United States Patent [19]

Good

[11] **3,923,280**

[45] **Dec. 2, 1975**

[54] **ADJUSTABLE SUPPORT COLUMN FOR A PIVOTAL CHAIR**

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[73] Assignee: **Harter Corporation,** Sturgis, Mich.

[22] Filed: **Mar. 21, 1975**

[21] Appl. No.: **560,580**

[52] **U.S. Cl.** **248/405;** 248/415; 297/347

[51] **Int. Cl.²** **F16M 13/00**

[58] **Field of Search** 248/405, 406, 161, 415; 297/347, 348; 108/141

[56] **References Cited**

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Assistant Examiner—Robert W. Gibson, Jr.
Attorney, Agent, or Firm—Hamilton, Renner & Kenner

[57] **ABSTRACT**

An adjustable support column for pivotally mounting the seat section of a chair to the base portion thereof. The nave of the base portion has an upwardly flared bore into which the lower, tapered end portion of a sheath tube is supportingly received. A thrust bearing is mounted inside the lower end portion of the sheath tube and rotatably supports an adjusting screw. The seat section has a conical spindle that is received within a conical socket at the upper end of the spindle tube. A bushing is fixed to the lower end portion of the spindle tube and is threaded onto the adjusting screw. The bearing and bushing are selected such that the bearing offers less resistance to relative rotation between the adjusting screw and the sheath tube than the bushing offers to relative rotation between the adjusting screw and the spindle tube. A knob means is attached to the adjusting screw exteriorily of the support column in order to afford a means by which to overcome the aforesaid resistance to relative rotation offered by the bushing in order to permit selective adjustment in the height of the seat section with respect to the base portion of the seat.

6 Claims, 4 Drawing Figures

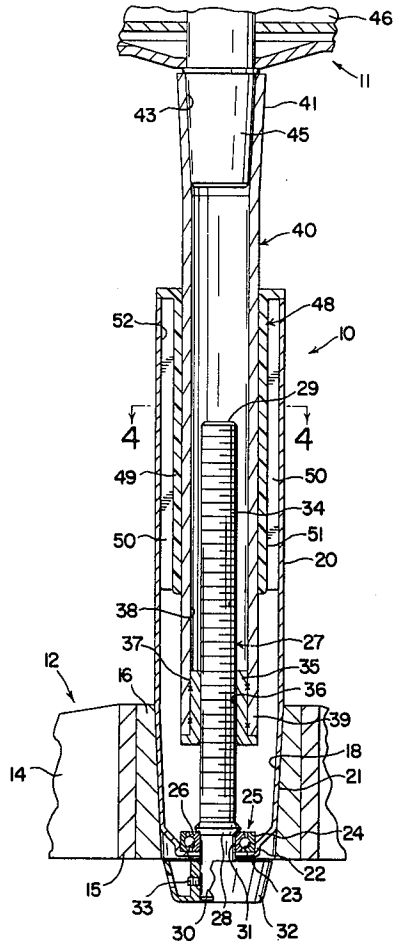
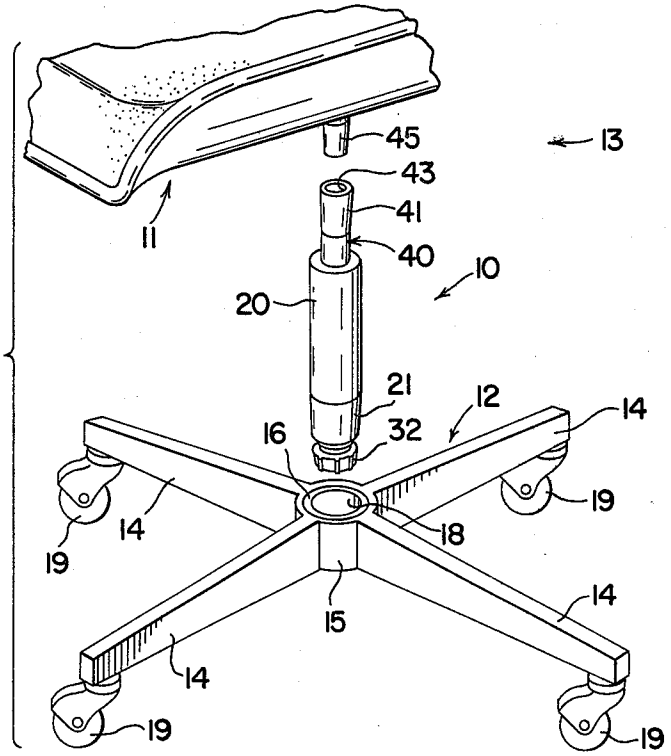


