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(54) Chair support column and chairs with elevating seats.

(57) A chair support column comprising a first member attachable to a seat for supporting same, a second member slidable relative to the first member and attachable to a base, sliding of the first and second members permitting a variation of the height of the seat relative to the base, a mechanical brake which acts to prevent relative movement between the first and second members, brake actuator means operable by a person sitting on the seat, to release the mechanical brake and permit relative movement of the first and second members, mechanical drive means for incrementally moving the said first and second members in a direction to raise a seat carried by the first member relative to a base carried by the second member, and a drive actuator operable by a person whilst sitting on the seat to raise the first member relative to the second member.

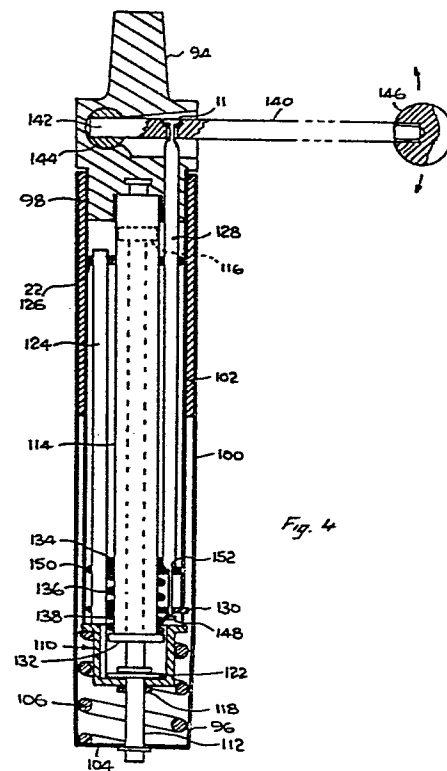
The brake actuator and drive actuator may be combined into a single control lever which extends laterally from the column near the end of the first member which is attachable to the seat.

The first member conveniently comprises an elongate tubular member having a solid upper end adapted to be attached to a seat and having embedded therein the inboard end of a control lever serving as a combined brake actuator and drive actuator and the said second member is a similar elongate cylindrical member with a larger internal diameter than the external diameter of the said first member and is

closed at one end to provide a fitting by which the said second member can be secured to the said base.

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- 1 -

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Title: Chair support column and chairs with elevating seats.

Field of invention

This invention concerns chair support columns typically of the type fitted to typist's seats to enable the user to
5 raise or lower the seat relative to the base of the chair.

Background to the invention

Chairs of the aforementioned type have become more widely used with the increasing use of video display units (VDU's) associated with computer installations in offices and
10 adjustable seats have also become popular in drawing offices.

Current designs for chair supports of this type generally fall into two broad categories namely mechanical adjustment only and hydraulic or pneumatic adjustment. Both categories
15 have the disadvantage that the user must normally get off the chair before he can adjust the height and with pneumatic/hydraulic types, he must normally remove his weight to allow the seat to rise and then reseal himself and adjust the seat down to the required position.

20 Where the seat is dedicated to one person (as in the case of a typist's chair or executive's chair associated with a desk) the height adjustment is normally a one off operation and the fact that it is not so convenient and requires the user to get off the chair to permit the adjustment is of
25 little consequence.

- 2 -

With computer installations however there tends to be more multiple occupation at working stations such that two or three different people may use the same VDU at different times during the same working day. As with a typing
5 position it is essential the seat is at the correct height to enable the user to view the screen correctly and operate the keyboard associated therewith. In consequence there is a much greater need for a readily adjustable seat for use by typists and other office personnel and it is an object
10 of the present invention to provide an improved chair support for such seats.

Summary of the invention

- According to one aspect of the present invention a chair support column comprises
- 15 1. A first member attachable to a seat for supporting same.
 2. A second member slidable relative to the first member and attachable to a base, sliding of the first and second members permitting a variation of the height of the seat
20 relative to the base.
 3. A mechanical brake which acts to prevent relative movement between the first and second members.
 4. Brake actuator means operable by a person sitting on the seat, to release the mechanical brake and permit
25 relative movement of the first and second members.
 5. Mechanical drive means for incrementally moving the said first and second members in a direction to raise a seat carried by the first member relative to a base carried by the second member and
 - 30 6. A drive actuator operable by a person whilst sitting on the seat to raise the first member relative to the second

- 3 -

member.

In a preferred embodiment the brake actuator and drive actuator are combined into a single control lever which extends laterally from the column near the end of the first
5 member which is attachable to the seat.

In a convenient embodiment of the preferred form of the invention, the control lever is pivotally mounted at one end of the said first member close to the position at which the seat is attachable to the first member and is
10 normally held in a mid position from which it can be pulled in an upward direction so as to effect a releasing of the mechanical brake and pushed in a downward direction so as to incrementally raise the first member relative to the second member, the mechanical brake being engaged at all
15 times except when the control lever is pulled in an upward direction.

In another embodiment of the invention, the brake actuator comprises a first control lever and the drive actuator comprises a second control lever which extend laterally
20 from the column in diametrically opposed directions. Preferably stop means is provided against which the control levers rest which determines the normal positions for the two levers from which they can be pushed or pulled to effect the driving or brake releasing associated therewith.

