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(71) Applicant: SOL. ID S.r.l.
Via Industriale 46
I-25065 Lumezzane S.S (Brescia)(IT)

(72) Inventor: Bugatti, Lucio
Via Turati
Lumezzane S.S. (Brescia)(IT)

(72) Inventor: Dall'Era, Flavio
Via Rango 3
Lumezzane S.S. (Brescia)(IT)

(74) Representative: Lecce, Giovanni
Dott. Giovanni Lecce & C. S.r.l. Via G. Negri 10
I-20123 Milano(IT)

(54) Improved mechanism for selecting the vertical positioning of load-bearing furniture components.

(57) The improved mechanism for selecting the vertical positioning of load-bearing furniture components comprises a load-bearing column 10 placed between the work surface or seat 42 and the base 38. This load-bearing column has a double wall formed by two coaxial tubular bodies 14 and 12. A moving piston 32 placed in the cavity of this column divides the cavity into two chambers 16 and 18. A pressurised gas is distributed in the chambers. Valve components 68 are attached to the upper part of the said column and include a moving body 26, part of which has a reduced diameter and which is moved by a lever 22; these valve components allow the gas to be transferred from the upper chamber 18 to a small valve chamber 66. A pierced tube 62 connects up the said small valve chamber 66 with the lower chamber 16.

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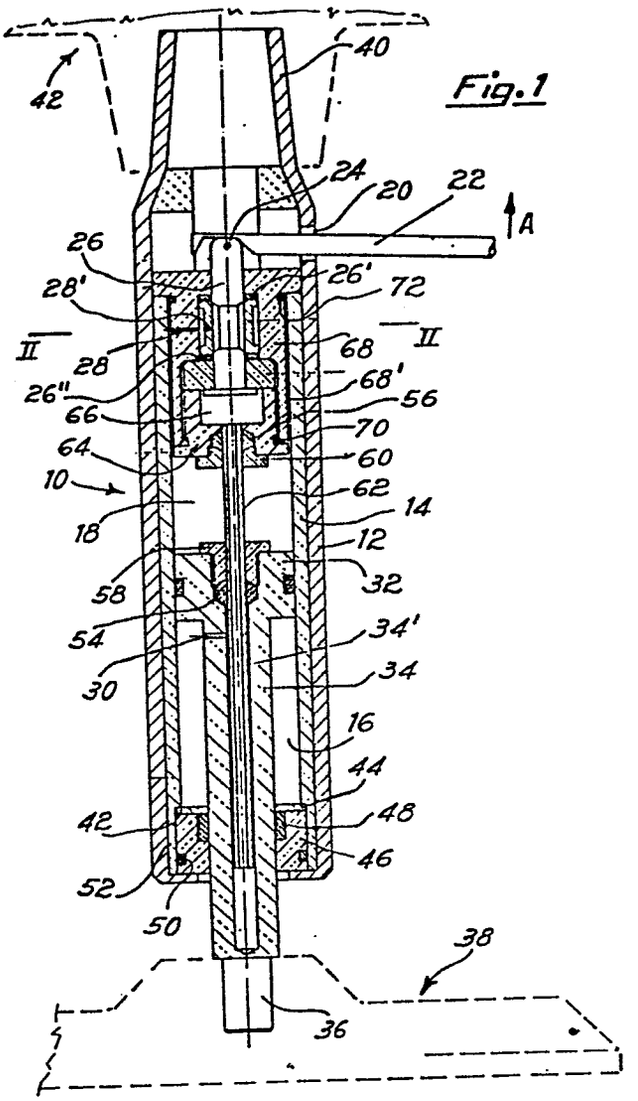
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16
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42
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52
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38
36

Fig. 1

IMPROVED MECHANISM FOR SELECTING THE VERTICAL POSITIONING OF LOAD-BEARING FURNITURE COMPONENTS

This invention consists of an improved mechanism for selecting the vertical positioning of load-beraing furniture components.

To be more precise, this invention consists of an improved mechanism for selecting the vertical positioning of load-bearing components for seats, chairs and armchairs, tables and occasional tables and such like (furniture).

Various types of load-bearing components are known for seats for reading, for people involved in work activities such as typing, for office staff, for professional people and others.

These load-bearing components normally comprise a column. The lower end of the column is attached to a base which ensures that it rests firmly on the ground. The upper end of the column is attached to the seat, chair or armchair, table or occasional table or any other work surface.