FIG. 1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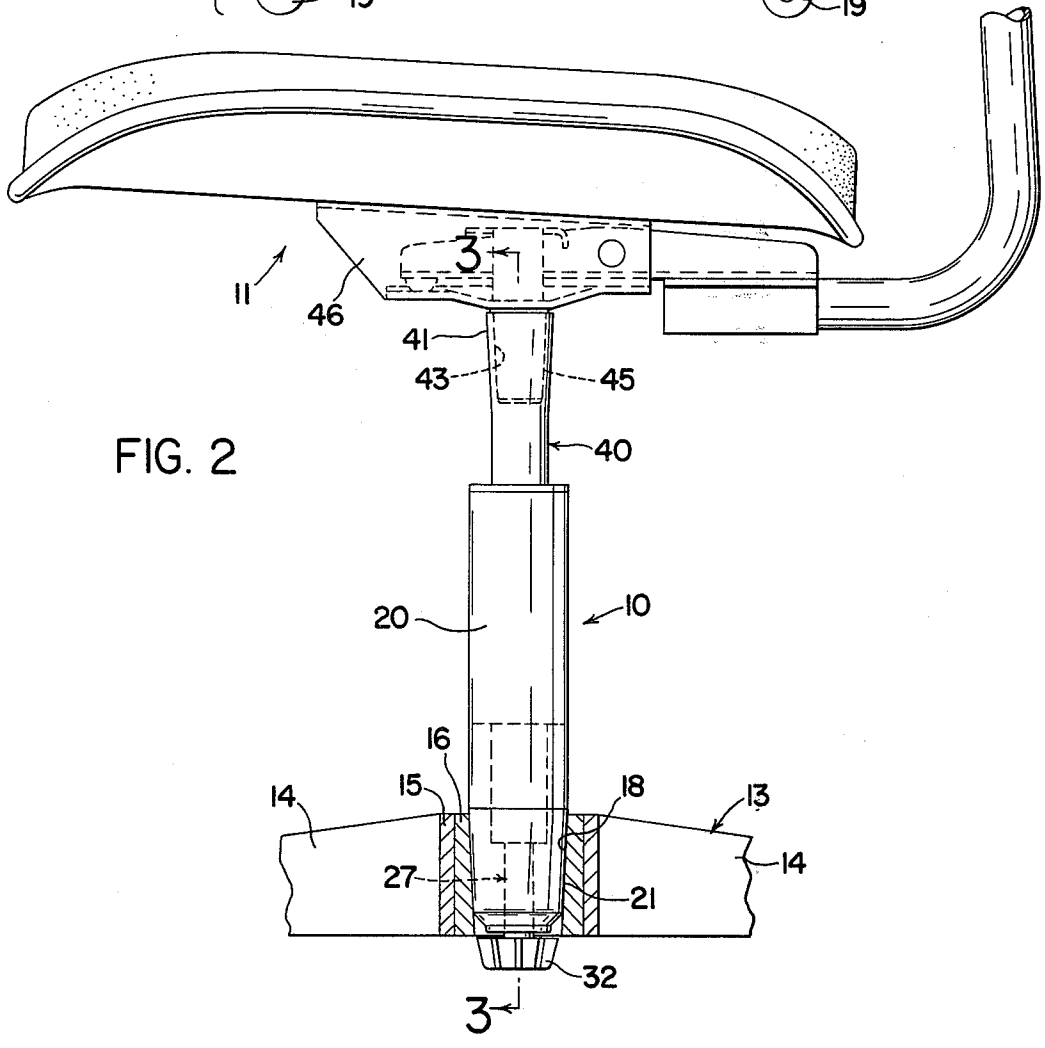
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FIG. 2

