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Stoll

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[54] **CHAIR**

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[51] **Int. Cl.** **A47c 1/036**

[58] **Field of Search** 297/325, 326, 316, 313, 312, 297/61, 114, 408, 355, 354, 391, 284

[56] **References Cited**

UNITED STATES PATENTS

242,733	6/1881	Yengling	297/61
804,784	11/1905	Von Eschen	297/408 X
2,947,352	8/1960	Schliephacke	297/61
3,446,532	5/1969	Cramer	297/313 X
3,533,658	10/1970	Gropp	297/355

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[57] **ABSTRACT**

Chair having tiltable rigidly interconnected seat and back portions with the front edge of the seat portion being tiltable during backward tilting movement towards an inclined position for an increased leg comfort and provided with a head support pivotally mounted to the top of the back portion together with means for automatically tilting the head support forwardly as the chair is moved towards a reclining position to maintain the head erect and means for selectively rendering the automatic head support rotating means inoperative.

9 Claims, 4 Drawing Figures

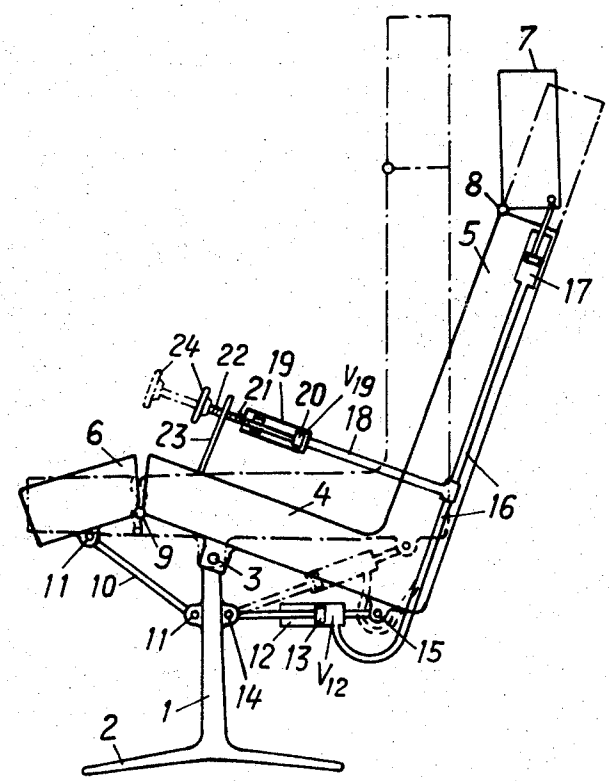


Fig. 1

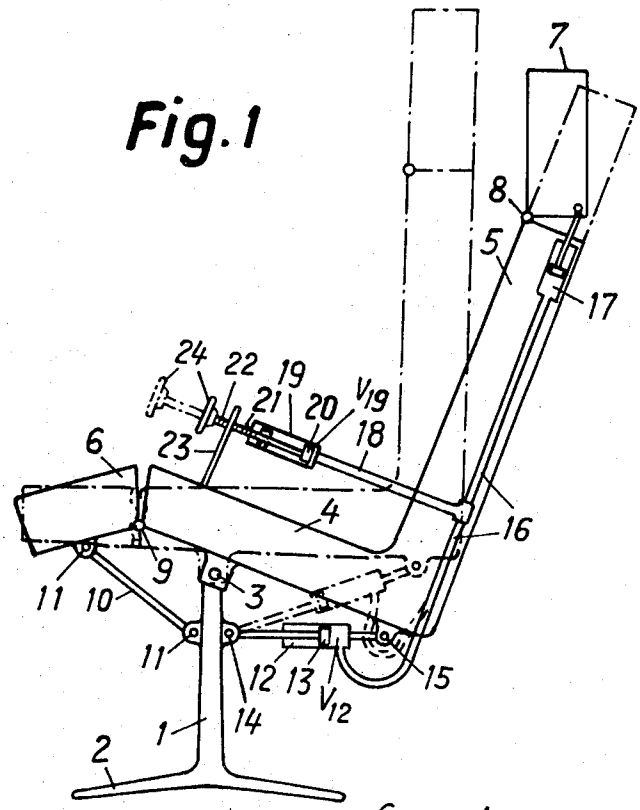


Fig. 2

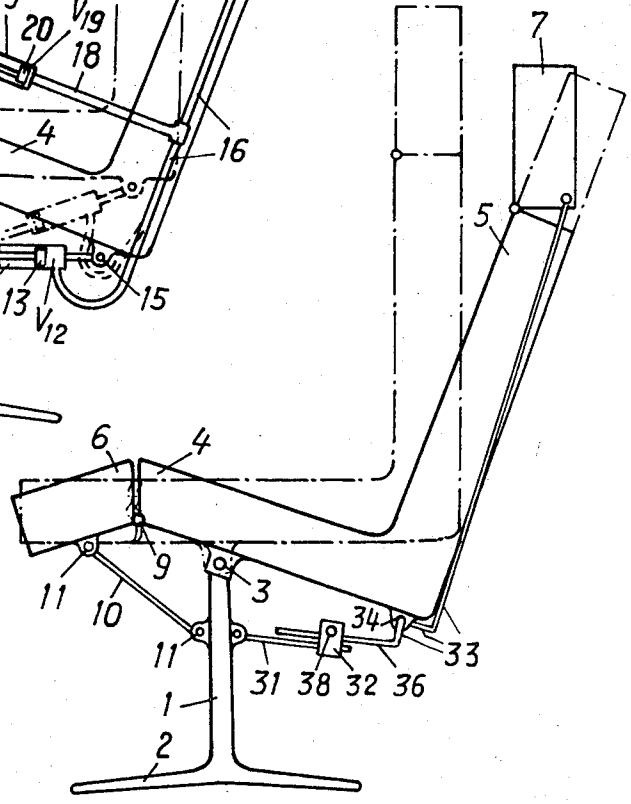


Fig. 3

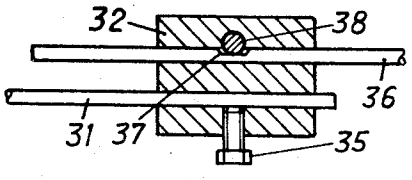
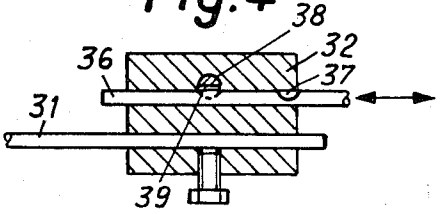


Fig. 4



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CHAIR

This invention relates to chairs and, more particularly, to tilting or reclining chairs.

Chairs are known having a seat and back support which can be tilted into an inclined or resting position about a horizontal axis disposed generally centrally under the seat as, for example, at the upper end portion of a pedestal comprising, for example, a generally vertically extending floor stand tube and a plurality of feet extending generally radially outwardly of the lower end portion thereof. In such an inclined or resting position the user of the chair can assume a reclined relaxed attitude and, therefore, such chairs may be referred to as lounge, reclining or relaxing chairs. Although such chairs offer good seating comforts, they still have certain