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(54) Adjusting device for chairs

(57) Adjusting device for chairs and the like having mutually movable parts, including a couple of telescoping arranged elements (10, 12) connected between a movable part of the chair and a frame or the like thereof, the telescoping arranged elements being provided with an adjusting device, in one position allowing relative movements between the elements and in another position rigidly locking the two elements to each other, the adjusting device including a control body displaceable essentially radially towards and from the axis of mutual movement of the elements. The novelty lies in the provision in the one of the elements, preferably, the inner one, of a continuous elongated slot having a number of wide portions (31) and intermediate narrow portions (32) connecting the wide portions; and a radially displaceable control body having a thick portion (26) mating the wide portions (31) of the said slot and a thin portion (25) mating the narrow portions (32) of the slot, the thin portion engaging the narrow slot portions serving as a stabilising means during relative movement of the elements (10. 12).

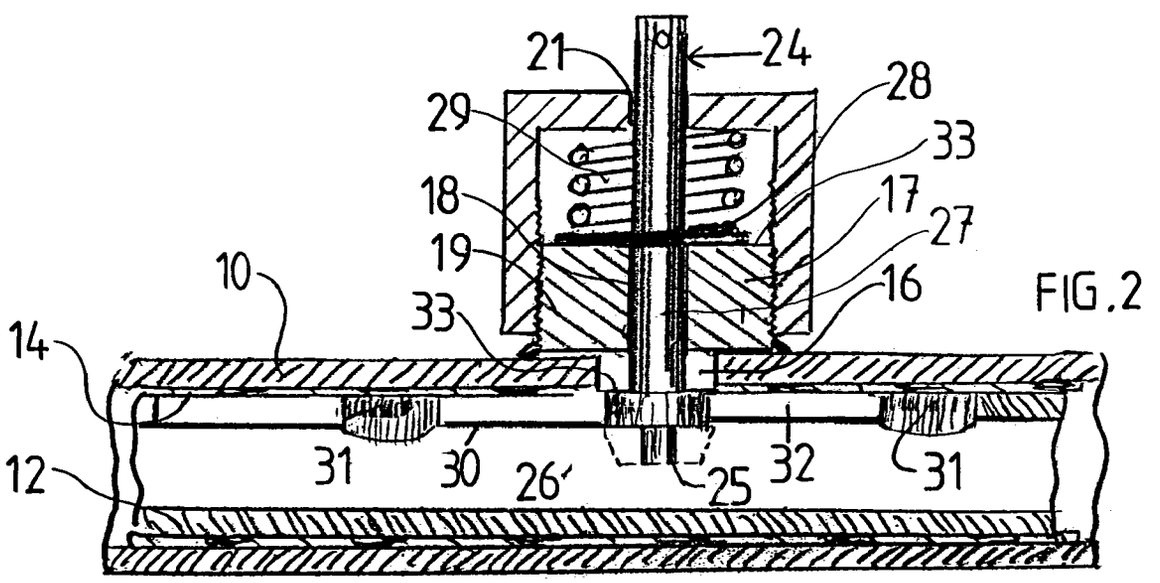

FIG.2

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Description

Technical Field of the Invention

[0001] This invention relates to an adjusting device for chairs and the like, both as pieces of furniture and seats for vehicles and vessels as well as other similar pieces of furniture such as beds and the like where one movable part is hingedly or slideably connected with another part and provided with an adjusting device for setting the intended position of the movable part.

Background of the Invention

[0002] Devices for adjusting parts of furniture pieces are known in multitude. Such devices generally include two elements, the one slideable relatively to the other and the one connected to a furniture or chair main frame or support, the other connected to the movable part of the chair or piece of furniture and a control means controlling the relative movement between the elements and thereby define the positions of the chair parts.

