United States Patent [19]

Engstrom

[11] **3,910,544**

[45] **Oct. 7, 1975**

[54] **CHAIR CONTROL ADJUSTABLE POST**

[76] Inventor: **Carl J. Engstrom,** 412 Marquette Trail, Pottawattomie Park, Michigan City, Ind. 46360

[22] Filed: **Jan. 28, 1974**

[21] Appl. No.: **437,514**

[52] **U.S. Cl.** **248/405;** 248/416

[51] **Int. Cl.²** **F16M 11/00;** F16M 13/00

[58] **Field of Search** ..... 248/405, 406, 415, 417, 248/418, 188.4, 354 S; 85/1 K, 1 L; 108/147; 297/347, 348

[56] **References Cited**

UNITED STATES PATENTS

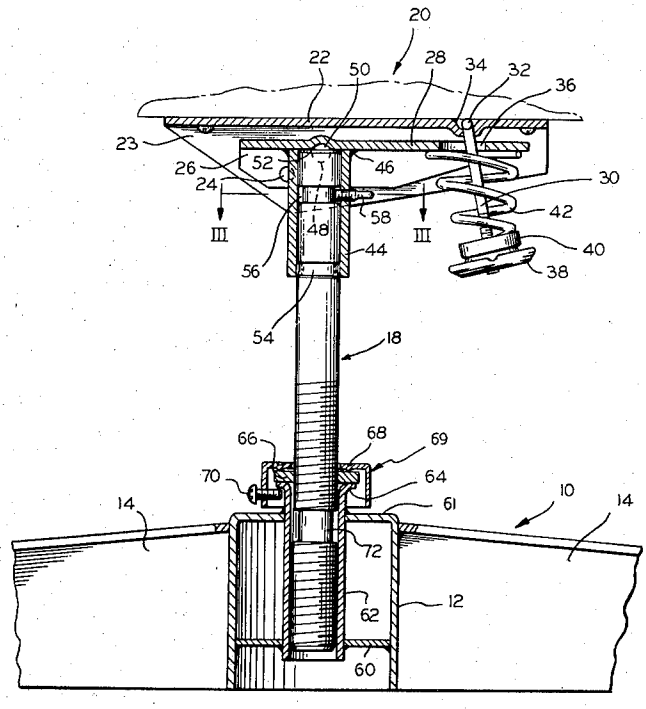
2,308,328	1/1943	Despres	248/415
2,403,425	7/1946	Bolens	248/406
2,684,222	7/1954	Miller	248/405
2,758,635	8/1956	McKinley	248/406
2,935,121	5/1960	Good	248/406
2,999,706	9/1961	Wilcox	85/1 L UX
3,406,939	10/1968	Doerner	248/405

Primary Examiner—Roy D. Frazier
Assistant Examiner—Lawrence J. Staab

[57] **ABSTRACT**

A swivel chair or stool with a single, partly threaded stem or post supporting a seat centrally on a base, and with a bearing ball disposed in recesses in the facing spaced apart surfaces of the seat and the top end of the stem. A circumferential groove is provided in the upper portion of the stem which is journaled in a tubular member depending from the seat, with a thumb screw extending through the wall of said tubular member into said groove to prevent removal of the seat from the stem and, when tightened, to lock the seat and stem against relative rotation. The threaded portion of the stem extends into the base and is threadedly engaged by a manually operable adjustment collar for regulating the height of the seat above the base.