disadvantages even when the back support is made sufficiently high as to support the head of the user. Namely, when such a chair is tilted back, the part of the back support which engages the head is inclined with the back support so that the user's head remains in alignment with his back so that if the user wishes, for example, to engage in conversation with another, watch television, read, or engage in substantially any other activity wherein he desires to have his line of sight approximately horizontal, he must lift his head off of the support and thereby lose the benefit of such support for his head. Further, when such chairs are tilted in the inclined position, the front edge of the seating surface is lifted. If the seat had been adjusted to a desired height while in the horizontal or working position, the legs of the user will be lifted off the floor by the tilting movement which again may lead to discomfort.

Tiltable chairs for specialized purposes are also known wherein back and/or leg support portions are tiltable or movable relative the seat portion to enable movement to a reclining position. Such specialized chairs may, for example, be surgical chairs which are used by doctors so that when a patient is sitting therein, actuation of some device such as an actuating lever or foot pedal causes the back support portion to be tilted completely backwards into a horizontal position while at the same time a leg support portion which may have been previously disposed vertically at the front edge of the seating portion is swung upwardly into the horizontal position lifting the legs of the patient to form a continuous horizontal surface on which the patient then lies; barbers' or beuticians' chairs in which the back support and a special head support mounted thereon can be moved into an inclined position to facilitate the work of the hairdresser or barber such as for facial massage, shaving, hair shampooing, and the like; and seats for motor vehicles where the back support may be adjusted for comfort in driving or to enable reclining. However, all such chairs embody adjusting means which require separate energy sources for their operations and in some cases, cannot even be actuated by the user himself.