[0003] WO 87/02182 discloses one typical example of an adjusting device including two parts, one elongated part arranged to slide through a guiding part and a control means in the shape of a screw means attached to the guiding part, the screw means on rotating being arranged to either lockingly engage the elongated part or release the same for movement relatively to the guiding part.

[0004] US-A-4 607 883 discloses a device including one slotted tube connected to one chair part and a guide bar slidably received in the tube part and connected to another chair part. The tube is provided with a sliding block arranged inside the tube and engaging the guide bar. The friction produced between the sliding block and the guide bar on relative movements between the tube and the guide bar controls the rate of movement and prevents sudden and un-intended movements between the chair parts.

[0005] UK-A 636 806 discloses a further arrangement including an adjusting device, wherein one elongated part secured to the chair frame is provided with a toothed rack and a runner connected to another part of the chair, viz. the back of the chair, is provided with a movable tooth co-operating with the toothed rack for stopping the relative movement at intended positions. The tooth is movable by means of a Bowden cable attached to a handle secured at the arm rest of the chair against the force of a spring urging the tooth against the toothed rack.

[0006] EU-A-0 325 569 discloses still another adjusting device for chairs including a sleeve connected to the sub structure of the chair, a slide bar connected to a seat portion, movable relatively to the sub-structure thereof and slidably received in the sleeve, an adjustment device including at least one bore made in the slide bar and at least one spring biased pin and at least one hole in the sleeve for inserting the pin so that it reaches the bore of the slide bar thereby locking the slide bar and sleeve together in a position or positions defined by the position of the hole or holes.

[0007] In order to adjust known devices, but for the friction controlled ones, a control handle or device must be biased, e.g. by turning of a handle in order to move a threaded element into or out of engagement with a movable part, by swinging a lever in order to pull a pin outwardly out of engagement with a bore or the like or by swinging a tooth into an out of engagement with a toothed rack.

[0008] Most adjustable chair frame structures are manufactured of rather thin gauge pipe material and this means that even upon normal upon loading, pipe sections may be bent, warped or otherwise deformed. If a frame section or a seat structure becomes warped the attachment points for the adjustment devices thereon are often also distorted resulting in a miss-alignment of the slidably or otherwise relatively movable parts of the adjustment device, which means e.g. that locking pins are unable to find the correct position of a bore or a tooth fails to properly engage a toothed rack, and no locking of the two parts take place. It is possible to reduce the risk for missalignment by such measures as the one shown in UK-A 636 806, i.e. to use extremely sturdy square pipe sections and solid bracket and roller guiding means etceteras.

[0009] One aspect of this invention is to provide an adjustment device which irrespectively of occurring distortions at adjoining chair frame structure parts remains fully operable.

[0010] A further aspect is to provide an adjustment device, which can be manufactured in an easy way from inexpensive material.

[0011] Another aspect is to provide an adjustment device demanding an extremely short movement of a control body for releasing or securing the mutually movable parts to and from, respectively, each other.

[0012] Yet an aspect is to bring about an adjustment device in which the force necessary for releasing and locking the device elements is very low, and consequently requires minimum setting force at spring means and the like.

[0013] Still another aspect is to provide an adjustment device requiring no lubrication or service and which may be built into any appropriate section of a chair or the like piece of furniture.

Summary of the invention

[0014] The adjustment device according to the invention includes two mutually displaceable telescoping elements, the outer one of which is a piece of tube as preferably also the inner one and a lining of low-friction tubing material provided between the outer and inner tube element. The outer element has a guide means for

a control body slidably arranged for movement essentially radially or normally relatively to the outer element tube and an opening in line with said guide means. The inner element of the two coaxially arranged elements is provided with an aperture formed by a multitude of axially separated wide portions connected by intermediary narrow portions forming together a continuous elongated opening. A first thick portion of the control body has a cross section adapted to fit into any of the wide portions of the continuous elongated aperture and axially separated therefrom a thin second portion adapted to fit into the narrow portions of the elongated aperture. By displacing the control body a tiny distance radially relatively to the inner and outer elements, the thick portion of the control body will either enter one of the wide portions of the elongated aperture and lock the elements together or leave the said position thereby releasing the two elements from each other while the thin portion by engaging the narrow portions of the continuous elongated aperture sees to that the peripheral positioning of the two elements is maintained.

