

[54] **FULLY ENCLOSED, ADJUSTABLE, SUPPORT COLUMN FOR A PIVOTAL CHAIR**

[75] Inventor: Gary L. Bowman, Sturgis, Mich.

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

[22] Filed: Oct. 31, 1973

[21] Appl. No.: 411,196

[52] U.S. Cl. 248/406, 108/142, 297/349

[51] Int. Cl. A47c 3/24

[58] Field of Search 248/405, 406, 161, 404, 248/399, 425, 418, 417, 422; 297/349; 108/142

[56] **References Cited**

UNITED STATES PATENTS

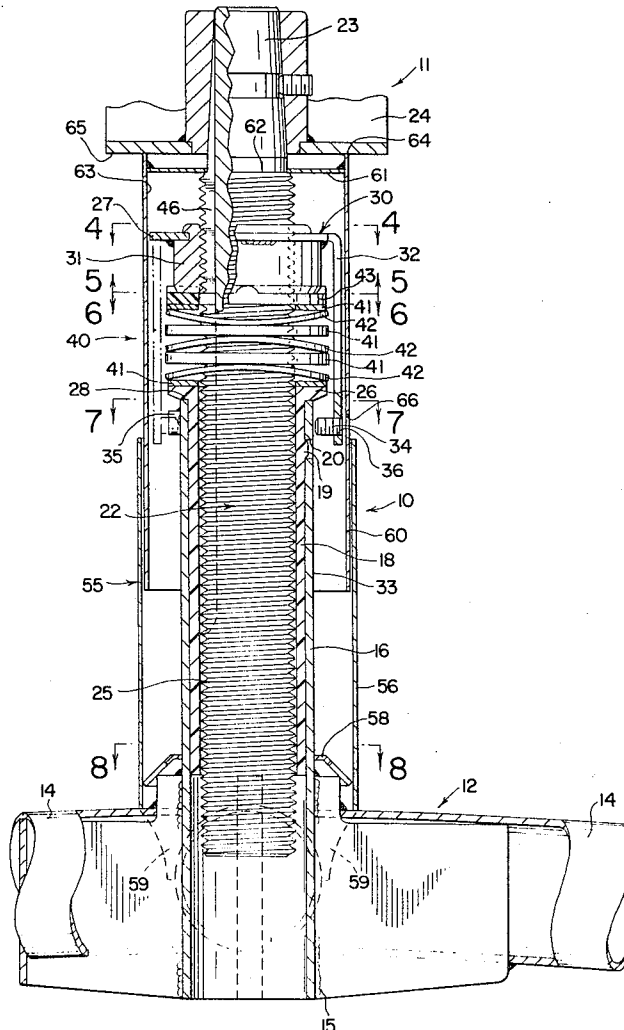
2,702,075	2/1955	Richards	248/405
2,704,113	3/1955	McKinley	248/406
2,764,223	9/1956	Michke	248/418
3,164,357	1/1965	Hage et al.	248/406
3,227,113	1/1966	Kupski	248/406 X
3,534,937	10/1970	Heinzel	248/406 X
3,599,924	8/1971	Schmidgall	248/418
3,606,234	9/1971	Prescott	248/406
3,727,871	4/1973	Harper	248/406

Primary Examiner—James T. McCall
Attorney, Agent, or Firm—Hamilton, Renner & Kenner

[57] **ABSTRACT**

A support column for a pivotal chair. The support column may be fully enclosed and yet permit selective adjustability in the height of the seat section above a base portion merely by rotation of the seat section. A threaded spindle is non-rotatably secured to, and extends downwardly from, the seat section to be received within a hub tube that extends upwardly from the base portion. An adjusting nut is threaded onto the spindle to control the axial extent to which the spindle is received within the hub tube and thereby regulate the height of the seat section above the base portion. A contact means presented from the adjusting nut engages a stop presented from the hub tube so that rotation of the seat section when the chair is not occupied effects relative rotation of the spindle with respect to the adjusting nut, thereby adjusting the height of the seat section. When the chair is occupied, however, the contact means will not engage the stop, and the seat section may be rotated without effecting any adjustment in the height thereof.