25 In the preferred embodiment, the first member conveniently comprises an elongate tubular member having a solid upper end adapted to be attached to a seat and having embedded therein the inboard end of a control lever serving as a combined brake actuator and drive actuator and the said
30 second member is a similar elongate cylindrical member

- 4 -

having a larger internal diameter than the external diameter of the said first member and is closed at one end to provide a fitting by which the said second member can be secured to the said base by which the column is supported when in use and is open at the other end to allow the said first member to be introduced therein and to slide relative thereto.

Preferably a sleeve of plastics material is secured either to the internal surface of the second member or to the external surface of the said first member so as to fill any gap between the two said members and provide a guide for the said first and second members as they slide relative the one to the other.

In another embodiment of the invention, the first member comprises a cylindrical rod and the second member a generally cylindrical housing surrounding the rod over part of its length with guide means in the said cylindrical housing for supporting the first member centrally therein in sliding relationship thereto, the second member including a region of enlarged diameter forming a housing within which incremental drive means is located with an actuating control lever extending through the wall of the housing to permit incremental advance of the rod relative to the cylindrical housing of the second member and within the same housing there is located the braking means and the actuating control lever for the braking means also extends through the said housing wall.

According to a further preferred feature of the invention, a sealed pneumatic or hydraulic ram is fitted within the column and attached to the first and second members and when

- 5 -

compressed produces a substantial restoring force acting in a direction to displace the first and second members. The hydraulic or pneumatic ram thus constitutes a hydraulic or pneumatic spring and the restoring force exerted by the
5 hydraulic or pneumatic spring when compressed is selected so as to be not greater than the force required to lift a weight on the seat comensurate with the lightest adult person likely to use the seat.

Preferably means is provided for presetting the compression
10 pressure and therefore restoring force exerted by the hydraulic or pneumatic so that the design weight (i.e. the minimum weight of person to use the seat) can be selected at least during manufacture.

Conveniently any such preset control is available after
15 manufacture to allow a chair to be customised to the weight of persons using it. However where the seat is to be occupied by persons of differing weight, it will be essential for the restoring force to be restricted to just less than that required to elevate the lightest person to
20 use the seat.

The introduction of a hydraulic or pneumatic spring of the aforementioned type serves to reduce the force required on the incremental drive means in order to elevate the seated person. This is acheived by virtue of the fact that the
25 restoring force is acting all of the time and it is therefore only necessary to add such force as is required to just overcome the gravitational force due to the weight of the person seated on the seat to allow the seat to rise. By fine tuning of the pressure within the hydraulic or
30 pneumatic ram so the actual force required to be exerted so

- 6 -

as to increment the seat upwardly relative to the base can be made very small. In practice however it will be appreciated that a heavier person will have to exert a stronger force on the actuator than a lighter person for the
5 same setting of the restoring force exerted by the ram.

Preferably a pneumatic spring is employed (i.e. a cylinder and piston arrangement containing a volume of gas trapped between the piston and the cylinder. It is found in practice that a pneumatic spring of this type is more
10 preferable than a hydraulic spring particularly since it is important to be able to compress the fluid to a very small volume and in general hydraulic fluids are not as compressable as are gases.

According to another aspect of the present invention a chair
15 having a seat of adjustable height comprises a base adapted to stand on the floor, a seat on which a person occupying the chair can sit, a first member attached to the seat and extending in a downward direction therebelow, a second member attached to the base and extending upwardly
20 therefrom, the first and second members being slidable relative one to the other, a mechanical braking means which normally prevents relative movement between the said first and second members, a brake actuator by which the braking means can be released to permit relative movement of the
25 said first and second members, mechanical drive means by which the first member can be incrementally raised relative to the second member and a drive actuator by which the said mechanical drive means can be operated, both the brake and drive means being operable by a person whilst seated in the
30 chair.

According to a preferred feature of this second aspect of

- 7 -

the invention, the brake and drive actuators comprise levers which extend on opposite sides of a column formed by the said first and second members.

5 Preferably the levers extend from a part of the column which is still accessible by a person seated on the chair even when the seat has been elevated.

Preferably means is provided to prevent opposite movement of the said first and second members by more than a given amount.

10 Preferably further means is provided preventing relative inward movement of the first and second members beyond a certain point which determines the minimum length of the column formed by the first and second members.

15 In a particularly preferred embodiment of this second aspect of the invention, both said brake and mechanical drive actuators are combined into a single lever which is movable from a rest position in an upward direction or a downward direction to effect a release of the braking and to effect incremental upward movement respectively.

20 Although the preferred arrangement provides that the lever which effects the drive is moved in a downward direction to effect a lifting of the seat relative to the base of the chair, it is to be understood that the invention is not limited to this arrangement and the alternative in which the
25 lever is lifted in order to effect the incremental upward movement is equally possible. It is however believed that a greater force could be exerted by a person sitting on the seat by exerting a downward thrust on the end of the lever rather than an upward pull.

- 8 -

According to a further preferred feature of this aspect of the invention, a hydraulic or pneumatic spring is associated with the column so as to urge the first and second members apart, the braking normally preventing the separation of the first and second members so as to reduce the force required on the incremental drive means to effect incremental upward movement of the first member relative to the second member.