Having in mind the foregoing, it is a primary object of the present invention to provide novel and improved tiltable chairs.

Another primary object of the present invention, in addition to the foregoing object, is the provision of such chairs which require no outside energy sources and which may be controlled by the user.

Still another primary object of the present invention, in addition to each of the foregoing objects, is the provision of tiltable chairs having a seat portion and a back portion rigidly interconnected and tiltable on a pedestal or support stand base having a head support portion tiltable relative the back support portion.

Yet another primary object of the present invention, in addition to each of the foregoing objects, is the provision of such tiltable chairs wherein the head support portion is automatically tilted during tilting of the seat and back portions to maintain the user's head generally erect and upright.

Another and further object of the present invention, in addition to each of the foregoing objects, is the provision of such chairs wherein such automatic head support tilting means may be manually controlled by the user.

Yet still another primary object of the present invention, in addition to the foregoing objects, is the provision of tiltable chairs having a front edge portion of the seat member tiltable relative thereto.

Another and yet still further primary object of the present invention, in addition to each of the foregoing objects, is the provision of such tiltable chairs wherein the front edge portion is automatically pivoted during tilting movement of the seat member.

The invention resides in the combination, construction, arrangement and disposition of the various component parts and elements incorporated in improved chairs constructed in accordance with the principles of this invention. The present invention will be better understood and objects and important features other than those specifically enumerated above will become apparent when consideration is given to the following details and description, which when taken in conjunction with the annexed drawing describes, discloses, illustrates and shows a preferred embodiment or modification of the present invention and what is presently considered and believed to be the best mode of practicing the principles thereof. Other embodiments or modifications may be suggested to those having the benefit of the teachings herein, and such other embodiments or modifications are intended to be reserved especially as they fall within the scope and spirit of the subjoined claims.

In the drawing:

FIG. 1 is a side elevational schematic illustration of an embodiment of a novel chair constructed in accordance with the present invention;

FIG. 2 is a view similar to FIG. 1 of another chair constructed in accordance with the present invention;

FIG. 3 is an enlarged cross-sectional illustration of a control member incorporated in the chair shown and illustrated in FIG. 2 in a first position of operation; and

FIG. 4 is a view similar to FIG. 3 showing the member in a second position of operation.

With reference now to the drawing, there is shown and illustrated two chairs constructed in accordance with the present invention having a rigidly connected seat member and back support portion tiltably mounted on a support base or pedestal with the front edge portion of the seat member rotatable relative the seat member to provide a leg support portion and the upper end portion of the back support member is rotatable relative thereto to provide a head support

portion together with means for automatically rotating the leg support and head support portions during tilting movement of the seat and back members. In the chair shown and illustrated in FIG. 1 the automatic control means for the head support portion comprises an hydraulic system and in the chair shown and illustrated in FIG. 2 the head support control means comprises a mechanical linkage.

The chair in accordance with the present invention may comprise a floor stand or pedestal having a generally vertically extending stand tube 1 and a plurality of feet 2 projecting generally radially from the lower end portion thereof and a generally horizontally extending shaft or pin 3 carried by the upper end portion thereof to tiltably support a seat member 4 which may be rigidly attached generally perpendicularly to a back support portion 5. Hence, the seat member 4 and back support 5 may tilt about the shaft 3. A front portion 6 may be pivotally mounted on the seat member 4 to form, in the horizontal or working position of the seat member, an enlargement of the total seating surface. An upper end portion 7 is pivotally mounted on the back support 5 so as to define a head support member which, when the seat member 4 is in the horizontal or working position will be in general alignment with the back portion 5 so that the head support portion 7 and the back support portion 5 extend generally vertically. Horizontal shafts or hinge pins 8 and 9 may be provided to pivotally secure the head support portion 7 and the front edge portion 6 with the back member 5 and the seat member 4, respectively, while enabling the head support portion 7 to tilt generally forwardly of the back support member 5 and the seat front portion 6 to tilt generally downwardly of the seat member 4.