12 Claims, 10 Drawing Figures



PATENTED MAR 11 1975

SHEET 1 OF 4

3,870,271

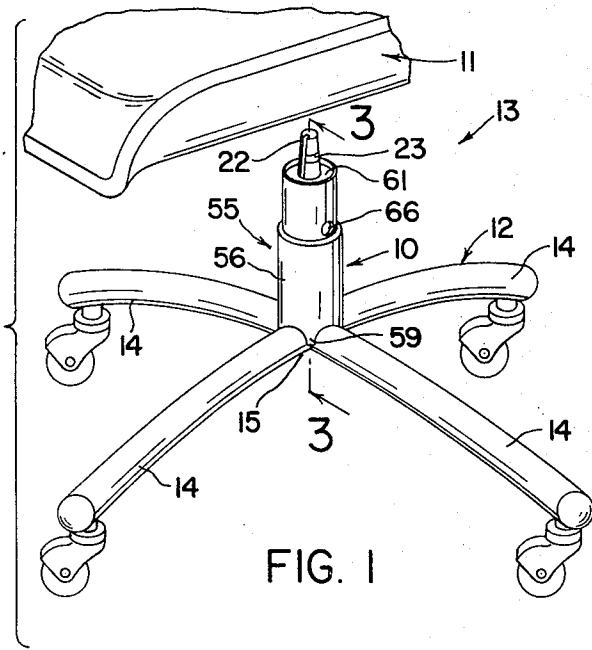


FIG. 1

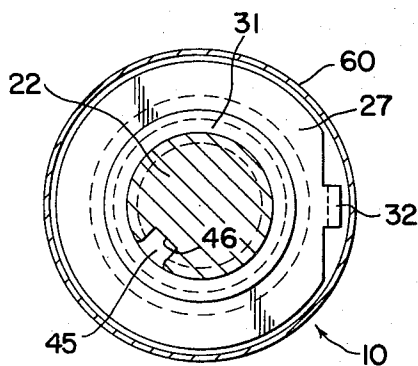


FIG. 4