1 Claim, 7 Drawing Figures



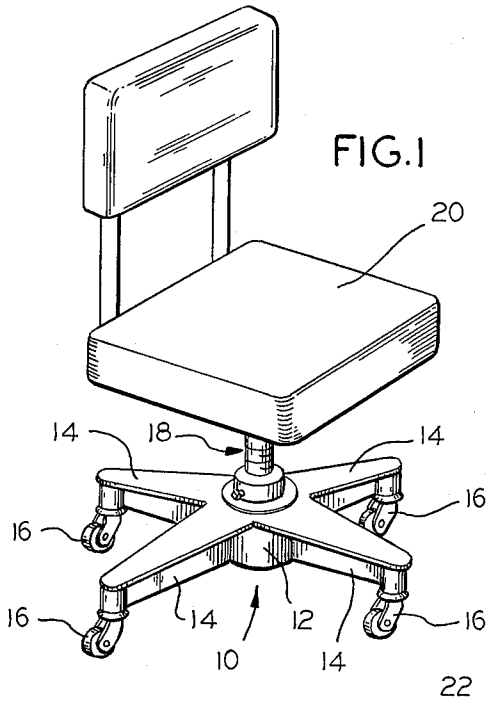


FIG.1

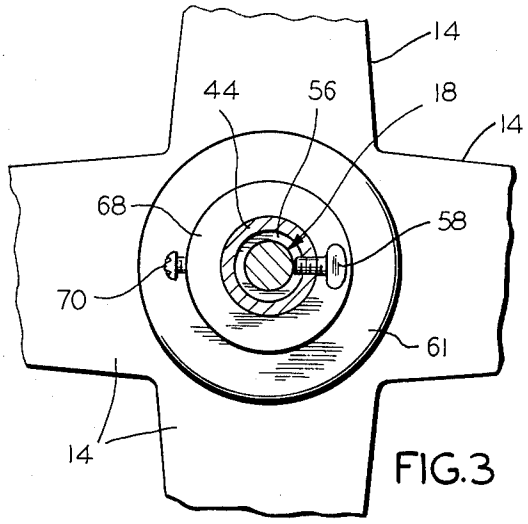


FIG.3

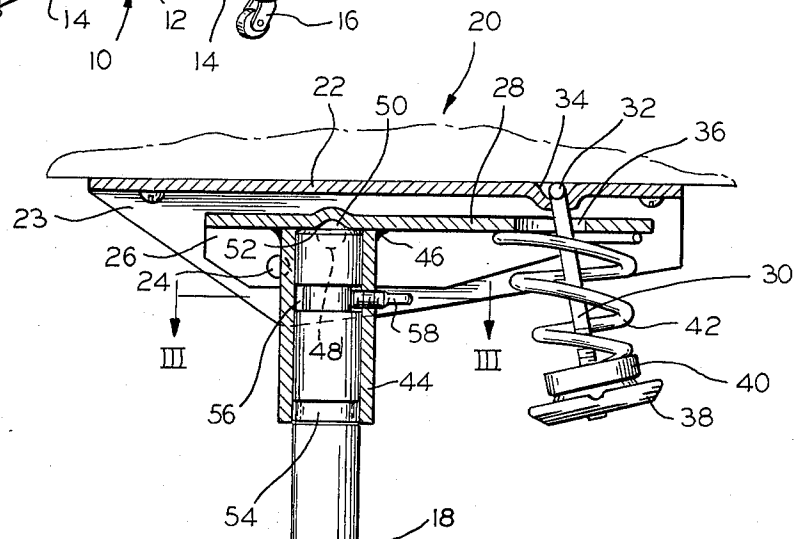
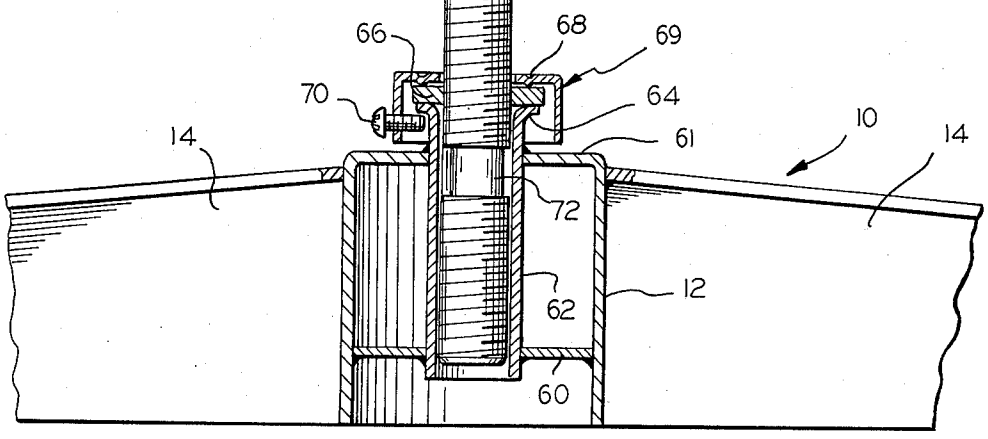