In a preferred arrangement, a pneumatic spring is employed which is arranged to provide up to 40 per cent of the force required to support the weight of a typical adult seated on the chair.

According to a particularly preferred feature of both aspects of the invention, the hydraulic or pneumatic spring is conveniently located centrally within the said first and second members so as to be contained therewithin, so as not to add to the compressed length of the column.

According to another preferred feature of both aspects of the invention, the locking means comprises a rod or other rigid elongate member forming part of or attached to one or other of said first and second members and slidable relative thereto an apertured plate, the aperture being just large enough to accomodate the cross section of the rod or other elongate member on which it is slidable, and means is provided linking the plate to the other of said first and second members so that the plate is normally jammed on the rod or other elongate member on which it is slidable and when so jammed represents a stop which prevents relative movement of the first and second members at least in a direction to reduce the overall length of the column and

- 9 -

means is provided for tilting the plate so as to release the jamming effect between the plate and the rod or other elongate member to release the brake and allow the first and second members to slide relatively.

- 5 According to another preferred feature of both aspects of the invention, the incremental drive means likewise comprises an apertured plate which is normally free of the elongate member so as not to inhibit relative movement of the first and second members when braking means is released
10 but can be tilted by means of a lever so as to engage on the said rod or elongate member to enable a thrust to be exerted between the said first and second members to move the two said members apart and the thrust so exerted serves to release the braking means to allow the first and second
15 members to be incrementally moved apart, the braking means regaining control as soon as the driving thrust is removed to hold the assembly of first and second members in their incrementally moved apart condition.

- Where two actuating levers are provided, the one typically
20 acts on the one plate and the other on the other.

Where a single lever is employed, a thrust rod may be employed which passes through apertures in the two plates and includes one or more thrust rings for engaging the plates indendently.

- 25 The invention will now be described by way of example with reference to the accompanying drawings in which

Figure 1 is a side elevation of a chair which can be used in an office either as a typist's chair or as a VDU operator's chair,

- 10 -

Figure 2 is a cross section through a first embodiment of the invention

Figure 3 is a cross section through a second embodiment of the invention and

- 5 Figure 4 is a cross section through a third embodiment of the invention which incorporates a gas spring.

Detailed description of the drawings

Figure 1 shows diagrammatically a chair the height of which can be adjusted and which comprises a seat 10 back rest 12
10 and arms one of which is shown at 14. The seat is supported on a column generally designated 16 which includes a protruding control lever 18 the function of which will be described hereinafter.

The lower end of the column 16 extends from a trolley base
15 20 having castors such as 22.

In accordance with the invention the column 16 can be extended even when the seat is occupied thereby allowing the user to elevate the chair to exactly the correct height without having to remove his or her weight from the seat.
20 One embodiment of the column is shown in the Figure 2. The seat 10 is attached to the upper end of a central rod 24 which itself is supported within a generally cylindrical sleeve 26 which includes at its upper end a generally cylindrical housing 28 which houses the brake and drive
25 mechanism of the invention.

The lower end of the sleeve 26 is attached to the trolley

- 11 -

base 20 of Figure 1 (not shown in Figure 2).

The rod 24 sleeve 26 and housing 28 make up the column 16.

The rod 24 is slidably received in circular guides at 30 and 32 and 34 and includes a ring of plastics material 36 which
5 is a sliding fit in the sleeve 26. The housing 28 includes an internal web 38 against which a spring 40 abuts. The opposite end of the spring bears against a thrust ring 42 housed within a frusto conical cup 44 fitted to the upper end of the tubular sleeve 26 the lower end of which is
10 fitted to the base 20 of Figure 1. The cup 44 is slidable within the sleeve 28 to compress the spring 40. The latter serves as a shock absorbing device to cushion sudden movements between the rod 24 and the sleeve 26.

Movement of the rod 24 in a downward direction relative to
15 the sleeve 26 is prevented by a tilt lock device formed by a plate 46 which rests on a ledge 46 in the wall of the housing section 28 and at a diametrically opposed region is engaged by the surface of a lifting cam 50 at the end of a brake release lever 52. The relative levels of the ledge 48
20 and cam 50 are such that in the straight ahead position of the lever 52 the plate 46 is tilted by an amount sufficient to jam onto the rod 24 to lock the latter relative to the housing 28 and therefore the sleeve 26, thus maintaining the relative positions of the rod 24 and sleeve 26 and therefore
25 height of the seat (not shown) relative to the base (not shown).

The brake comprises not only the plate 46 but also a second plate 54 apertured at 56 to receive a hooked end 58 of the lever 52, to retain the latter in position. An intermediate
30 thrust plate 60 having a pivoting ridge 62 is sandwiched

- 12 -

between the plates 46 and 54 and the assembly of plates 46, 60 and 54 are held together under the action of helical compression springs 64 and 66 compressed between the upper end wall 68 of the housing 28 and an incremental drive plate 5 70. The latter is, like the plate 46, apertured to receive the rod 24 and is normally held square to the axis of the rod 24 by being squeezed against an end of a guide take by the spring 66. The tube 72 is prevented from axial movement (other than to compress the spring 66) by the lower end wall 10 74 of the housing 28. Upward movement of the lever 52 thus releases the braking action of the plate 46 on the rod 24.