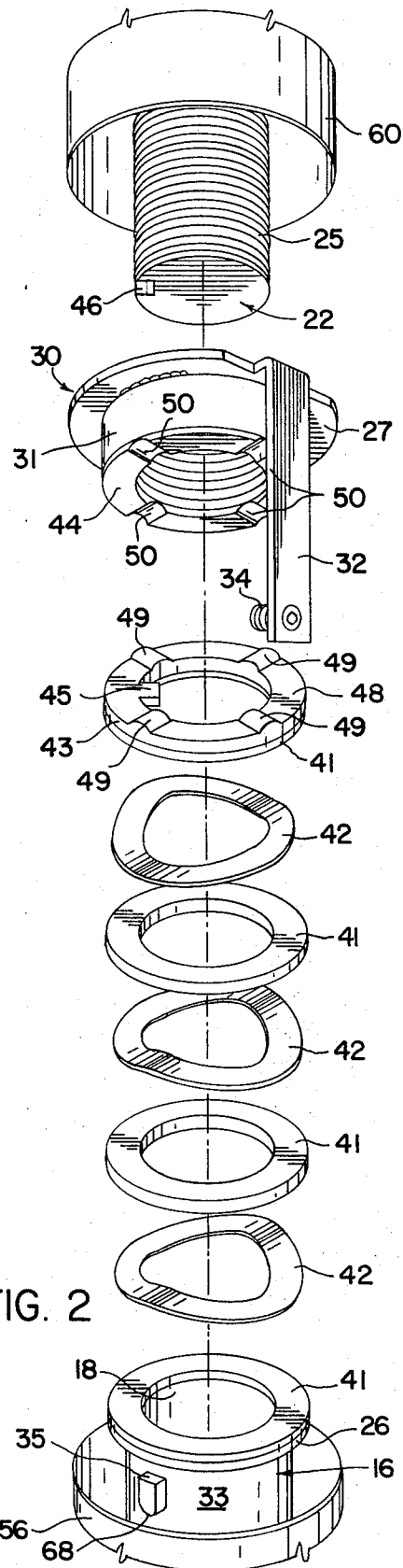


FIG. 2

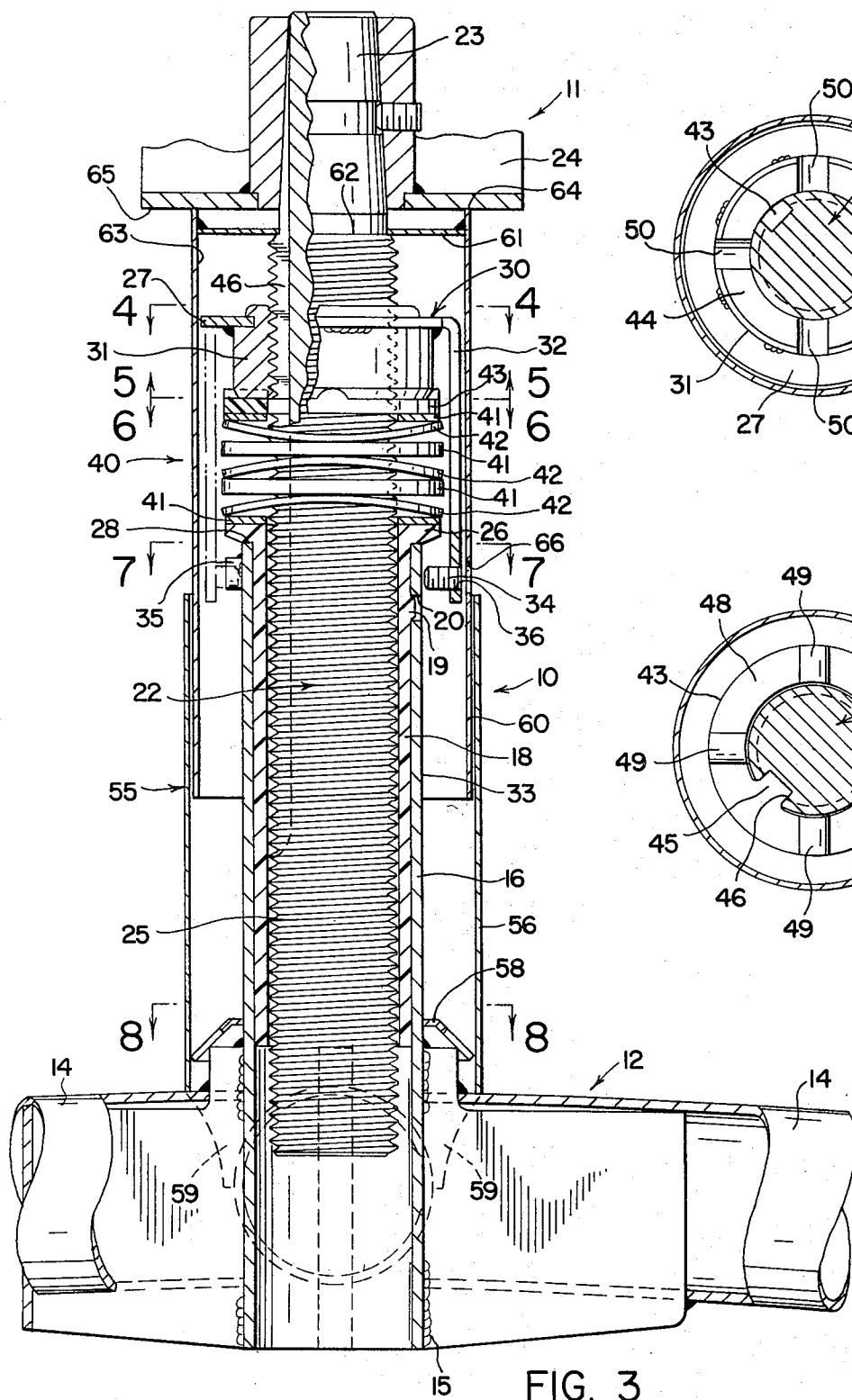
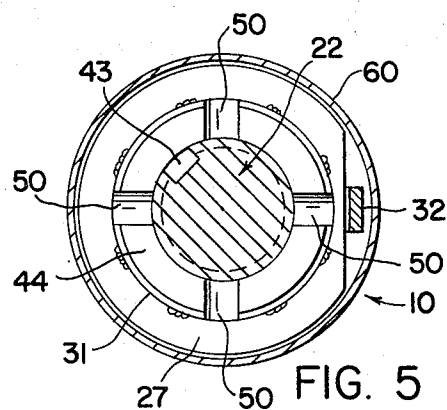
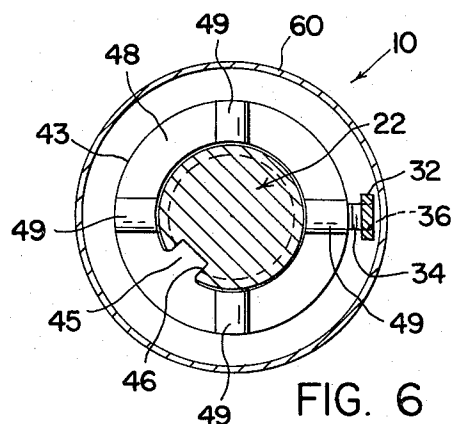