FIG. 3

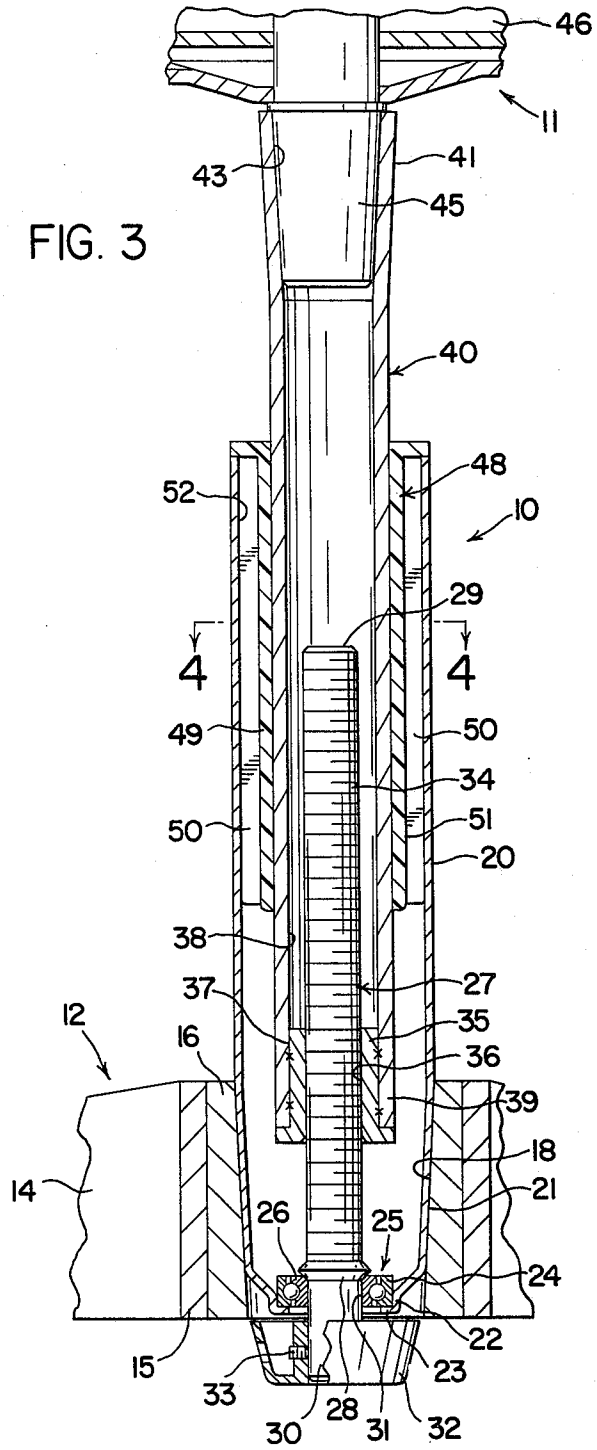
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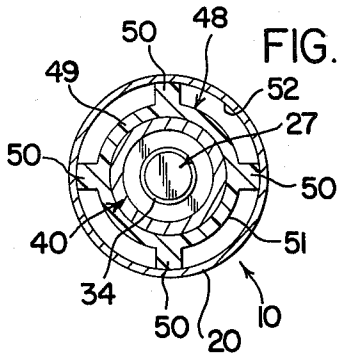
FIG. 4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ADJUSTABLE SUPPORT COLUMN FOR A PIVOTAL CHAIR

BACKGROUND OF THE INVENTION

The present invention relates generally to an adjustable support column for pivotally mounting the seat section of a chair to a base portion.