The aperture in the plate 54 is such that even tilted it rides freely on the rod 24.

Tilting of the plate 70 is effected by pushing down on a

15 pivoted lever 76 which is pivotally mounted by means of stub axles of which one is shown at 78. The lever extends through a slot 80 in the housing wall which is cutaway to allow for the pivoting of the lever, on the inside and outside of the housing in a direction to lift the right hand 20 side of the plate 70. In doing so the plate 70 becomes locked onto the rod 24 by the tilt-lock principle (known per se) and continued movement of the lever in a downward direction will cause the rod 24 to be moved upwardly relative to the housing 28 and therefore the sleeve 26 and 25 base not shown, as a result of the reaction through the stub axles, one of which is shown at 78.

Upward movement of the rod 24 relative to the housing 28 will cause the plate 46 to be tilted square to the rod 24 and this will allow the rod to move upwardly relative to the 30 plate 46. If the rod attempts to move in the opposite

- 13 -

direction the plate 46 reverts to its normal locking mode and prevents the rod 24 from returning completely.

By positioning the fulcrum of the lever 76 near to the point at which the inboard end of the lever 76 abuts the plate 70, so a relatively small force applied in a downward direction to the outer end of the lever 76 will result in a large force being applied to the plate 70 and thereby, due to the tilt-lock, to the rod 24. In this way a person sitting on the seat 10 (Figure 1) can, by a series of downward pushes on the lever 76, lift himself incrementally relative to the base 20 (Figure 1).

The ring 36 prevents the rod 24 from being completely withdrawn from the housing 28 by engagement with the guide ring 34 crimped to the upper end of the sleeve 26 at 82.

The alternative embodiment of Figure 3 is similar to that of Figure 1 except in so far as the plate assembly 46, 60 and 54 is replaced by a single plate 86 which is received in a slot 88 in the inboard end of a lever 90 which extends through an aperture 92 in the housing 28 wall. The upper and lower extremities of the aperture 92 determine the maximum upward and downward movement of the lever 90.

In either of the embodiments shown in Figure 1 and 2 a gas spring (not shown) may be incorporated, for example in place of the sleeve section 26, in which event the rod 24 is conveniently attached to the piston and the sleeve 26 becomes the cylinder, of the air spring.

Figure 4 shows another arrangement in which an air spring is incorporated into the overall assembly of the column. In this embodiment the seat (10 in Figure 1) is attached to the

- 14 -

upper end 94 and the base (20 in Figure 1) is attached to the lower end 96. The solid upper end 94 is secured to a thin walled cylindrical sleeve 98 which extends within an outer sleeve 100 and is a close slipping fit in a sleeve 102
5 of plastics material (such as PTFE) secured to the outer sleeve 100.

The outer sleeve is closed at its bottom end 104 to form a cup which houses a shock absorbing spring 106, held captive between end 104 and an annular flange 108 of an inner top-
10 hat shaped member 110. The latter is secured to a central rod 112 which comprises a piston rod extending from an air spring, the cylinder of which is denoted by reference numeral 114. The piston is shown dotted at 116. Two
15 circlips or the like at 118 and 120 axially retain the member 110 in the rod, with a thrust washer 122 between the clip 120 and the base of the member 110.

A locking rod 124 extends parallel to the axis of the column and is located at its upper end by a spacer plate 126 which is slidable relative to the cylinder 114 and an actuating
20 rod 128, located on the opposite side of the air spring cylinder 114. At its lower end the rod 124 is attached to the wall of the top hat shaped member 110.

Downward thrust on the upper end 94 will result in the spring 106 becoming compressed, provided relative movement
25 is possible between the outer sleeve 100 and inner sleeve 98. As shown the unit has virtually bottomed, and no such movement is possible, but at elevated positions of the seat, i.e. with the inner sleeve raised relative to the outer sleeve, shocks can be absorbed by the spring 106.

30 The air spring 114, 116 exerts a downward thrust on the top

- 15 -

hat member 110 and an equal and opposite thrust on the inner sleeve 98 and solid upper end 94 attached thereto. This resisted by the interaction of a tilt-locking plate 130 on the rod 124. The plate 30 is fixed between a lower annular rim 132 of the cylinder 114 and an annular ring 134 (such as a circlip) fitted to the outside of the cylinder 114, by means of two helical springs 136, 138 sandwiched between the ring 134 and plate 130 on the one hand and plate 130 and rim 132 on the other hand.

10 The action of the springs is such as to cause the plate 130 normally to jam (or tilt-lock) onto the rod 124, due to any tendency of the cylinder 114 and therefore the plate 130 to move in an upward direction relative to the rod 124. The actuator rod 128 is articulately connected to a lever 140 15 the inboard end 142 of which is held in a bearing assembly 144. The outboard end of the lever 140 has ball-handle 146 fitted thereto.

The lower end of the rod 128 has an enlarged head 148 which if the rod 128 is raised (with appropriate lifting of the 20 lever 140), engages the underside of the plate 130 and removes the tilt induced by the springs 136, 138 thereby freeing the rod 124, and allowing the cylinder 114 and rod/piston assembly 112, 116 to move apart under the action of the compressed air/gas in the cylinder 114.