FIG. 9

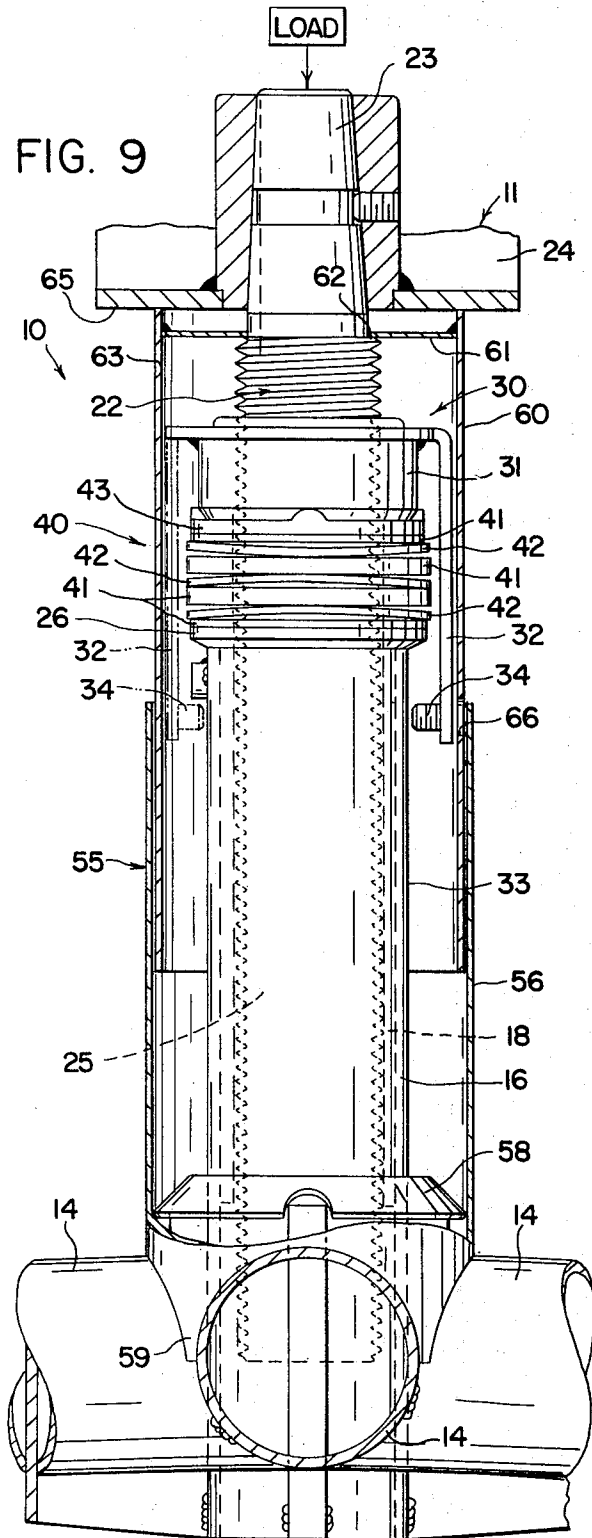
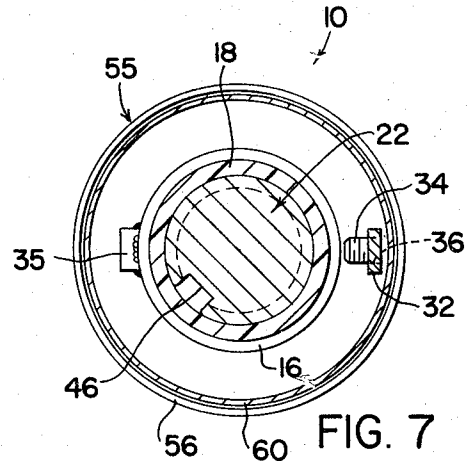