A tie rod 10 may be provided pivotally mounted at each end thereof with the stand tube 1 and front member 6, as by means of pivot pins and lugs 11, as shown, so that upon backward tilting movement of the seat member 4 and back member 5 away from the upright or working position shown in phantom to a reclining position, shown in solid lines, the front portion 6 will be tilted downwardly from the seat member 4 to enable the user's legs to remain on the floor. The head support portion 7, as heretofore pointed out, is preferably pivotally attached, as by means of the hinge pin 8, to the back support portion 5 so as to be tiltable forwardly thereof and, preferably, means are provided for automatically tilting the head support portion 7 forwardly of the back support member 5 during rearward tilting movement of the seat member 4 and back support portion 5 so that the head support portion 7 remains generally vertical, regardless of the position of the back member 5 so that the user's head remains erect and his eyes level.

The manner of working of this apparatus is as follows:

The seat member 4 and the back support 5 can be moved from the position illustrated by the phantom lines, which may be referred to as a working position and in which the seat member 4 together with the front member 6, as previously mentioned, may form an approximately horizontal seating surface, into an inclined position illustrated in full lines when a person sitting in the chair leans back. Hence, the spacing between the pin 9 of the front member 6 and the pin 11 joining the tie rod 10 with the stand tube 1 will be increased. At the same time, the spacing of the front member or portion 6 and the pin 11 connecting the tie rod 10 to the stand tube 1 is also increased. Additionally, the spacing of the front member 6 from this point is kept constant due to the tie rod 10 and therefore, it follows that the front member 6 must tilt forwardly relative to the seat member 4, as shown, and thereby assumes a forwardly inclined position. Hence, in contrast to conventional tilting chairs, the user's legs are not lifted but remain approximately in their usual position to provide a considerable improvement in comfort.

In an hydraulically controlled chair as shown and illustrated in FIG. 1, their may be located under the seating surface of the seat member 5 a first control device which may comprise a cylinder 12 and a piston 13 rotatably attached to a bearing 14 mounted with the stand tube 1. At the end portion thereof remote from the stand tube 1, the first control device may be pivotally mounted in an eye 15 carried or rigidly connected with the seat member 4 and which is preferably located at or adjacent the transmission or intersection between the seat member 4 and the back support 5 or, in other words, as remotely as possible from the axis of rotation defined by the pin 3. The control cylinder 12 may be connected through piping or tubing 16 to a cylinder 17 of a second control device which may be located uppermost in the back support 5 and which controls the head support member 7. A branch tubing or conduit 18 may be connected between the piping or tubing 16 and a cylinder 19 of a third control device. The piston 20 of the third control device may be provided with a piston rod 21 projecting generally forwardly from one end portion of the cylinder 19 and extending into a smooth threaded spindle 22 axially displaceable in a fixed mount 23 upon rotation, for example, by means of a hand wheel 24 so that upon rotation of the hand wheel, the piston will be axially moved within the cylinder 19.

Owing to the spacing of the eye 15 from the cylinder 12 of the first control device as a result of the tilting movement of the seat member 4, the first control cylinder 12 and the first control cylinder 14 move relative each other in such a manner that a volume (V12) of hydraulic fluid contained within the cylinder is reduced or forced outwardly through the pipe or tubing 16. This fluid, being essentially incompressable, is conducted, through the piping or tubing 16 to the cylinder 17 of the second control device positioned, for example, adjacent the upper end portion of the back support 5. The piston of the second control device may be connected with the head support member 7 at a point which is as far remote as possible from the pivot axis defined by the horizontal pin 8 so as to turn the head support member relative the back support member in a rotary direction which is opposite the tilting movement of the back support or, in other words, generally forwardly thereof. By appropriate selection of the piston cylinder diameters, and the turning radii of the seat member 4 relative the stand tube 1 and the head support portion 7 relative the back support portion 5, when the back support portion 5 is moved to any inclined position during the tilting movement, the head support member 7 will remain approximately in its

original vertical position. The head of the person sitting in the chair is thus supported in its relaxed position, which further increases the seating comfort. This position may be particularly pleasant when the user is engaged in a discussion with another individual, or is watching some display, such as television, reading a book, or the like, and may be conveniently referred to as "discussion position."