FIG.2



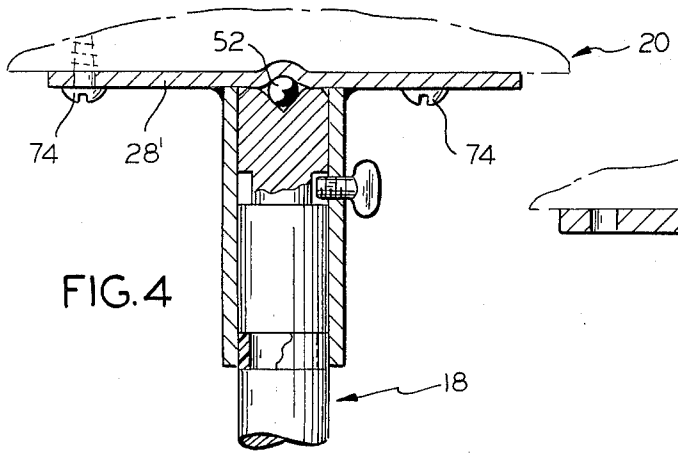


FIG.4

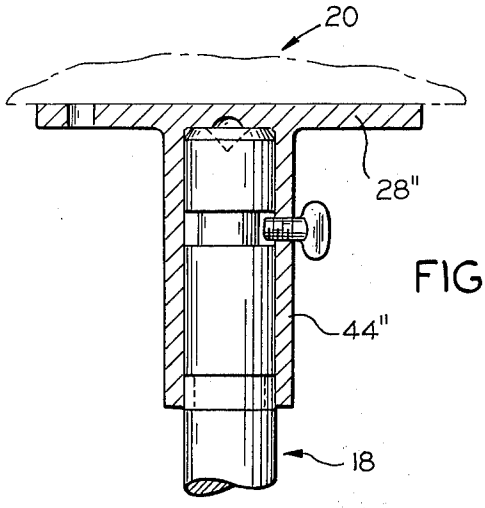


FIG.5

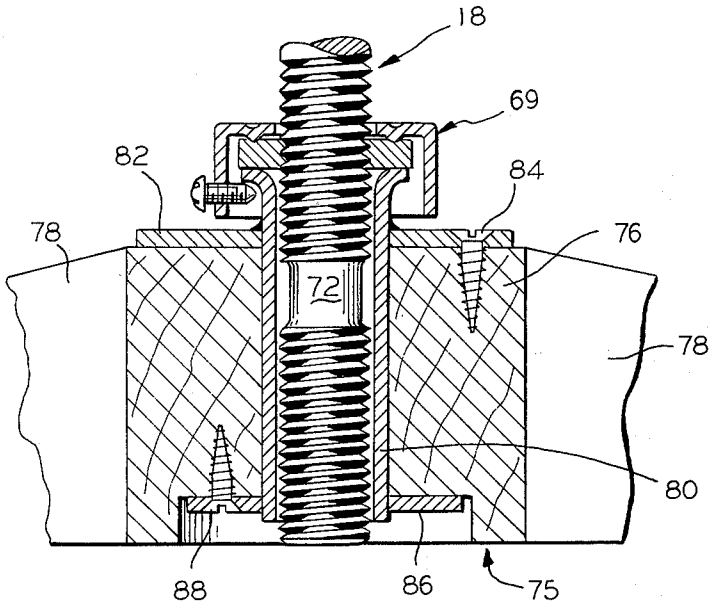
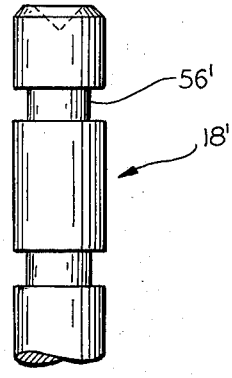