FIG. 7

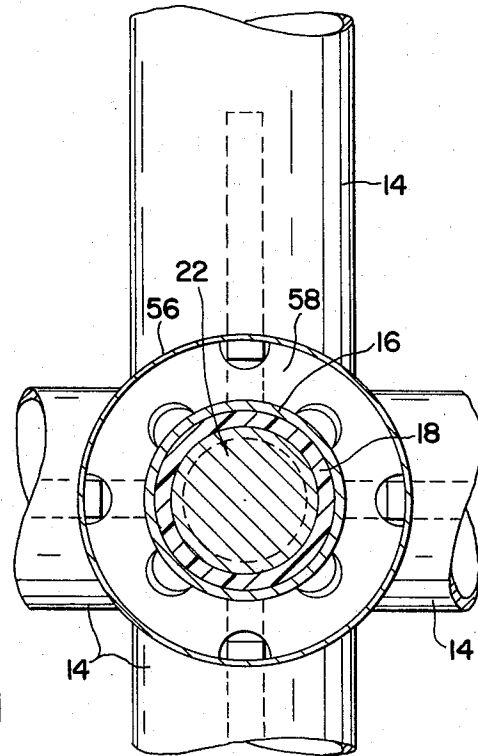
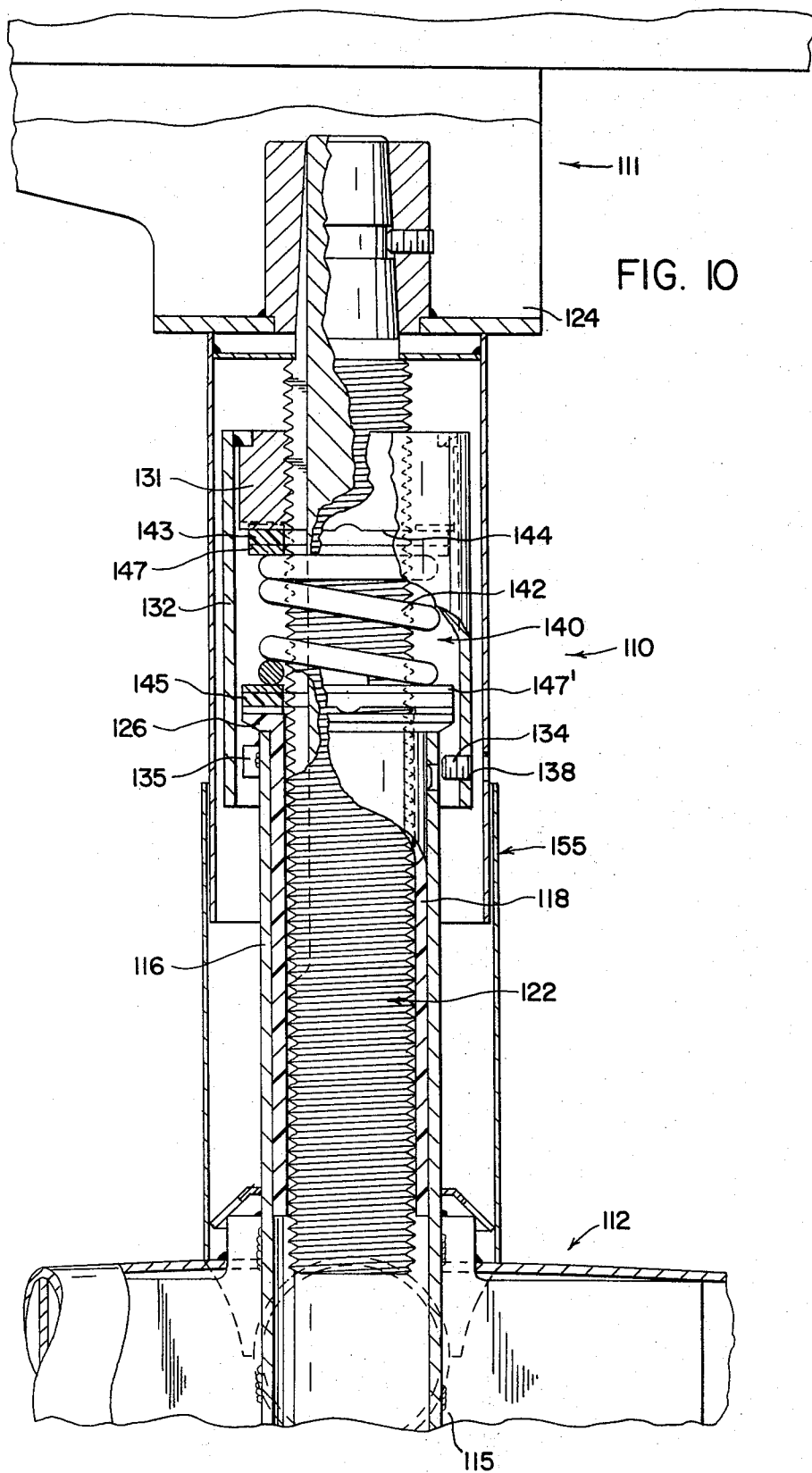


FIG. 8



FULLY ENCLOSED, 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 a 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. However, the prior known configurations have not been totally acceptable.

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 ability to raise and lower a pivotally mounted seat section simply by the convenient expedient of rotating the seat section has not heretofore been accomplished, and on the basis of the state to which the prior art has advanced, to provide such a result in conjunction with a cover arrangement has been considered well nigh impossible.

SUMMARY OF THE INVENTION

It is, therefore, a primary object of the present invention to provide a support column for pivotally mounting the seat section of a chair to a base, said support column affording height adjustability by rotation of the seat section with respect to the base portion.

It is another object of the present invention to provide a support column for a chair, as above, which is only adjustable when the seat section is not occupied.

It is a further object of the present invention to provide a column for a chair, as above, which, when the seat section is occupied, allows the seat section to be rotated at will about the base without affording a change in the height of the seat section.

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, an adjustable support column embodying the concept of the present invention incorporates a hub tube that extends upwardly from a base portion to receive at least a portion of a threaded spindle that is fixedly secured to, and extends downwardly from, a seat section. The portion of the spindle received within the hub tube may rotate and/or reciprocate with re-

spect thereto, and an adjusting nut assembly is threaded onto the spindle to establish the extent to which the spindle can be inserted into the hub tube and thereby adjust the height of the seat section relative to the base portion.

A contact means presented from the adjusting nut assembly is engagable with a stop presented from the hub tube so that rotation of the seat section, when empty, will effect rotation of the spindle with respect to the adjusting nut assembly. Means are also provided so that when the seat is occupied the contact means will not engage the stop. As such, rotation of the seat section, when occupied, will not occasion relative rotation between the spindle and adjusting nut assembly and thereby not effect an adjustment in the height of the seat section.