Historically, adjustment in the height of a seat has been accomplished by the use of a threaded spindle that becomes progressively exposed as the seat is raised by threading the spindle upwardly out of the bell nut and hub tube.

In response to considerations of: improving the operating efficiency (by shielding the threaded portion of the spindle from deleterious dust and dirt); providing an aesthetically improved appearance (by shielding the threaded spindle from view); and, maintaining cleanliness (by shielding the person using the chair, and his or her clothes, from the lubricant employed on the threaded spindle), various types of cover assemblies and concomitant mechanisms for permitting selective height adjustability have been provided.

One approach has necessitated the incorporation of a special connection between the seat section of the chair and the threaded spindle — often by inserting a pivot therebetween in order to permit the seat section to be rotated without effecting an adjustment in the height of the seat.

Another approach has necessitated some physical connection between the cover assembly and the adjusting mechanism hidden thereby. But irrespective of the approach, the structure has generally required the use of an axially slotted adjusting screw and a J-washer to determine rotation between the adjusting screw and various other parts of the height adjusting mechanism, as required selectively to adjust the height of the seat section with respect to the base portion.

Moreover, the more complex the structure of the support column becomes to effect the desired objectives of providing an efficient, aesthetic and clean height adjusting column, the more tedious and expensive it becomes to manufacture and maintain the support column.

SUMMARY OF THE INVENTION

It is, therefore, a primary object of the present invention to provide an improved support column for pivotally mounting the seat section of a chair to the base portion.

It is another object of the present invention to provide an improved support column, as above, which employs an adjusting screw that does not need to be longitudinally slotted and which does not employ the customary J-washer.

It is yet another object of the present invention to provide an improved support column, as above, that can be completely assembled and disassembled with facility, thereby allowing the chair to occupy the minimum volume of space for shipment in its knocked-down state and to be assembled at the point of use without the need for tools.

It is a further object of the present invention to provide an improved support column, as above, which can, because of the facility with which it can be assembled and disassembled, be readily converted from a high base to a low base chair, or vice versa.

It is a still further object of the present invention to provide an improved support column, as above, in which the threaded adjusting screw is shielded from view and no lubricant is required on the adjusting screw itself.

It is an even further object of the present invention to provide an improved support column, as above, that is not only uncomplicated but relatively inexpensive to manufacture and maintain.

These and other objects, together with the advantages thereof over existing and prior art forms which will become apparent from the following specification, are accomplished by means hereinafter described and claimed.

In general, a chair embodying the concept of the present invention has a base portion comprising a plurality of legs radiating from the nave thereof. A collet with an upwardly flared bore is secured within the nave of the base portion supportingly to receive the conically tapered, lower end portion of a sheath tube. A thrust bearing is mounted interiorily of the sheath tube at its lower extremity, and the thrust bearing rotatably supports an adjusting screw.

A knob is presented from the end of the adjusting screw which, though axially fixed within the thrust bearing, extends downwardly through the thrust bearing to be accessible at a location immediately beneath the nave. Upwardly with respect to the thrust bearing the adjusting screw is threaded along substantially its entire length.

A tapered spindle is secured to the underside of the seat section and is received within a tapered socket in the upper end of the spindle tube. The spindle tube extends concentrically within the sheath tube, and an annular bushing is secured in the lower end portion of the spindle tube. The interior of the bushing is threaded to be received on the threaded portion of the adjusting screw. The bushing is fabricated so that the resistance to relative rotation between the adjusting screw and the spindle tube is greater than the resistance afforded by the thrust bearing against relative rotation of the adjusting screw with respect to the sheath tube. As such, the seat section may freely rotate with respect to the base portion of the chair without effecting any adjustment in the height of the chair. Yet, by rotating the seat section while grasping the knob to preclude rotation of the adjusting screw or by manipulating the knob to rotate the adjusting screw while holding the seat section against rotation, one can effect relative rotation between the adjusting screw and the spindle tube in order to adjust the height of the seat section with respect to the base portion.