FIG.6



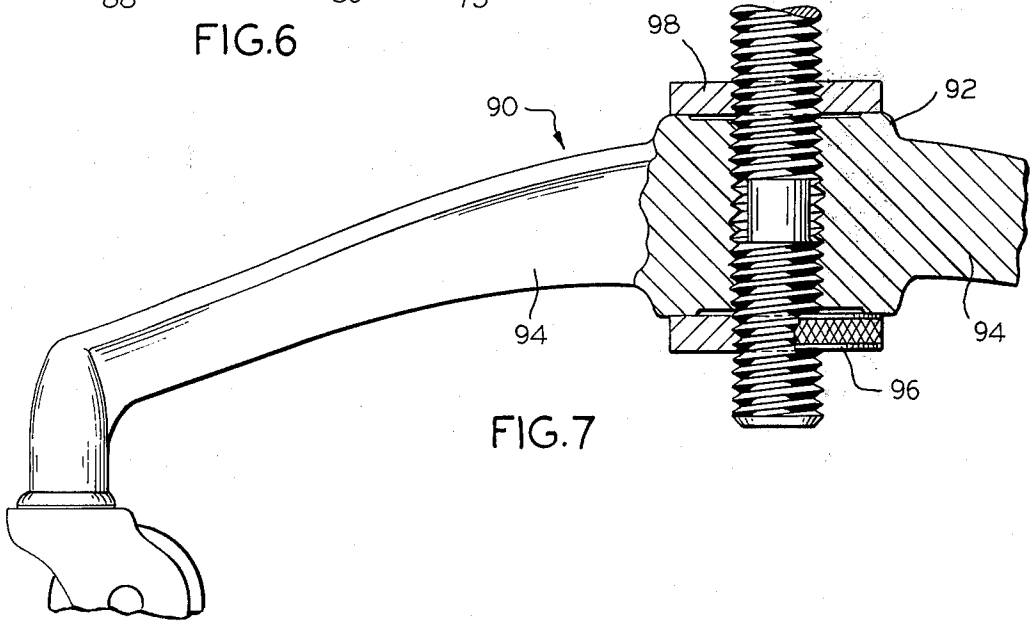


FIG.7

CHAIR CONTROL ADJUSTABLE POST

This invention relates to a swivel chair of the type which comprises a seat rotatably supported on a base through the intermediary of a single centrally disposed stem, and which also includes means for manually adjusting the length of the portion of said stem that projects upwardly above said base to thereby vary the height of the seat above the base.

A variety of chairs of the general kind indicated above are known which differ widely with regard to materials, structural details and manufacturing costs. However, common to a majority of such chairs is a stem which is threaded along at least a portion of its length and provided with a longitudinal groove traversing the threads for locking cooperation with an inwardly directed projection on an adjacent part of the structure.

The base of the chair is commonly in the form of a central hub from which a plurality of legs extend radially outwardly and in many cases are provided with supporting caster wheels. Said base may be made of wood, metal, or combinations thereof, and in the case of a metallic material the base may be manufactured by casting, forging, welding or any other suitable process. The stem extends vertically through said central hub and is connected with the seat, in some cases through the intermediary of a seat tilting mechanism.

It is an object of the present invention to provide a swivel chair mechanism of the general type indicated which is simple and inexpensive to manufacture and yet easy and reliable to operate and adjust.