A telescoping cover extends between the seat section and the base portion to enclose the spindle, hub tube and adjusting nut assembly.

Two alternative embodiments of an adjustable support column for a pivotally mounted chair embodying the concept of the present invention are 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 of the chair being exploded upwardly to reveal the uniquely adjustable support column extending upwardly from the base portion and being, in part, broken away to conserve space;

FIG. 2 is an enlarged, exploded, perspective of a portion of the internal mechanism incorporated in one embodiment of the adjustable support column depicted in FIG. 1;

FIG. 3 is an enlarged vertical section taken substantially along line 3—3 of FIG. 1 and depicting the mechanism — of that embodiment to which FIG. 2 is directed — interiorly of the support column, said mechanism being disposed as it would be with the chair empty;

FIG. 4 is a horizontal section taken substantially along line 4—4 of FIG. 3 and appearing on the same sheet of drawings as FIGS. 1 and 2;

FIG. 5 is a further horizontal section taken substantially along line 5—5 of FIG. 3 and appearing on the same sheet of drawings as FIG. 3;

FIG. 6 is a still further horizontal section taken substantially along line 6—6 of FIG. 3 and appearing on the same sheet of drawings as FIGS. 3 and 5;

FIG. 7 is a still further horizontal section taken substantially along line 7—7 of FIG. 3;

FIG. 8 is an even further horizontal section taken substantially along line 8—8 of FIG. 3;

FIG. 9 is a view similar to FIG. 3 but depicting the mechanism interiorly of the support column disposed as it would be with the chair occupied; and,

FIG. 10 is a view similar to FIG. 3 depicting an alternative form of the support column, the mechanism interiorly of the support column being depicted as it would be with the chair empty.

DESCRIPTION OF TWO PREFERRED EMBODIMENTS

A support column embodying the concept of the present invention is designated generally by the numeral 10 in the appended drawings and is depicted as providing adjustment in the height of a seat section 11 above a base portion 12 in a chair 13.

The base portion 12 may comprise a plurality of legs 14 that are conjoined at the nave 15 to support a hub tube 16 (FIG. 3) that is secured to, and extends vertically upwardly from, the nave 15. An annular bushing, or liner, 18 is received within the hub tube 16 and a nib 19 on the outer surface thereof may be positioned within a radial bore 20 in the hub tube 16 to anchor the bushing 18 therein. The bushing 18 is preferably made of a plastic such as Zytel to provide a self-lubricating, bearing surface for a spindle 22 that is secured to, and extends vertically downwardly from, the seat section 11. The spindle 22 is secured to rotate with the seat section 11, and this result may be effected by staking, press fitting or otherwise securing the point 23 of the spindle 22 non-rotatably within a chair control 24 fastened to the underside of the seat section 11. The threaded portion 25 of spindle 22 is rotatably and reciprocatingly received within the bushing 18.

A flange 26 extends radially outwardly from the upper extremity in the bushing 18 and engages the upper rim 28 of the hub tube 16.

An adjusting nut assembly 30 includes a nut 31 that is threaded onto the threaded portion 25 of the spindle 22. The adjusting nut assembly 30 also includes an arm 32 that is secured to the nut 31 (as by the overlying washer 27) and extends downwardly past the outer surface 33 of the hub tube 16 in radially outwardly spaced relation with respect thereto. A contact, or finger, 34 extends radially inwardly from the arm 32 and is selectively engagable (depicted in chain-line representation on FIGS. 3 and 9 and more fully hereinafter explained) with a stop 35 projecting radially outwardly beyond the outer surface 33 of the hub tube 16.

To facilitate assembly and disassembly of the chair 13, the finger 34 may well comprise the screw depicted that is threadably received within a bore 36 through the arm 32. With the screw contact finger 34 removed, the arm 32 may be rapidly translated past the flange 26 on bushing 18 to allow the seat section 11 to be lifted independently of the base portion 12 and thereby to be physically separated from the base portion, but with the screw contact finger 34 extending radially inwardly of the arm 32 to its operative position it will extend radially inwardly with respect to the flange 26, thereby serving to preclude separation of the seat from the base.

Engagement between the finger 34 and the stop 35 is controlled by a resilient means 40 that is interposed between the adjusting nut assembly 30 and the hub tube 16. As shown in FIGS. 3 and 9 the resilient means 40 may comprise a plurality of disc washers 41 alternately stacked with a plurality of bowed, spring washers 42, the composite stack encircling a portion of the spindle 22.

By judicious selection of the resilient means 40, when a load is received on the seat section 11 the resilient means 40 will compress sufficiently to displace the finger 34 axially below the stop 35 as depicted in FIG. 9 (note particularly the chain line representation in FIG.