One preferred embodiment of an adjusting support column for a pivotally mounted chair embodying the concept of the present invention is shown by way of example in the accompanying drawings without attempting to show all of the various forms and modifications in which the invention might be embodied; the invention being measured by the appended claims and not by the details of the specification.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a frontal-side perspective of a chair embodying the concept of the present invention, the seat section and the support column being exploded vertically with respect to the base portion in order to reveal

the interrelation of those components prior to field assembly;

FIG. 2 is an enlarged side elevation of a chair embodying the concept of the present invention, the seat section, support column and base portion being disposed in their normal operative position and the base being partially broken away to reveal the disposition of the support column with respect thereto;

FIG. 3 is a further enlarged vertical section taken substantially along line 3—3 of FIG. 2; and,

FIG. 4 is a horizontal section taken substantially along line 4—4 of FIG. 3.

DESCRIPTION OF A PREFERRED EMBODIMENT

A support column embodying the concept of the present invention is designated generally by the numeral **10** on the appended drawings and provides means for adjusting the height of a seat section **11** with respect to a base portion **12** in a chair **13.**

The base portion **12** may comprise a plurality of radially extending legs **14** that are conjoined at the nave **15** to support a collet **16** which extends vertically therethrough and which presents an upwardly flared bore **18.** The radially outer extremity of each leg **14** may be provided with casters **19,** as shown.

The support column **10** has an outer sheath, or casing, tube **20** the lower end portion of which is tapered, as at **21,** to be matingly received within and supported by the flared bore **18** in collet **16.** The lower extremity of the sheath tube **20** is directed radially inwardly to present an annular cavity **22** and an annular supporting flange **23,** the latter comprising the lower wall of cavity **22.** The supporting flange **23** should have substantial strength because it will be required to support the full weight of the seat section **11** and anyone or anything resting thereon.

A thrust bearing **25** is removably insertable within the cavity **22** accurately to position the thrust bearing **25,** and the stationary element **24** of the thrust bearing **25** is carried on the supporting flange **23.** An adjusting screw **27** is captured within the moving element **26** of the thrust bearing **25** to be rotatable therewith, and in order to assure a fixed vertical disposition of the adjusting screw **27** with respect to the thrust bearing **25,** one may preferably employ a positioning rib **28** that circumscribes the shaft **29** of the adjusting screw **27.** Although the cylindrical lower end portion **30** of the shart **29** is preferably press fit through the bore **31** of the moving element **26,** the positioning rib **28** maintains the desired relative vertical disposition of the adjusting screw **27** with respect to the thrust bearing **25** such that the cylindrical lower end portion **30** of the shaft **29** extends through the bearing **25** and teriminates below the collet **16** in order to permit a control knob **32** to be secured thereto, as by the set screw **33,** and to permit manual access to the knob **32** immediately beneath the nave **15.**

That portion of the shaft **29** which extends vertically upwardly of the positioning rib **28** is provided with external threads **34.** An annular bushing **35** is provided with internal threads **36** which allow the bushing **35** to be screwed onto and along the threads **34** of shaft **29.** The cylindrical outer surface **37** of the bushing **35** is secured within the cylindrical inner wall **38** at the lower end portion **39** of a spindle tube **40.**

The upper end portion **41** of the spindle tube **40** presents a flared socket **43** into which the tapered spindle **45** of the seat section **11** is supportingly received. As best seen in FIG. **2,** the spindle **45** is secured to rotate with the seat section by staking, press-fitting, or otherwise securing the spindle **45** to a chair control **46** presented from the underside of the seat section **11.**

A bearing liner **48** has an elongate, annular sleeve portion **49** that embraces the spindle tube **40.** A plurality of ribs **50** extend longitudinally along the outer surface **51** of the sleeve portion **49.** The ribs **50** project radially outwardly from the sleeve portion **49** to engage the radially inner wall **52** of the sheath tube **20** and thereby maintain the spindle tube **40** concentrically with respect to the sheath tube **20.** In order to minimize frictional resistance between the spindle tube **40** and the sleeve portion **49,** at least the sleeve portion **49** of the bearing liner **48** is preferably made of a self-lubricating plastic such as Zytel.