25 Releasing the lever 140 allows the latter to drop, and in turn the plate to revert to its tilted and locked position.

Incremental lifting is achieved through a plate 150 which is normally held square to the rod 12 by the action of being squeezed between the spring 136 and the ring 134. However 30 the rod 128 includes a shoulder at 152 which engages the

- 16 -

upper face of the plate 150 and downward movement of the rod 128 (due to downward pivoting of the lever 140) will result in the plate 150 locking onto the rod 124.

Since the member 110 is held fixed relative to the outer sleeve 100 (subject to any compression in the spring 106) continued downward thrust on the end 146 of the lever 140 results in an equal and opposite thrust being transmitted via the bearing assembly 144 to the upper end of the inner sleeve 98.

10 This in turn produces a reverse of the forces acting on the tilt lock plate 130, thereby freeing the rod 124 and allowing for relative movement of the cylinder and piston (and therefore rod 112), under the action of the compressed gas/air. This allows (and assists in) relative movement of
15 the inner and outer sleeves 98, 100.

As soon as pressure on the lever 140 is removed, relative initial movement of the inner sleeves 98, 100 produces a jamming of the plate 130 on the rod 124 thereby locking the sleeves in their displaced positions.

20 Release of the lever 140 completely, results in the latter reverting to the normal position as shown, from which it can be pushed again in a downward direction to effect a further increment of relative outward displacement of the two sleeves 98,100.

25 Such movement, being assisted by the action of the air/gas spring is thus readily achieved by the simple expediency of gently pumping the lever 140 downwardly from the position shown and allowing it to revert to its mid position after

- 17 -

each such pumping action.

Downward movement is resisted by the air/gas spring as soon as the plate 130 is lifted (by lifting the lever 140), but by selection of air/gas compresion, so the restoring force
5 acting is still less than the weight of the person sitting on the seat, and the column will thus slowly collapse towards its bottomed condition shown.

Collapse will be terminated as soon as the lever 140 is released.

- 1 -

Patent claims.

1. A chair support column comprising a first member attachable to a seat for supporting same, a second member slidable relative to the first member and attachable to a base, sliding of the first and second members permitting a variation of the overall length of the of the column, characterised by the combination of:
- 5
- (1) a mechanical brake which acts to prevent relative movement between the first and second members;
- 10 (2) brake actuator means operable to release the mechanical brake and permit relative movement of the first and second members;
- (3) mechanical drive means for incrementally moving the said first and second members in a direction to raise the first member relative to the second member, and
- 15 (4) a drive actuator for operating the said mechanical drive means.
2. A chair support column as claimed in claim 1 wherein the brake actuator and drive actuator are combined into a single control lever which extends laterally from the column near the end of the first member which is attachable to the seat.
- 20
3. A chair support column as claimed in claim 1 wherein the said first member comprises an elongate tubular member having a solid upper end adapted to be attached to a seat and having embedded therein the inboard end of a control
- 25

- 2 -

lever serving as a combined brake actuator and drive actuator and the said second member is a similar elongate cylindrical member having a larger internal diameter than the external diameter of the said first member and is closed at one end to provide a fitting by which the said second member can be secured to the said base by which the column is supported when in use and is open at the other end to allow the said first member to be introduced therein and to slide relative thereto.

4. A chair support column as claimed in claim 6 wherein a sleeve of plastics material is secured either to the internal surface of the said second member or to the external surface of the said first member so as to fill any gap between the two said members and provide a guide for the said first and second members as they slide relative the one to the other.

5. A chair support column as claimed in claim 1 wherein the first member comprises a cylindrical rod and the second member a generally cylindrical housing surrounding the rod over part of its length with guide means in the said cylindrical housing for supporting the first member centrally therein in sliding relationship thereto, and wherein the second member includes a region of enlarged diameter forming a housing within which the incremental drive means is located and an actuating control lever extends through the wall of the housing to permit incremental advance of the rod relative to the cylindrical housing and within the same housing there is located the braking means and the actuating control lever for the braking means also extends through the said housing wall.

6. A chair support column as claimed in any of the preceding

- 3 -

claims wherein a sealed pneumatic or hydraulic ram is fitted within the column and attached to the first and second members and when compressed produces a substantial restoring force acting in a direction to displace the first and second
5 members.

7. A chair having a seat of adjustable height comprising a base adapted to stand on the floor, a seat on which a person occupying the chair can sit, a first member attached to the seat and extending in a downward direction therebelow, a
10 second member attached to the base and extending upwardly therefrom, the first and second members being slidable relative one to the other characterised by:

a mechanical braking means which normally prevents relative movement between the said first and second members, a brake
15 actuator by which the braking means can be released to permit relative movement of the said first and second members, mechanical drive means by which the first member can be incrementally raised relative to the second member and a drive actuator by which the said mechanical drive
20 means can be operated, both the brake and drive means being operable by a person whilst seated in the chair.

8. A chair support column as claimed in any of the preceding claims or chair when fitted therewith wherein the incremental drive means comprises an apertured plate which
25 is normally free of the elongate member so as not to inhibit relative movement of the first and second members when the braking means is released but can be tilted by means of a lever so as to engage on the said rod or elongate member to enable a thrust to be exerted between the said first and
30 second members to move the two said members apart, the thrust so exerted serving to release the braking means to allow the first and second members to be incrementally moved

- 4 -

apart, the braking means regaining control as soon as the driving thrust is removed to hold the assembly of first and second members in their incrementally moved apart condition.