Another and more specific object of the invention is to provide a swivel chair mechanism of the general kind indicated in which the cutting of a longitudinal groove in the stem is eliminated, and in which the stem is readily exchangeable so that various lengths of stems may be stocked and conveniently interchanged with each other as desired.

A further object of the invention is to provide a swivel chair mechanism of the kind indicated in which the support of the seat on the stem is accomplished by a single bearing ball disposed in aligned recesses in the facing surfaces of the seat and the top end of the stem.

Other objects and advantages of the invention will be evident from the following description of preferred embodiments thereof, considered in conjunction with the accompanying drawings, in which

FIG. 1 is a perspective view of a swivel chair of conventional appearance, to which the invention may be applied,

FIG. 2 is a partial cross-sectional view in a vertical plane which includes the axis of the seat supporting stem,

FIG. 3 is a partial cross-sectional view on line III—III of FIG. 2,

FIG. 4 is a partial vertical cross-sectional view through the axis of the stem showing details of the connection between the stem and the seat of an embodiment having a non-tiltable seat,

FIG. 5 is a view similar to that of FIG. 4 but relating to a slightly different embodiment of the invention, and

FIGS. 6 and 7 are similar cross-sectional views of two different embodiments of the juncture between the stem and the base of the chair.

With reference first to FIGS. 1, 2 and 3, the swivel chair comprises a base 10 which includes a central hub

portion 12 from which four legs 14 extend radially outwardly with a supporting caster 16 attached to the outer end of each of said legs 14. A vertical stem 18 extends through the hub portion 12 and supports on its upper end a seat 20 which in the present instance is of the tiltable variety, the tilting means including a bottom plate 22 secured to the underside of the seat 20 and having depending flanges 23 (only one shown) with a pivotal connection 24 with depending flanges 26 (only one shown) on a substantially horizontal plate member 28 which is non-tiltably supported on the top end of the stem 18 in a manner to be described.

A pin 30 has a horizontal portion 32 which is pivotally received in a recess 34 in the bottom plate 22 and extends downwardly therefrom through an aperture 36 in the plate member 28. A manually operated nut 38 is threaded onto the free end of the pin 30 and has a cup-like member 40 in engagement therewith in which the lower end of a tapered coil spring 42 is received, the larger top end of which is in engagement with the bottom side of the plate member 28 around the aperture 36. Obviously, tilting of the seat 20 in the counterclockwise direction on the pivotal connection 24, as seen in FIG. 2, will cause compression of the spring 42 which upon removal of the tilting force from the seat 20 causes the seat to return to its normal substantially horizontal position.

A tubular member 44 has its top end secured, as by welding at 46, to the bottom side of the plate member 28, and the stem 18 extends into said tubular member 44 through the open bottom end thereof. The top end surface of the stem 18 is provided with a central recess 48 which is in axial alignment with a recess 50 in the bottom side of the plate member 28. A bearing ball 52 is disposed in said recesses 48, 50 and is of such a diameter as to maintain the top end surface of the stem 18 and the bottom side of the plate member 28 around the recess 50 out of contact with each other.

The inner diameter of the tubular member 44 is such that the stem 18 is freely rotatable in said tubular member 44, and in order to prevent any misalignment between the latter and the stem, said stem is provided adjacent the open end of the tubular member 44 with a circumferential groove in which an annular member 54 is disposed which provides for a close fit between the stem and the tubular member in said region and suitably is made of a hard, lubricating plastics or a similar material, so that the tubular member 44 is rotatable around the stem 18 with negligible friction and yet maintained in strict alignment therewith.

The stem 18 is provided with a second circumferential groove 56 in the portion thereof within the tubular member 44, and a thumb screw 58 in the wall of the tubular member has its end portion extending sufficiently far into said groove 56 to prevent appreciable axial movement of the stem 18 in the tubular member 44, while at the same time permitting relative rotary motion of said stem and tubular member.