9). With the finger 34 so disposed no matter how many times the seat section 11 is rotated with respect to the base portion 12 of the chair 13, the adjusting nut 30 will rotate with the spindle 22 to provide a purely pivotal movement for the seat section 11 about the base portion 12 without effecting any adjustment in the height of the seat section 11 above the base portion 12.

The foregoing result is further assured by the use of a J-washer 43 interposed between the resilient means 40 and the under surface 44 of the nut 31. A radially inwardly directed key 45 on J-washer 43 engages an axial slot 46 in the threaded portion 25 of the spindle 22 so that the J-washer 43 will rotate with, but not with respect to, the spindle 22. At least one face surface 48 on the J-washer 43 is provided with a plurality of radially extending ridges 49, or other comparable protuberances, that engage with grooves, or recesses, 50 in the juxtaposed under surface 44 of nut 31 to urge the nut 31 to rotate with the spindle 22.

However, when the seat section 11 is empty, rotation thereof through no more than one revolution in either direction will bring the finger 34 into abutting contact with the stop 35 so that continued rotation of the seat section will effect rotation of the spindle 22 with respect to the nut 31 in the adjusting nut assembly 30, thereby raising or lowering (depending upon the direction in which the seat section 11 is rotated) the seat section 11 with respect to the base portion 12. It must be appreciated that when the adjusting nut 31 is restrained from rotation by engagement of the finger 34 with stop 35 the ridges 49 on the J-washer 43 will slip over the grooves 50 on the under surface 44 of nut 31 to permit rotation of the spindle 22 with respect to the adjusting nut assembly 30.

As such, the hub tube 16, spindle 22 and adjusting nut assembly 30 may be completely inaccessible without impairing the adjustability in the height of the seat section 11 above the base portion 12, and a suitable cover arrangement 55 may be employed to conceal those parts.

In the embodiment of the cover arrangement 55 depicted, an outer hub cover 56 may be positioned in concentrically spaced relation about the hub tube 16. This disposition of the outer hub cover 56 is achieved by the cooperative effect of a spacer 58 which circumscribes the hub tube 16 in proximity to the nave 15, and the crenelated lower edge of the outer hub cover 56. As best seen in FIGS. 1, 3 and 9, the tines 59 forming the crenelations conform to the legs 14 and present decorative fillets therebetween.

The inner hub cover 60 is suspended from the seat section 11 and is telescopically received within the outer hub cover 56. One may conveniently suspend the inner hub cover 60 by means of an annular ring 61 that rests on the shoulder 62 formed at the juncture of the threaded portion 25 and the point 23 of the spindle 22. The ring 61 may be secured to the interior surface 63 of the inner hub cover 60, the upper edge 64 of which engages the under surface 65 of the chair control 24 on the seat section 11.

When a cover arrangement 55 is employed, an access bore 66 is provided through the appropriate hub cover (the inner hub cover 60, as depicted in FIGS. 3 and 9) to permit access to the screw contact finger 34 in order that the chair 13 may be selectively assembled and disassembled.

In the embodiment depicted, the stop 35 is represented as being a bar-like arrangement that is vertically oriented and secured to the outer surface 33 of the hub tube 16, but the stop 35 could just as well be a projecting pin received within a bore in the hub tube 16, or, for that matter, an extension of the nib 19 on bushing 18 which could be appropriately located and would extend outwardly through the radial bore 20 in the hub tube 16. Thus, it should be apparent that any number of configurations would satisfy the purpose of the present invention. But irrespective of the particular arrangement selected it is recommended that the finger 34 and stop 35 be of such configuration that the finger 34 cannot become inadvertently hung up on the stop 35, as by having the finger 34 accidentally engage, and be retained by, the axially under surface 68 of the stop 35 when the weight compressing the resilient means 40 is removed from the seat section 11. One way in which this undesirable result can be obviated is by rounding the surface 68, or by bringing it to a point, so that it will not be retained by the rounded, upwardly directed surface of the screw contact finger 34.

In an alternative form of adjustable support column 110, as depicted in FIG. 10, the threaded spindle 122 is non-rotatably secured to, and extends downwardly from, the chair control 124 fixed to the underside of seat section 111. The spindle 122 is received in the bushing 118 fitted within the hub tube 116 which extends upwardly from the nave 115 of the base portion 112.

The arm means 132 is depicted in the form of a collar that is secured to, and extends concentrically downwardly from, the nut 131. A screw 134 extends through a bore 138 in the collar-like arm means 132 and terminates radially inwardly thereof axially below the flange 126 on the bushing 118 selectively to engage the stop 135 presented from the hub tube 116.