9. A chair support column as claimed in claim 8 or chair
5 when fitted therewith in which a single lever is employed,
and a thrust rod is utilised which passes through apertures
in the two plates and includes one or more thrust rings
which engage the plates independently depending on whether
the thrust rod is being moved in a downward or an upward
10 direction relative to a mean rest position.
10. A chair support column as claimed in any of the
preceding claims or a chair when fitted therewith wherein
the incremental drive means comprises an apertured plate
which is normally free of the elongate member so as not to
15 inhibit relative movement of the first and second members
when the braking means is released but can be tilted by
means of a lever so as to engage on the said rod or elongate
member to enable a thrust to be exerted between the said
first and second members to move the two said members apart,
20 the thrust so exerted serving to release the braking means
to allow the first and second members to be incrementally
moved apart, the braking means regaining control as soon as
the driving thrust is removed to hold the assembly of first
and second members in their incrementally moved apart
25 condition.

1/4

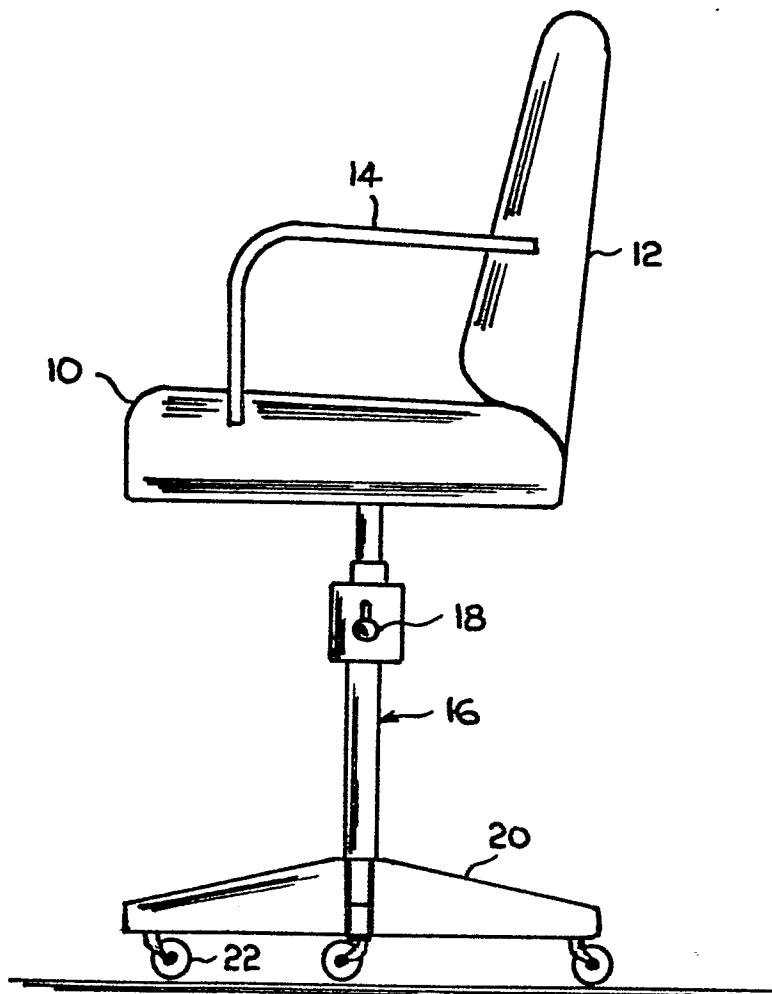
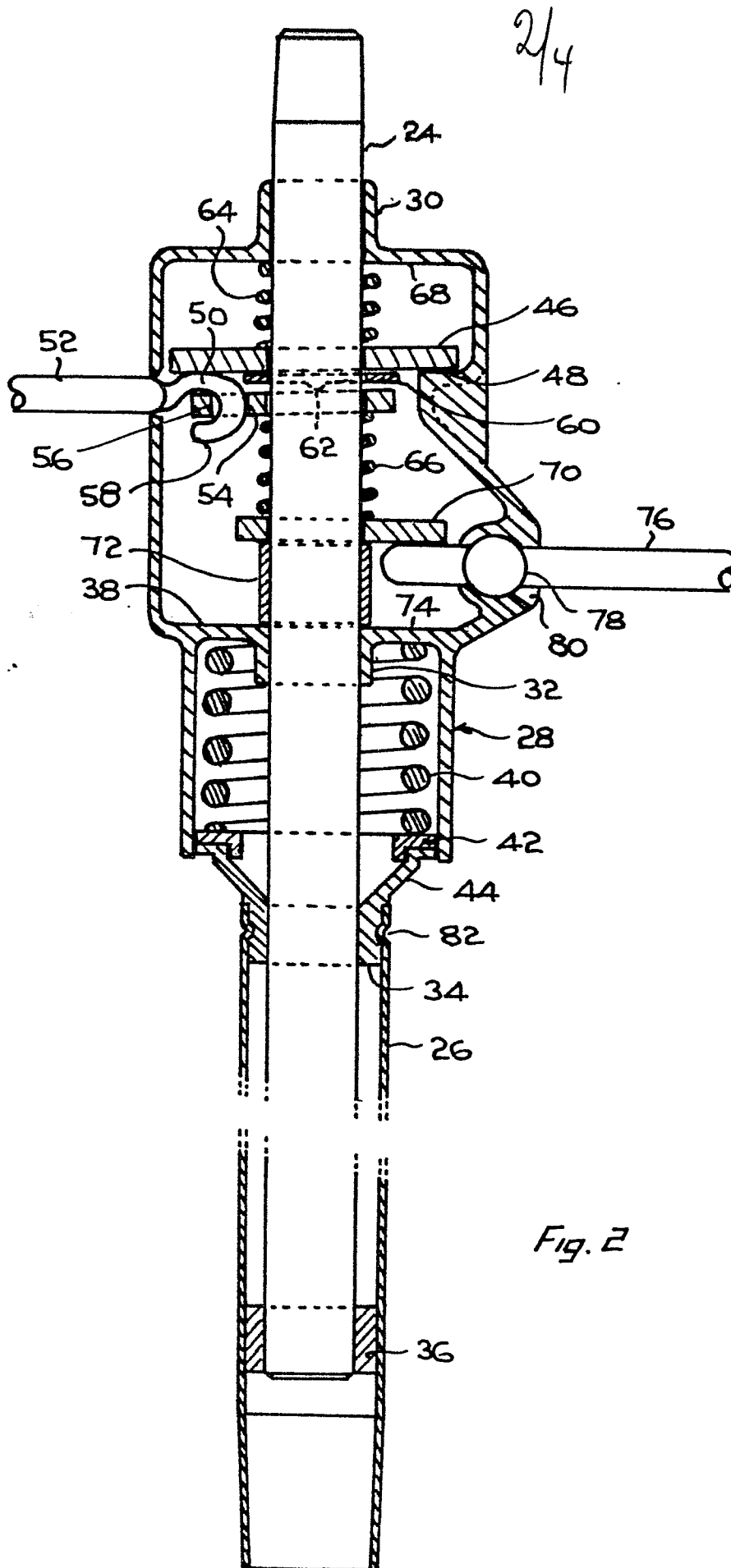