When the chair is operated as set forth above, the piston **20** of the third control cylinder **19** should preferably be located in an end position in which the volume (V19) of the fluid contained in the cylinder is a minimum. However, by rotating the hand wheel **24** and the resultant movement of the screw threaded spindle **22** relative the fixed mounting point **23**, the piston **20** of the third control cylinder may be moved towards the other end of the cylinder. Owing to the resultant increase of the volume forwardly of the piston **20** within the cylinder **19**, fluid is withdrawn from the piping system **16** and **18**. If the back support member **5** is already located in the tilted position, the required quantity of fluid can only be derived from the cylinder **17**. Therefore, the piston of this cylinder moves downwardly and the head support member **17** rotates backwardly until it forms a continuous generally flat surface with the back support member **5**. This third position of the head support is shown by phantom lines and enables the chair to be used for complete relaxation or reclining and may, therefore, be referred to as a "resting position."

It should be noted that in this case the hand wheel **24** need not necessarily be adjusted after the chair has been tilted back but, in fact, it can be adjusted even while the chair is in a "working position." During tilting, the fluid from the cylinder **12** would not then flow into the cylinder **17**, but would flow directly through the branch pipe **18** into the cylinder **19**. Means may also be provided for preventing the creation of a vacuum within the hydraulic system as, for example, by the third control device being constructed and arranged that the screw threaded spindle **22** acts as an adjustable stop for the piston **20**, rather than being rigidly connected thereto so that, upon withdrawal of the spindle **22** or movement thereof forwardly of the cylinder **19**, the piston **20** will only move forwardly if pressure is applied to the hydraulic fluid from elsewhere in the system, as by the head support member **7** being tilted forwardly, against gravity or other biasing, whereupon the piston **20** will move forwardly until stopped by the spindle **22**. The head support member **7** therefore may remain unchanged in its position relative the back support **5** and tilt back together with the latter. The user is, therefore, at liberty to connect or disconnect, as desired, the automatic control of the head support member **7**. If, on the other hand, a change is to be made from the resting position to the discussion position it is sufficient to screw the hand wheel **24** in again. Thereby, fluid will be displaced from the cylinder **19** and flow into the cylinder **17** to cause the piston thereof to be displaced upwardly and the head support member **7** be moved into the vertical position.

The various component parts and elements of the hydraulic system, including the control devices and the piping or tubing **16** and **18** may conveniently be embedded and hidden in the seat and the pipes may be led to any desired location to enable the hand wheel **24** to be disposed at a location which is as convenient as possible to the sitting person, for example, in or on the arm rest (not illustrated).

With reference now to FIG. **2**, there is shown and illustrated a mechanical control which operates similarly in principle. The control of the front member **6** may be the same as previously discussed. For the head support **7**, a bell crank lever system may be provided which is generally referred to by the reference character **30** and which may comprise a push rod **31** which may be pivotally attached to the stand tube **1**, a slider casing **32**, the purpose of which will be explained below, and a linkage **33** which may comprise, in turn, a plurality of rods, levers and bearings, and which may be pivotally connected to the seat member **4** at a point **34** and which extends to the head support member **7**. The push rod **31** may be secured in the casing **32** by means of an adjusting screw **35** for enabling, for example, compensation of manufacturing tolerances, and a rod **36** of the linkage **33** may be slidably mounted in the slider casing **32**.

To enable selective operation of the head support member control, the rod **36** may be provided with a recess **37** and a transverse rod **38** may be disposed generally perpendicular to the longitudinal axis of the rod **36** and be slidably mounted in the slider casing **32** to engage the recess **37**, as shown in FIG. **3**, and thereby prevent movement of the linkage **33** relative the slider casing **32** and thus, relative the push rod **31**. During tilting movement of the chair and the ensuing change of spacing of the point **34** from the stand tube **1**, the linkage **33** is shifted to displace the head support member **7** relative the back support **5**, as indicated in FIG. **2**, in such a manner that the chair may assume the previously mentioned "discussion position." In order to render the control ineffective when so desired, the transverse rod **38** may also be provided with a recess **39** which may be so dimensioned that the transverse rod **38** remains outside the profile of the rod **36**, as shown in FIG. **4** so that the latter is no longer impeded and can be displaced freely relative the casing **32**. In a tilting movement the linkage **33** is, therefore, no longer driven by the slider casing **32** and remains unchanged relative the seat member **4** and the back support **5**. The head support member **7**, therefore, may tilt back together with the back support **5** directly into the resting position.