The load-bearing columns are fitted with mechanisms which regulate the height of the seat or work surface from the ground. The purpose of this is to allow the user to assume a position which is suitable for his height and physical build and which is more comfortable and appropriate for the work to be done.

There are various kinds of mechanism known. For example, helicoidal load-bearing columns mean that the seat has to be rotated to reach the desired level from the floor or the ground.

The more recent types of load-bearing column are fitted with components which are made up of several coaxial components. A pressurised gas (usually nitrogen) is enclosed in the hollow

space of these components. The gas is distributed in various coaxial chambers, the gas being transferred from one to the other as necessary to achieve the change in height or vertical extension of the load-bearing column.

A lever, which can be easily and comfortable reached by the person sitting on the chair, acts on the valves which control the movement of the pressurised gas between the coaxial chambers. All the known mechanisms, even the most recent and most sophisticated ones, have limitations or certain negative aspects. For example, the pressurised gas is contained in spaces which are adjacent to the outermost component of at least one of the aforementioned coaxial chambers of the load-bearing column. Because of this, the gas, which reaches several tens of atmospheres of pressure, can catch fire, particularly if it heats up because of high ambiental temperatures.

Attempts have been made to counteract the above-mentioned fire risk by isolating the spaces either occupied, or which can be reached by the pressurised gas, from the outer structural component of the column. This is done by placing a copper pipe in the circuit connecting the coaxial spaces, one of which is enclosed by the outermost component, which could explode under the effect of the pressure or eventual temporary or transitory superpressures. This was the way in which problems of possible fire or explosion were solved. However, the presence of the pipe referred to above means that the structure of the resultant load-bearing column

becomes exceedingly complex. Moreover, the presence of this pipe means that the load-bearing column has to be completely dismounted if there are losses and/or solutions of continuity in the pipe and the components which make up the circuit. The improved mechanism covered by this invention provides a rational and complete solution to all these defects indicated above.

This mechanism is composed of a multiple structure forming the load-bearing column. This structure has at least two coaxial components which enclose the coaxial chambers between which the pressurised gas moves. This multiple structure has a double wall which is resistant to pressure and to eventual transitory or persistent superpressures. This multiple structure also encloses the various gas passages and has a lever which acts as necessary on the valve components which are present in and act on the pressurised gas transfer circuit whenever it is necessary to adjust the height of the seat and/or other piece of furniture.

The improved mechanism covered by this invention is also fitted with a series of seals which are distributed among the various fixed and moving components in such a way as to guarantee optimal sealing.

In addition to this, at least some of the said seals are arranged in the mechanism in such a way that they can be removed and replaced if necessary.

The characteristics mentioned above and other, more specific, characteristics of the improved mechanism covered by this invention

will become apparent in the course of the detailed description which follows. The references made in this description are to the attached figures, which illustrate a specific example of use. These figures are:

- Fig. 1, which is a diagram of the section of this improved mechanism showing the vertical plane containing the axis of the load-bearing column;
- Fig. 2, which is a diagram of the section of the plane indicated by II-II in Fig. 1.

With reference to the figures, the mechanism 10 which forms the load-bearing column of furniture components, is made up of an outer tubular component 12 which encloses a coherent coaxial tubular body, thereby forming a double structure.

A piston 32, which runs in the tubular body 14, divides the space into two chambers, 16 and 18. The pressurised gas is contained in these chambers and is transferred from one to the other as necessary by the action of valve components which are described on the following pages.

The outer tubular component 12 has an aperture 20 from which a lever 22 extends. This lever is screwed onto a hinge 24 which is kinematically connected to a moving body 26, part of which has a reduced diameter. The axial movements of this component open and close the circuit.

When at rest, the parts of the moving body 26 which have a larger diameter hermetically seal chambers 16 and 18 by means of seals 26'

and 26". When lever 22 is raised, the part of the moving body 26 with a reduced diameter allows the gas to move between the two chambers, 16 and 18, through the passages 28 and 30.

The moving piston 32 which defines and separates the two chambers 16 and 18 can be defined as being an "entrainer". It forms a solid body with a rod 34 which contains the passage 30 running through to chamber 16.

The free end 36 of the above rod 34 has a shaped appendix attached to it. This is locked into a base, indicated as a whole as 38 and indicated in the figure as a broken line, which allows the seat or equivalent piece of furniture to rest firmly on the ground. The upper part 40 of the outer tubular component 12 is attached, in the normal way, to the seat 42, which again is indicated by a broken line. The structural characteristics of this seat are not described as they are not pertinent to the subject of this invention.