Fig. 1



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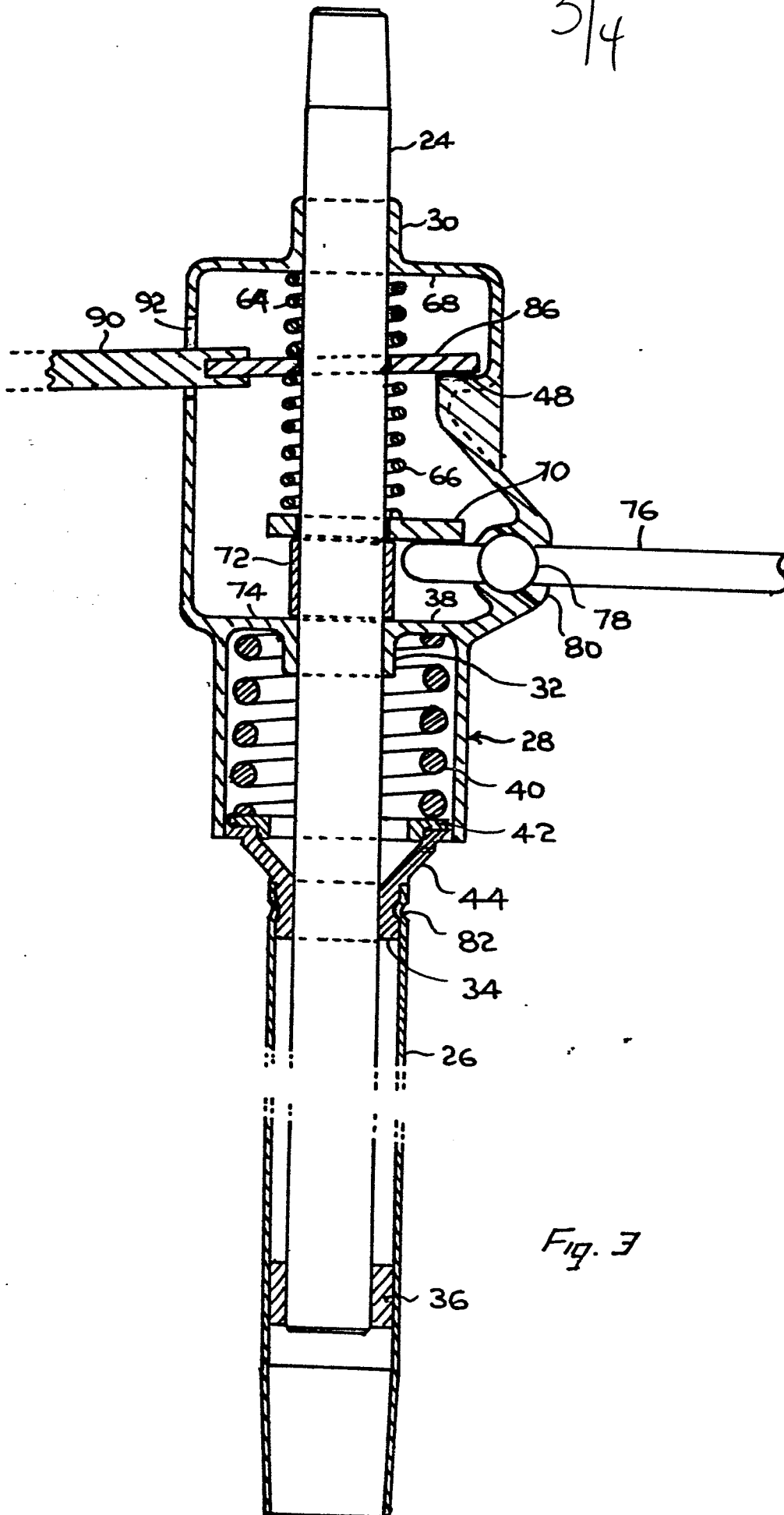