The transverse rod **38** may be displaceably or slidably mounted below the seat member **4** in any suitable manner and may project laterally thereof to such an extent that it can be reached easily by the user of the chair. Suitable stops (not shown) may be provided in order to move the recess **39** into the correct position relative the rod **36**.

While the invention has been described, disclosed, illustrated and shown in terms of certain embodiments or modifications which it has assumed in practice, the scope of the invention should not be deemed to be limited by the precise embodiments or modifications herein described, disclosed, illustrated or shown, such other embodiments or modifications as may be suggested to those having the benefit of the teachings herein being intended to be reserved especially as they fall within the scope and breadth of the claims here appended.

What is claimed is:

1. Tilting chair comprising, in combination, a seat member, a back support structure associated therewith so as to extend generally vertically when said seat member is disposed in a generally horizontal position, means for supporting said seat member, means for enabling said back support to be tilted generally backwardly from a generally vertical working position to a generally rearwardly inclined position when a person seated therein leans backwardly, a head support member disposed generally adjacent the upper end portion of said back support and mounted for tilting movement relative thereto about a generally horizontally extending axis between a first position in general alignment therewith and a second position tilted generally forwardly relative thereto, means for automatically moving said head support away from said first position and towards said second position during rearward tilting movement of said back support so that said head support remains substantially vertical at all times comprising, in turn, first hydraulic control means structurally and operatively connected between said back support and said support means for containing a volume of hydraulic fluid therein which decreases upon a rearward tilting movement of said back support relative said support means, second hydraulic control means structurally and operatively connected between said head support and said back support for tilting said head support generally forwardly relative said back support upon the addition of hydraulic fluid thereto and conduit means interconnecting said first and second hydraulic control means so that fluid displaced outwardly of said first hydraulic control means during backward tilting movement of said head support will enter said second hydraulic control means to provide a similar forward tilting movement of said head support together with disabling means located for convenient operation by such seated person for disabling said means for automatically moving said head support to enable said head support to remain in general alignment with said back support at the option of such seated person even when reclining, comprising, in turn, means for diverting such displaced fluid from flow into said second hydraulic control means.

2. Chair defined in claim 1 wherein said seat member and said back support are generally rigidly interconnected substantially perpendicular one another, said support means comprises a support stand and said first control means comprises a variable volume fluid pump connected between said support stand and said rigidly interconnecting seat member and back support.

3. Chair defined in claim 1 wherein said diverting means comprises manually operable hydraulic control means having a manually selectable volume operatively connected with said conduit means for selectively diverting hydraulic fluid therefrom so that the automatic tilting action of the head support is disabled to enable manual positioning thereof.

4. Chair defined in claim 3 wherein each of said hydraulic control means comprises a piston-cylinder arrangement.

5. Chair defined in claim 4 wherein said back support and said seat member are rigidly interconnected in generally perpendicular relationship and wherein said first control means is pivotally mounted with said seat member generally adjacent the rearward extent thereof.

6. Tilting chair comprising, in combination, a seat member, a back support structurally associated therewith so as to extend generally vertically when said seat member is disposed in a generally horizontal position, means for supporting said seat member, means for enabling said back support to be tilted generally backwardly from a generally vertical working position to a generally rearwardly inclined position when a person seated therein leans backwardly, a head support member disposed generally adjacent the upper end portion of said back support and mounted for tilting movement relative thereto about a generally horizontally extending axis between a first position in general alignment therewith and a second position tilted generally forwardly relative thereto, a bell crank pivotally mounted with said back support and having two arms extending generally outwardly perpendicular the pivotal axis in angularly spaced apart relationship, first linkage means extending between one arm of said bell crank and said support means for rotating said bell crank during rearward tilting movement of said back support, second level means extending between the other arm of said bell crank and said head support for tilting said head support upon rotation of said bell crank so that said head support tilts forwardly during rearward tilting movement of said back support and thereby remains generally vertical in all positions of said back support, at least one of said linkage systems comprising a pair of linkage rods disposed in generally parallel adjacent overlapping relationship and a slider casing structurally associated with one of said pair of rods provided with an aperture through which the other of said pair of rods extends, said other of said pair of rods being provided with a first recess generally perpendicular the axis thereof at a location whereat it will be in the confines of a slider casing when said back support is in its upright position and said head support is in alignment therewith and a manually movable transverse control rod extending slidably through said coupler intersecting said aperture so as to engage said first recess to preclude relative movement between said casing and said other one of said rods for selectively locking said parallel rods for generally axial movement as a unit enabling automatic tilting of said head support, said transverse control rod being provided with a mating recess for selective alignment with said other of said rods and movement of said other rod therepast to enable sliding movement of said other rod when said mating recess is positioned to intersect said aperture, so that said head support may move independently of said back support.