The lower part of the inner tubular component 34 corresponding to the base 38 is fitted with a step 42. The support washer 44 of a flange 46 is kept pressed against this step 42. The flange 46 contains the above-mentioned rod 34 by means of a seal 48. Another outer seal 50 guarantees the sealing between flange 46 and the shaped end 52 of the inner tubular component 14 mentioned above.

A valve component 68 is pressure sealed into the upper part of inner tubular component 14, corresponding to the seat 42. A hollow space 68' is left between the valve component 68 and the internal

walls of tubular component 14 for passage of the gas.

The hermetic sealing between the upper part of the inner tubular body 14 and the valve component 68 is completed by seals 70 and 72.

The moving body 26, which can correctly be defined as the valve unit which is actuated by lever 22, is hermetically sealed inside valve component 68.

The rod 34 and the piston 32 are pierced along their entire length.A pierced pipe 62, preferably made of copper, is inserted into this aperture. The upper end of this pipe 62 is attached to a small chamber 66 by means of a pipe-holder 64. The passage pierced inside pipe 62 exits into the little chamber 66.

A hollow space 34' is left between pipe 62 and the inner wall of the aperture in rod 34 to allow passage of the gas.

Chamber 66 can be made to connect with chamber 18 by means of tubes 28, 28' and hollow space 68', by lowering moving body 26.

Seals 54 and 56, which are screwed to dorm a kind of stuffing box, by screws 58 and 60 respectively, enclose pipe 62 in correspondence to piston 32 and valve component 68, guaranteeing sealing.

The way in which the improved mechanism covered by this invention works can be briefly summed up as follows. With the weight of the person seated weighing on the seat 42, let us suppose that the height of the seat has to be adjusted to make the seat lower. By moving lever 22 in the direction shown by the arrow A, the moving body 26 is lowered, allowing the pressurised gas contained in chamber 18 to move through passages 68', 28 and 28' into the small

chamber 66 and then through the aperture in pipe 62, hollow space 34 and passage 30 into the other chamber 16.

Because of the pull of gravity caused by the weight of the person, the multiple structure 12 and 14 gradually moves down with respect to rod 34 until, the position required for the comfort of the person having been reached, lever 22 is moved in the direction opposite to that shown by arrow A, thus halting the movement of the gas.

In order to obtain a proportionally progressive raising of the seat 42, the pressure of the gas in chamber 18, which is greater than that in the other coaxial chamber 16, is exploited.

When lever 22 is moved without the weight of a person sitting on the seat, the pressurised gas moves in the opoosite direction, i.e. from chamber 16 to chamber 18, thereby completing the operation of positioning seat 42 at the height desired by the user.

The improved mechanism covered by this invention has been described represented and commented on with reference to the figures, which represent a simplified, explanatory example.

It is understood that the mechanism which, when produced on an industrial scale, may undergo numerous constructional and/or functional modifications, will still be covered by the invention which is the subject of this patent.

WHAT I CLAIM IS:

1. Improved mechanism for selecting the vertical positioning of load-bearing furniture components, comprising a load-bearing column between the seat or work surface and the base, a moving piston in the cavity of this column which divides the cavity into two coaxial chambers, a pressurised gas distributed in these chambers and valve components for regulated movement of the said gas between the coaxial chambers. The mechanism is distinguished by the fact that the load-bearing column is made up of a multiple structure defined by a double wall which is resistant to pressure and to eventual superpressures.

2. Improved mechanism as in claim 1, in which the pressurised gas contained in the chambers or in the passages is constantly enclosed by a double wall.

3. Improved mechanism as in claim 1, in which the double wall consists of an inner tubular body surrounded and enclosed by a second, outer tubular body which is coaxial to the first one.

4. Improved mechanism as in claim 3, in which the end of the inner tubular body which is close to the base is closed by a flange fitted with seals, whereas the other end is closed by a valve component, with a hollow space for passage of the gas between the said tubular body and valve component.

5. Improved mechanism as in claim 4, in which the valve component comprises a lever hinged to a moving body, part of which has a reduced diameter, and a small chamber which is connected to the upper chamber of the column by means of pipes whose openings

are regulated by the moving body referred to above.

6. Improved mechanism as in one of the above claims, in which the moving piston is fitted with a rod pierced along its entire length. The free end of this rod is attached to the base and has a tube connecting up to the lower chamber of the column.