Fig. 3

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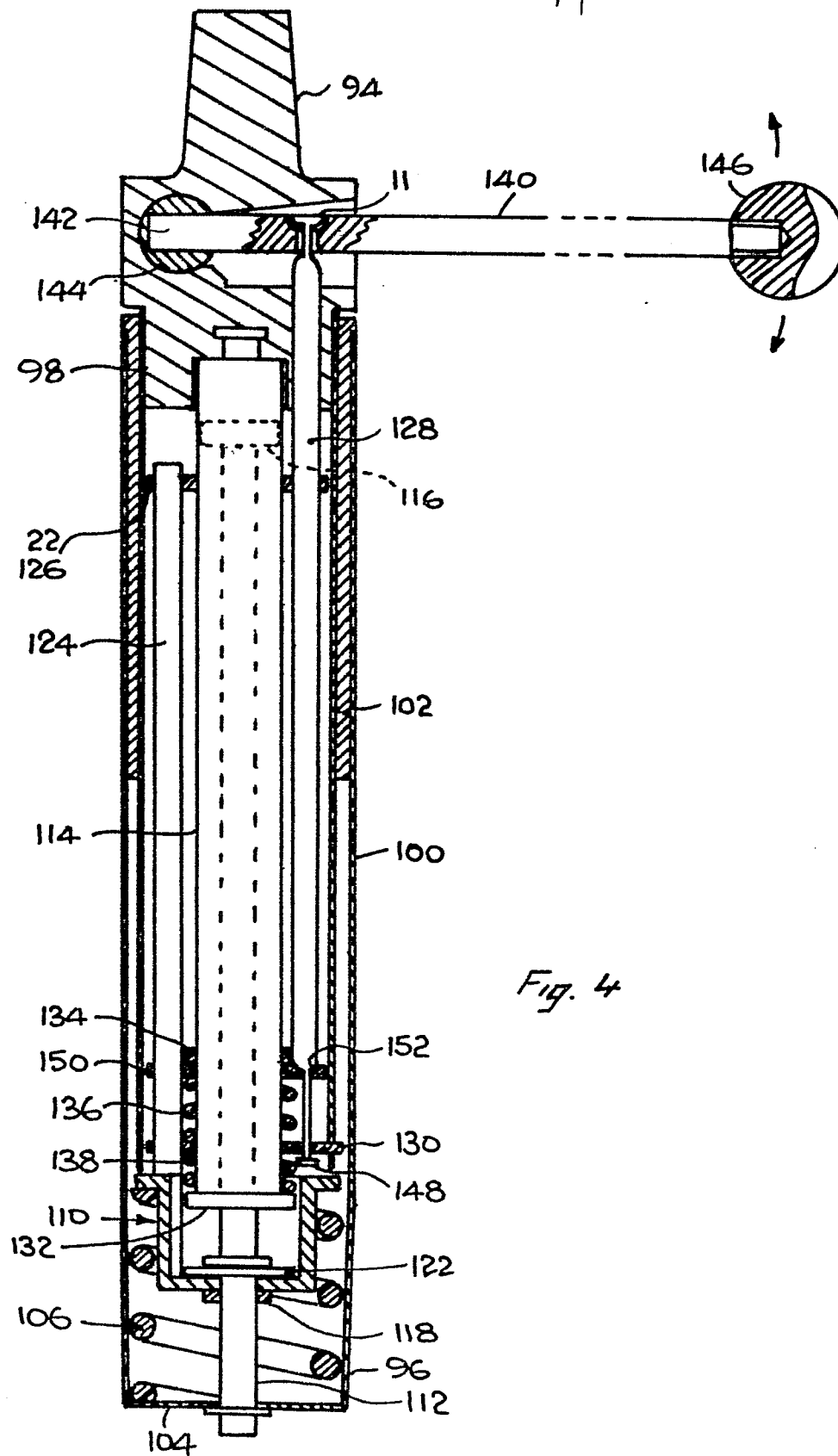


Fig. 4



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X	--- US-A-4 084 792 (BARON) * Column 2, line 6 - column 4, line 15; figures 1-4 *	1,5,7, 8,10	A 47 C 3/28
A	--- AT-B- 347 630 (DÜNSER) * Page 5, lines 8-29; page 6, line 49 - page 7, line 2; figures 1-3 * -----	1,2,8, 9,10	
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)
			A 47 C B 66 F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 02-02-1983	Examiner VANDEVONDELE J.P.H.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	