Brief Description of the Drawing

[0015] The aspects and advantage of the invention will be explained in the following with reference to the accompanying drawings, in which

Fig. 1 is a side view schematically showing the structure of a foldable or adjustable chair provided with an adjustment device according the invention,

Fig 2 is an enlarged sectional side view, showing one embodiment of the adjustment device according to the invention,

Fig. 3 is a fractional sectional top view of the embodiment according to Fig. 2,

Fig. 4 is a sectional side view similar with Fig. 2 and showing an amended embodiment,

Fig. 5 is an enlarged side view of an amended control body and co-operating parts of the device, and

Fig. 6 is a fractional sectional top view of the embodiment according to Fig. 5.

Description of preferred embodiments

[0016] In the following description parts and details having the same purpose and general configuration are given identical reference numerals.

[0017] A typical chair to be provided with an adjustment device according to the invention includes a substructure or frame 1, which can have many different constructions.

[0018] The frame 1 includes two side sections, the upper parts thereof often connected to armrests 2 and having pivot points 3, normally bolt holes or the like, for pivot bolts or pins connected with and carrying the back rest 4 of the chair. At its lower edge the back rest 4 in turn is swingably connected to the rear portion of a seat 6 by means of hinge type connectors 7, which means that on swinging the back rest 4 around the pivot points 3, the seat 6 will move forwardly or rearwardly.

[0019] The seat 6 connected with the back rest 4 at 7 is also supported by pads or the like sliding surface portions 8 at the sub structure frame 1. In order to control the movements of the back rest 4 and the seat 6 relatively to the sub-structure 1, at least one, normally two adjustments devices 9 according to the invention are mounted between on the one hand the seat and back rest combination and on the other hand the sub structure frame 1.

[0020] The adjustment device 9 includes two element, viz. an outer pipe 10, at one end having a connector means 11 to be connected with a completing connector 11' at the seat 6 or the sub structure frame 1, and an inner pipe 12 having at its end opposite to the connector end of the outer pipe 10, a connector means 13 to be connected with a completing connector 13' at the substructure frame 1 or the seat 6. A support bracket 2' is preferably connected withth fram 1 1 adjacent the connectors 11.

[0021] The outer and the inner pipes 10 and 12, respectively, are telescopically arranged and can, together, in dependence of the positions of the back rest 5 and seat 6 have different effective lengths. In order to reduce the friction and to prevent any noise there is between the two pipes 10 and 12, arranged a tube like lining 14 of insignificant thickness.

[0022] The purpose of the adjustment device 9 according to the invention is to enable the person wishing to alter or set a position of the back-rest and seat 5 to do this in an uncomplicated way. The moving of the seat and back-rest can be done manually, by altering the position of the body sitting in the chair or even by means of power driven apparatuses.

[0023] In the embodiment of the invention shown in Fig 2 there is provided at the outer pipe 10, aligned with a recess 16 made in the pipe wall, a base part 17 preferably welded or otherwise secured to the pipe 10 and having a through bore 18 and an external thread 19. In the embodiment shown the bore 18 is narrower than the recess 16, but they can also have identical cross section areas. A cup 20 having an internal thread 21 at its open end an a central bore 21 at its opposite end, can be threaded onto the base part 17. The control body proper 24 has at its inwardly directed end a thin portion 25 followed by a thick portion 26 and a cylindrical portion 27 adapted to the bore 18 of the plug element. A collar 28 is secured at the body 24 outside the plug element 17 and a compression spring 29 is mounted between the collar 28 and the inside of the top end of the cup 20.

