chair as recited in claim 1 wherein said first operating means is operable to pivot said seat and leg rest structure relative to said base.

5. A reclining chair as recited in claim 1 wherein said first operating means is operable to pivot said seat and leg rest structure relative to said base, and is operable independently of said second operating means.

6. A reclining chair as recited in claim 1 wherein said second operating means comprises:
   (a) a bracket arm affixed to said back and head rest structure, and
   (b) a hydraulic ram attached at one end to said seat and leg rest structure and connected at its opposite end to said bracket arm at a point spaced apart from the pivotal connection joining said seat and leg rest structure to said back and head rest structure.

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