The hub portion of the base 10 comprises a cylindrical member 12, substantially of inverted cup-shape, which is secured, as by welding, in an opening in the central portion of the base 10. A transverse wall 60 is disposed within said cylindrical member 12 and provided with a central opening in alignment with a similar opening in the bottom 61 of said member 12 for receipt of a sleeve 62 which is secured therein, as by welding, and projects above said bottom 61 where it is flared to

form a circumferential end flange **64.** The stem **18** is threaded on a considerable portion of its length counted from its bottom end, and said threaded section extends into said sleeve **62.**

A disc-shaped nut **66** is in threaded engagement with the stem **18,** and said nut **66** is spot-welded to the inside bottom wall of an inverted cup-shaped member **68** to form therewith an integral adjustment collar **69,** the circumferential flange of which is provided with a threaded hole in which a screw **70** is threadedly received. When the nut **66** rests on the sleeve flange **64,** said screw **70** can be screwed in sufficiently to engage below said flange **64** and thereby prevent separation of the adjustment collar **69** from the sleeve **62.** The threaded section of the stem **18** is provided with a circumferential groove **72** for a purpose to be explained below.

In operation, when a person is seated on the seat **20** and turns the same in one rotary direction or the other, the entire seat, including the plate member **28** and tubular member **44,** turns very easily on the bearing ball **52** which sustains the total weight of the seat **20** and the person seated thereon. The stem **18** is prevented from rotating by its frictional engagement with the hub sleeve **62.**

When it is desired to change the height of the seat **20,** the adjustment collar **69** is rotated manually in the proper direction on the stem **18** for increasing or decreasing said height. A prerequisite for achievement of the desired effect — raising or lowering of the seat **20** — is of course that the stem **18** does not turn with the adjustment collar **69,** and if such turning should have a tendency to occur, the thumb screw **58** is brought into engagement with the bottom of the groove **56,** thus enabling the operator to prevent the stem **18** from rotating by applying the proper force to the seat **20.**

If during the upwardly movement of the stem **18** the rotation of the adjustment collar **69** is continued sufficiently long, a point is reached where the nut **66** leaves the threaded portion of the stem **18** disposed above the groove **72.** Continued rotation of the collar **69** in the same direction will then have no effect on the stem **18,** as the collar **69** will merely rotate ineffectually in the groove **72.** The arrival at this point is readily noticeable by the operator, and at the same time there is no danger of excessive wobbling or falling-out of the stem **18** since the threaded portion thereof below the groove **72** remains in guided engagement with the inside of the sleeve **62.** By reversal of the rotary direction of the adjustment collar **69** engagement of the nut **66** with the thread above the groove **72** is re-established. The function of the thread below the groove **72** is, of course, to enable assembling and dis-assembling of the stem **18** and the adjustment collar **69.**

The embodiment of FIG. **4** is identical with that of FIG. **2** in every respect, except that in FIG. **4** there is no seat-tilting mechanism, the plate member **28'** being secured directly to the underside of the seat **20** by means of screws **74** and devoid of an aperture corresponding to the aperture **26** in FIG. **2.**

The embodiment of FIG. **5** is identical with that of FIG. **4,** with the exception that according to FIG. **5** the plate member **28''** is made in one piece with the tubular member **44''** as, for example, in the form of a unitary casting.

FIG. **6** illustrates an embodiment which includes a wooden base **75,** the hub portion **76** of which is integral with the legs **78.** A sleeve **80,** corresponding to the sleeve **62** in FIG. **2,** is inserted in the hub portion **76** and welded to a top flange member **82** which is secured to the hub member **76** by means of screws **84** (only one shown). A disc member **86** is secured to the recessed bottom end of the hub portion **76** by screws **88** (only one shown) and provided with an opening through which the sleeve **80** extends. The stem **18** and the adjustment collar **69** thereon are identical with those shown in FIG. **2** and function in the same manner.