7. In a chair having a back support portion movable between generally upright and reclining positions, a head support portion tiltably carried by said back support portion adjacent an upper end portion thereof for movement therewith and means for tilting said head support portion relative said back support portion when said back support portion is in a reclining position between a generally upright position and a position in general alignment with said back support portion; control means positioned for operation by an occupant of said chair for selectively controlling the angular relationship of said head support portion relative said back support portion enabling such occupant to select between an upright position of said headrest portion angularly disposed relative said back support portion

and an aligned position of said head support portion relative said back support portion when the back support portion is in the reclining position thereof, for automatically moving said head support portion away from said aligned position and towards said upright position during rearward tilting movement of said back support portion so that said head support portion remains substantially vertical at all times and for selectively precluding such automatic movement and comprising, in turn, first hydraulic control means structurally and operatively connected between said back support and said support stand for containing a volume of hydraulic fluid therein which decreases upon rearward tilting movement of said back support relative said support stand, second hydraulic control means structurally and operatively connected between said head support and said back support for tilting said head support generally forwardly of said back support upon the addition of hydraulic fluid thereto, conduit means interconnecting said first and second hydraulic control means so that fluid displaced outwardly of said first hydraulic control means during said rearward tilting movement of said back support will enter said second hydraulic control means to provide a similar forward tilting movement of said head support and manually operable hydraulic control means connected with said conduit having a manually selectable volume operatively connected with said conduit means for selectively diverting hydraulic fluid therefrom so that the automatic tilting action of the head support is disabled to enable manual positioning thereof.

8. Chair defined in claim 7 wherein each of said hydraulic control means comprises a piston-cylinder arrangement.

9. In a chair having a seat support carried by a support stand, a back support portion movable between generally upright and reclining positions, a head support portion tiltably carried by said back support portion adjacent an upper end portion of said back support portion for movement therewith and means for tilting said head support portion relative said back support portion when said back support portion is in a reclining position between a generally upright position and a position in general alignment with said back support portion; control means positioned for operation by occupant of said chair for selectively controlling the angular relationship of said head support portion relative said back support portion enabling such occupant to select between an upright position of said headrest portion angularly disposed relative said back support portion in an aligned position of said head support portion relative said back support portion when the back support portion is in the reclining position thereof and automatically moving said head support portion away from said aligned position and towards said upright position during rearward tilting movement of said back support portion so that said head support portion remains substantially vertical at all times and for disabling such automatic movement comprising a bell crank and link system comprising, in turn, a bell crank pivotally mounted with said back support and having two arms extending generally outwardly perpendicular the pivotal axis in angularly spaced apart relationship, first linkage means extending between one arm of said bell crank and said support stand for rotating said bell crank during rearward tilting movement of said back support, second lever means extending between the other arm of said bell crank and said head support for tilting said head support upon rotation of said bell crank so that said head support tilts forwardly during rearward tilting of said back support and thereby remains generally vertical in all positions of said back support, at least two linkage rods of said bell crank and linkage system being disposed in generally parallel adjacent overlapping relationship and a slider casing structurally associated with one of said rods provided within aperture through which the other of said rods extends, said other of said rods being provided with a first recess generally perpendicular the axis thereof at a location whereat it will be within the confines of the slider casing when said back support is in its upright position and said head support is in alignment therewith and a transverse control rod extending slidably through said coupler intersecting said aperture so as to engage said first recess to preclude relative movement between said casing and said other one of said rods, said transverse rod being provided with a mating recess for enabling sliding movement of said other rod when said mating recess intersects said aperture.

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