A resilient means 140 is depicted as a coiled compression spring 142 that circumscribes the spindle 122 and extends between a first J-washer 143 engaging the under surface 144 of nut 131 and a second J-washer 145 engaging the thrust washer 147 that rests on the upwardly directed surface of the flange 126 on the bushing 118, the flange 126 being located at the upper extremity of the hub tube 116. By positioning the coiled spring 142 between the J-washers 143 and 145, relative rotation between the spring 142 and spindle 122 is obviated, thereby alleviating any resistance to rotation of the seat section 11 when occupied and precluding wear that might be occasioned by such relative rotation. The J-washers 143 and 145 are often conveniently made of a plastic material, and in order to preclude any possible deleterious effect on the J-washers by movement of the spring 142, thrust washers 147 and 147' may be interposed between the spring 142 and the J-washers 143 and 145, respectively.

Judicious selection of the compression spring 142 permits adjustment of the seat in exactly the same manner as provided by column 10 described above so that a comparable cover arrangement 155 may be provided.

It should thus be apparent that a chair embodying the concept of the present invention: permits the height of the seat section to be adjusted merely by rotation of the seat section with respect to the base portion when the chair is not occupied; allows the seat section to be fully pivotal with respect to the base portion without changing the height of the seat section when the chair is oc-

cupied; and, otherwise accomplishes the objects of the invention.

I claim:

1. An adjustable support column for pivotally mounting the seat section of a chair to a base portion comprising; a hub tube extending upwardly from the base portion, a threaded spindle extending downwardly from the seat section, at least a portion of said spindle being rotatably and reciprocatingly received within said hub tube, an adjusting nut assembly threaded onto said spindle, a resilient means interposed axially between said adjusting nut assembly and said hub tube such that contact of the adjusting nut assembly with the hub tube through said resilient means establishes the extent to which said spindle can extend within said hub tube and thereby control the height of the seat section, stop means presented radially from said hub tube, contact means presented from said adjusting nut assembly and extending axially past said resilient means to engage said stop means and permit relative rotation of said adjusting nut assembly with respect to said spindle in the absence of weight being supported on said spindle, said resilient means being compressed between said adjusting nut assembly and said hub tube in response to weight being supported on said spindle to displace said contact means with respect to said stop means and permit free rotation of the threaded spindle and adjusting nut assembly with respect to said hub tube.

2. An adjustable support column, as set forth in claim 1, in which a first cover tube surrounds said hub tube and extends upwardly from the base portion, and in which a second cover tube surrounds said spindle and extends downwardly from the seat section, said first and second cover tubes being telescopically interfitted.

3. A chair having an adjustable support column comprising; a seat section, a base portion, a hub tube secured to and extending upwardly from said base portion, a rim presented from the upper extremity of said hub tube, a threaded spindle extending downwardly of the seat section to be received within said hub tube, means non-rotatably to connect said spindle to the seat section, an adjusting nut threaded onto said spindle and extending radially thereof in opposition to said rim in order to establish the extent to which said spindle may extend into said hub tube and thereby control the height of said seat section above said base portion, a stop presented from said hub tube, contact means presented from said adjusting nut selectively to engage said stop and permit relative rotation of the spindle with respect to said nut for adjusting the height of said seat section, and resilient means interposed between said adjusting nut and said hub tube whereby said contact means moves out of engagement with said stop when said seat section is occupied.

4. A chair, as set forth in claim 3, in which a first cover tube surrounds said hub tube and extends upwardly from said base portion, and in which a second cover tube surrounds said spindle and extends downwardly from said seat section, said first and second cover tubes being telescopically interfitted.

5. A chair, as set forth in claim 4, in which the contact means comprises a finger presented from an arm means secured to said adjusting nut, and said stop extends outwardly of said hub tube.

6. A chair, as set forth in claim 4, in which a J-washer is non-rotatably mounted from said spindle, said J-washer being located in juxtaposition with said adjust-

7

ing nut, first means on said J-washer interacting with second means on said adjusting nut to retard relative rotation therebetween.

7. A chair, as set forth in claim 4, in which said resilient means comprises a plurality of disc washers stacked alternately with one or more spring washers.

8. A chair, as set forth in claim 4, in which said resilient means comprises a coiled compression spring.

9. A chair, as set forth in claim 8, in which a first J-washer is interposed between said coiled compression spring and said adjusting nut and a second J-washer is interposed between said coiled compression spring and said hub tube.

10. A chair, as set forth in claim 6, in which said

8

contact means comprises a screw threaded through, and extending radially inwardly of, an arm means secured to said adjusting nut.

11. A chair, as set forth in claim 10, in which an annular flange means is attached to, and extends outwardly of, said hub tube, said flange means being positioned upwardly of said contact means to preclude inadvertent separation of the seat section from said base portion.

12. A chair, as set forth in claim 11, in which a bore is provided through at least one of said cover tubes to permit access to said screw.

* * * * *

15

20

25

30

35

40

45

50

55

60

65