Before discussing the adjustable features of the chair **13** it should be appreciated that the tapered coupling arrangement by which the support column **10** is secured to the base portion **12** and the tapered coupling arrangement by which the seat section **11** is mounted on the support column **10** allow the three basic components of the chair to be assembled and disassembled with facility. This feature not only makes it quite easy to repair the chair but also permits the chair to be shipped disassembled and allows extremely rapid assembly without requiring any tools.

In addition, the component parts of the support column **10** may also be readily assembled and disassembled. For example, if one selects a thrust bearing unit **25** having a diameter less than the internal diameter of the sleeve portion **49** presented by the bearing liner **48,** the thrust bearing **25,** the adjusting screw **27** and the spindle tube **40** may, upon removal of the control knob **32,** be extracted as a unit upwardly through the liner **48.** This capability not only allows ready replacement of any parts within the support column **10** but also permits any chair to be changed from a low base to a high base, or vice versa, simply by providing substitute sheath tubes **20** and spindle tubes **40** of appropriate length. As should now be appreciated, these components can be interchanged with relative ease.

As depicted in FIG. **3,** the bushing **35** appears to have a greater axial extent and might initially appear to be required. Yet this protracted axial extent serves the very crucial functional purpose of providing more resistance to rotation between the bushing **35** and the adjusting screw **27** than exists between the stationary and moving elements **24** and **26,** respectively, of the thrust bearing **25.** Thus, irrespective of whether the chair is empty or filled, rotation of the seat section **11** with respect to the base portion **12** effects relative motion between the elements of the thrust bearing **25** rather than between the bushing **35** (non-rotatably secured to the spindle tube **40**) and the adjusting screw **27** so long as the control knob **32** is free to rotate. When, however, relative rotation occurs between the control knob **32** and the seat section **11,** the bushing **35** will travel along the threads **34** on the shaft **29** of the adjusting screw **27** to raise, or lower, the seat section **11** with respect to the base portion **12** — depending on the relative rotational direction between the adjusting screw **27** and the bushing **35.**

It should now be apparent that a pivotal chair employing an improved support column embodying the concept of the present invention can be readily assem-

bled and disassembled, is relatively uncomplicated and otherwise accomplishes the objects of the invention.

What is claimed is:

1. An adjustable support column for pivotally mounting the seat section of a chair to a base portion comprising: a sheath tube extending upwardly from the base portion; bearing means carried by said sheath tube; an adjusting screw supported by said bearing means for rotation relative to said sheath tube; knob means to control rotation of said adjusting screw; a spindle tube supporting the seat section extending downwardly therefrom; a bushing fastened to said spindle tube and threaded onto said adjusting screw to rotate with and with respect thereto; and, means to assure that the resistance to relative rotation between said bushing and said adjusting screw exceeds the resistance to relative rotation between said adjusting screw and said sheath tube.

2. An adjustable support column, as set forth in claim 1, in which said spindle tube is insertable axially within said sheath tube and means are provided slidably to support said spindle tube concentrically with respect to said sheath tube.

3. An adjustable support column, as set forth in claim 2, in which the lower end portion of said sheath tube is directed radially inwardly to present an annular cup and supporting flange, said bearing means being removably positioned within said cup and carried on said supporting flange.

4. An adjustable support column, as set forth in claim 3, in which said knob means is demountably secured to said adjusting screw and the diameter of said bearing means is of lesser dimension than the internal diameter of the means slidably to support said spindle tube concentrically with respect to said sheath tube.

5. An adjustable support column, as set forth in claim 1, in which said base portion comprises a plurality of leg members extending radially outwardly from a nave, a conically upwardly flared bore presented from said nave, the lower end portion of said sheath tube being conically tapered to be supportingly received within said flared bore.

6. An adjustable support column, as set forth in claim 1, in which a conically tapered spindle is secured to and extends downwardly from said seat section, a conically flared socket is presented from the upper end portion of said spindle tube, said spindle being supportingly received within said socket.

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