[0024] At the inner pipe 12 there is provided an elon-

gated aperture 30 formed by a number of wide, essentially or nearly circular portions 31 at a distance from each other joined by narrow straight portions 32. The row of wide and narrow portions forms the continuous slot like aperture, which preferably is milled by means of a CNC machine.

[0025] In the rest or locked position shown in Fig. 2 the spring 29 holds the collar 28 against the outer face of the base part 17 and thereby positions the inner end of the control body 24 so that its thick portion 26 fits into one of the wide portions 31 of the inner pipe aperture 30 whereas the thin portion 25 extends beyond and inside the inner face of the inner pipe 12.

[0026] In order to release the locked position, the control body 24 has to be pulled outwardly, preferably by means of a wire or the like attached to the end at 24 protruding from the cap 20 against the force of the spring 29 until the outer axial face 33 at the thick portion 26 engages the inner face of the base part 17. In that position the thick portion 26 is completely outside the wide portion 31 of the aperture but the thin portion 25 remains in line with the narrow straight portions, which means that the inner pipe 12 can be freely moved longitudinally relatively to the outer pipe 10 the length of the aperture and that the mutual positions of the two pipes, peripherally are kept intact as the thin portion 25 on displacing the pipes 10 and 12 axially acts as a guide by engaging and following the narrow portions 32 of the aperture.

[0027] As can be seen from Figs. 4, 5 and 6 the shape of the co-operating details may vary.

[0028] Fig 5 shows another preferred embodiment where the control body has a conical thin portion 25' and a cylindrical thick portion 26'. The conical portion 25' is intended to facilitate the movement from released position to locked position.

[0029] Fig. 4 discloses an embodiment, which icould be regarded as inverted when compared with the embodiment according to Fig 2. In the latter embodiment the release of the two telescopically arranged elements or pipes 10 and 12 brought about by pushing the protruding end of the control body inwardly. The collar 28' is moved to an opposite position and the positions of the thin and thick portions 25" and 26", respectively, have been switched. On pressing the end of the control body inwardly the thick portion 26" is displaced inwardly into the interior of the pipe 12 whereas the thinn portion 25", in co-operation with the narrow aperture portions 32 serves as a guide on axially displacing the pipes.

[0030] Besides acting as a guide for preventing miss-alignment peripherally of the two pipe elements of the device, the specific design of the wider aperture portions in combination with the thick portion of the control body ensures a reduced contact surface pressure at the aperture edge portions defining the wider portions and consequently a reduced risk for upsetting or deforming said edge portions.

[0031] As the distance of displacement of the control body necessary for switching the control body between the locking position and releasing position is extremely short, and approximately corresponds to the wall thickness of the inner pipe, the force necessary to cause a switch operation is very low as it is necessary only to compress the spring slightly. The stable guiding of the control body together with the spring continuously holding the control body in its locking position ensures a very stable locking without any play.

[0032] Many modifications are possible without deviating from the scope of the claims. It is thus possible to refine the guiding function by giving the thin portion a more or less pronounced wing profile and an axial extension essentially corresponding with or even exceeding the diameter of the wider openings as indicated by dashlines in Fig.2. In this case the radially outer portions of the thin portions may even serve as end stops by engaging the outer pipe inner face portions defining the recess 16 thereby enhancing the stability of the thin portion when serving as guide against miss-alignment.

Claims

1. Adjusting device for chairs and the like with at least one member (4, 6) hingedly and/or slidably connected to a sub-structure or frame arrangement (1), said device (9) including telescoping elements (10, 12) displaceable relatively to each other; one element connected to the hingedly or slidably arranged member of the chair or the like, the other element connected to the sub-structure or frame structure or the like thereof, at least one guide means (17) for receiving at least one control body (24) movable into and out from holes or the like recesses arranged in the two elements, the control body in one position locking the elements together in order to position the chair member in a set position, the control body in another position allowing the elements and member to move, at least an outer of at least two telescoping elements is provided with a guide means (17, 20) aligned with a recess (16) in the wall of the outer element and guiding a control body (24) reciprocatingly movable essentially radially in relation to a longitudinal axis of the telescoping elements for engaging or releasing an inner element (12) movable inside the outer element,