The base **90** shown in FIG. **7** comprises a metallic hub portion **92** which is integral with the legs **94** and provided with a central threaded aperture for receipt of the correspondingly threaded stem **18'** with which a collar **98,** substantially corresponding to the above-mentioned collar **69,** is in threaded engagement. A lock nut **96,** preferably having a knurled circumferential surface, may be provided on the bottom end of the stem **18',** if desired.

In operation, assuming that the collar **98** and, if present, the lock-nut **96** are tightened against the hub portion **92,** the stem **18'** is securely locked against rotation in relation to the base **90,** and the seat is freely rotatable on the bearing ball (not shown in FIG. **7**) at the top of the stem **18'.** In order to lower the seat, the collar **98** is loosened and screwed upwardly on the stem **18'** a distance corresponding to the desired extent of lowering of the seat **20.** The thumb screw (not shown) is then screwed into engagement with the bottom of the groove **56',** the lock-nut **96** is loosened, and the seat and stem **18'** are rotated manually as a unit in the proper direction until the collar again engages the hub **92,** whereupon the lock-nut **96** is screwed into tight engagement with the bottom end of the hub **92** and the thumb screw is brought out of contact with the bottom of groove **56'.**

Raising of the seat is accomplished in a similar manner with the difference that the order of manipulation of the collar **98** and the lock-nut **96** is reversed and the stem **18'** is rotated in the opposite direction.

It is evident from the above description that the inventive operating mechanism of the swivel chair is very simple and inexpensive to manufacture and extremely dependable and versatile to use. For example, the stem may simply and readily be replaced by one of greater or smaller length, and identical stems differing only in length may be manufactured and stored at low cost. Savings are also accomplished by elimination of the need for a longitudinal groove in the stem and for expensive and rapidly worn-out washers or bushings in the adjustment collar and bearings in the base sleeve. The bearing ball supporting the seat on the top of the stem also represents an important improvement in the operation of the swivel chair.

The term "chair" is used herein in a general sense to include any seating device, with and without a back support.

The invention is not limited to the structural details set forth as examples above but is intended to include any and all modifications coming within the scope of the appended claims.

I claim as my invention:

1. A swivel seat comprising a base, a seat, a vertical stem supporting said seat upon said base, a tubular member attached to the underside of said seat having a closed top end and extending downwardly therefrom in surrounding relation to the upper portion of said

stem, the top end of said tubular member and the upper end of said stem having aligned ball receiving recesses, a ball bearing between the upper end of the stem and the top end of said tubular member riding in said recesses, said stem having a first circumferential groove adjacent said upper end thereof, a combination locking and retaining screw threaded through said tubular member and projecting into said first circumferential groove to maintain the ball in said recesses and to lock the stem and tubular member for co-rotation, a bearing ring around said stem riding in the bottom end portion of the tubular member to align the stem and tubular member, the lower end of said stem being circular in cross section to define a smooth surface, said smooth surface being interrupted only by a pair of threaded portions spaced apart by a second circumferential groove, said base having a hub with a sleeve providing an elongated bore receiving the threaded portions of the stem in sliding contact therewith to hold the stem in upright position on the base, said sleeve having an outturned end flange on the upper end thereof spaced from said hub, a manually rotatable adjustment collar threaded onto the lower end of said stem, said adjustment collar including an inverted cup shaped metal member with an aperture through the top end wall thereof larger than the stem with a nut secured to the underside of said top end wall, said nut being threaded onto said stem and resting directly on said outturned flange of said sleeve, a screw threaded through said cup shaped member underlying said outturned flange to limit lifting of the stem out of the sleeve of the base, said adjustment collar being located above said second circumferential groove, whereby said seat is freely rotatable on said stem when said combination locking and retaining screw is loose in said first groove and rotatable with said stem when tightened in said first groove and said stem is raised and lowered in said sleeve by rotation of said adjustment collar to and from a height aligning the second groove with the adjustment collar.

* * * * *