7. Improved mechanism as in one of the above claims, in which a pierced tube, preferably made of copper, is attached to the small chamber of the valve component and runs in its aperture, thereby forming with the valve component a hollow space for passage of the gas.

8. Improved mechanism as in claim 7, in which seals, screwed to form a kind of stuffing box, are fitted around the tube in correspondence to the piston and the valve component.

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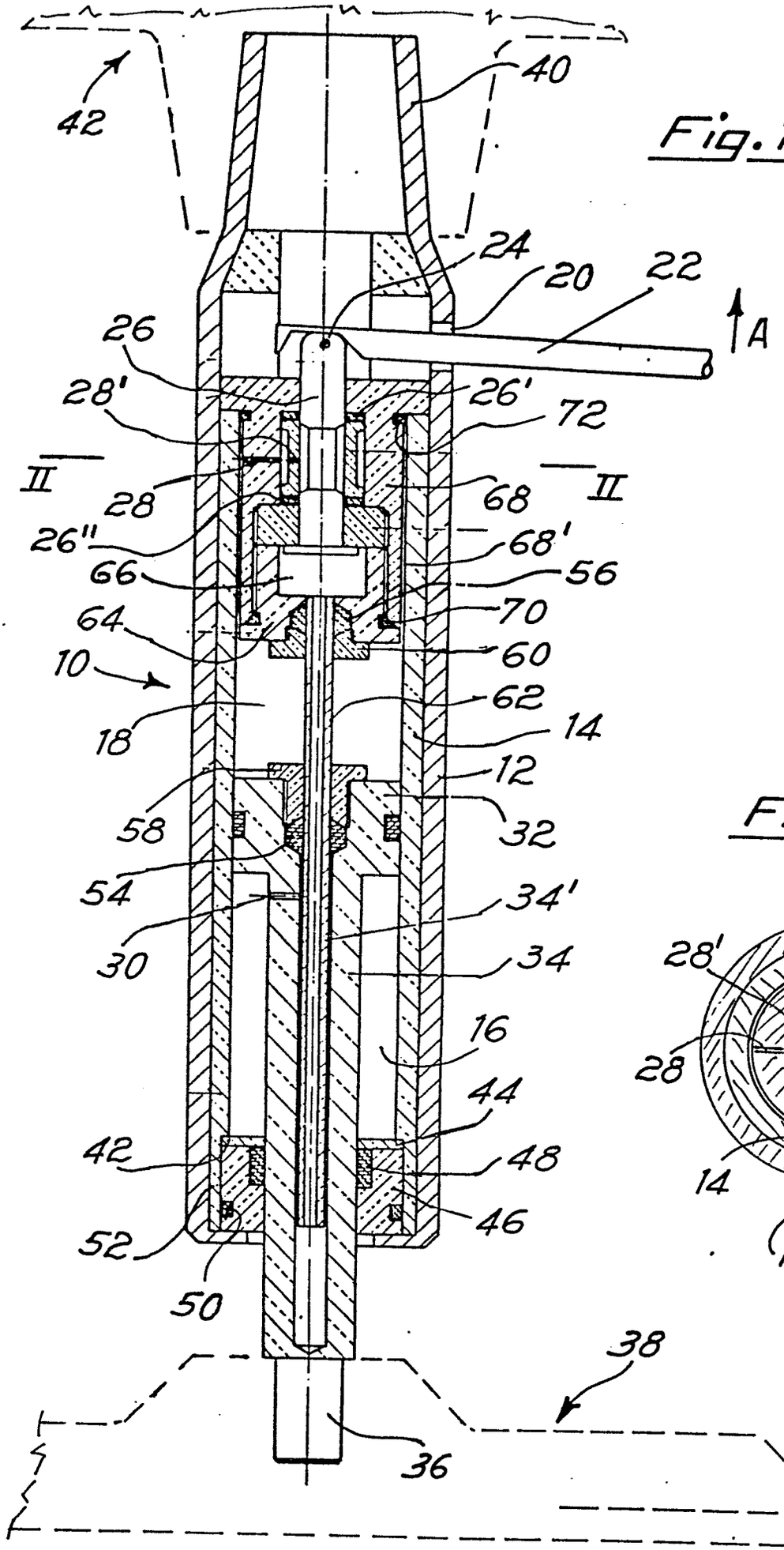

Fig. 1

Fig. 2