   characterized in,

   that the inner element (12) slidably received in the outer element (10) at one side thereof facing the recess (16) and the guide means (17, 20) of the outer element is provided with a multitude of wide recesses or openings (31) connected by intermediary elongated narrow recesses or openings (32) so as to form together a continuous elongated slot or open-

ing with alternatively wide and narrow portions in parallel with the longitudinal axis of movement of the elements,

that an end portion of the control body (24) has a thick portion (26) adapted to fit into any of the wide slot portions (31) and a thin portion (25), with a width seen transversally of the axis, adapted to fit into the narrow slot portions (32) and

that the control body is displaceable between a locking position, in which the thick portion (26) thereof is received in any of the wide slot portions (31) for locking the telescoping elements (10, 12) together, and a releasing position, in which the thin portion (25) is received and slidable along the entire continuous elongated slot for guiding and aligning the two elements during mutual displacement.

2. Adjusting device according to claim 1, **characterized** in, that the outer element (10) being tubular or pipe shaped, the inner element (12) preferably also being tubular,

that the guide means includes a base part (17) provided with a through bore (18) aligned with a recess (16) in the wall of the outer element (10) and secured by welding or the like to said element (10) and a cup like part (20) threaded onto the base part, enclosing a spring means (29) and also provided with a through bore (24),

that the control body (24) besides the thick portion (26) and the thin portion (25) at its inner end, is provided with an abutment means (28) for the spring means (29), the spring means to be arranged between said abutment means (25) and an abutment surface (33) at the guide means,

that an end of the control body projecting outwardly through the bore (24) of the cup like part (20) is adapted to be manually manipulated in a direction opposite to the direction of the force exerted by the spring means (29) for displacing the thick control body portion (26) out of engagement with a wide portion (31) of the continuous elongated slot allowing relative movement between the two elements (10, 12), the thin control body portion (25) been guided along and engaging the narrow slot portions (32) between the wide one during movements.

3. Adjusting device according to claim 1 or 2, **characterized** in, that the thick one of the thin and the thick portions (25 and 26) of the control body has an axial extension, seen in the length direction of the said body, adapted to the wall material thickness of the inner pipe shaped element (10), an axial displacement of the control body a distance essentially corresponding to the thickness of the said material resulting in locking or releasing, respectively, of the two telescoping elements to or from each other, respectively.

4. Adjusting device according to claim 1, 2 or 3, **characterized** in, that the thick one (26) of the thin and thick portions (25, 26) of the control body has a thickness essentially corresponding to the overall thickness of the said body, the width of the wide portions (31) of the continuous elongated slot mating said thickness,

that the thin one (25') of the said control body portions, projecting from the inner end of the said body, preferably being tapered towards a thickness mating the width of the narrow portions (32) of the continuous elongated slot.

5. Adjusting device according to claim 1 or 2, **characterized** in,

that the thick portion (26") of the control body is at the extreme inner end of the said body, the thin portion (25") connecting the thick portion (25") with the remainder of the, control body, and
that the control body, is displaceable inwardly against the force of the spring means (29) relatively to the telescoping elements (10, 12), from a displacement preventing locking position, in which the thick portion thereof (26") engages any of the wide portions (31) of the continuous elongated slot of the inner element (12), the thick portion (26") thereby being displaced inwardly into the hollow interior of the inner element (12),
on displacement of the elements, the thin portion (25") being guided along and to engage the narrow portions (32) of the continuous elongated slot.

6. Adjusting device according to any of claims 1-4, **characterized** in, that means for connecting a flexible power transmitting device of wire type at the control body (24) is arranged for providing remote control of the device.

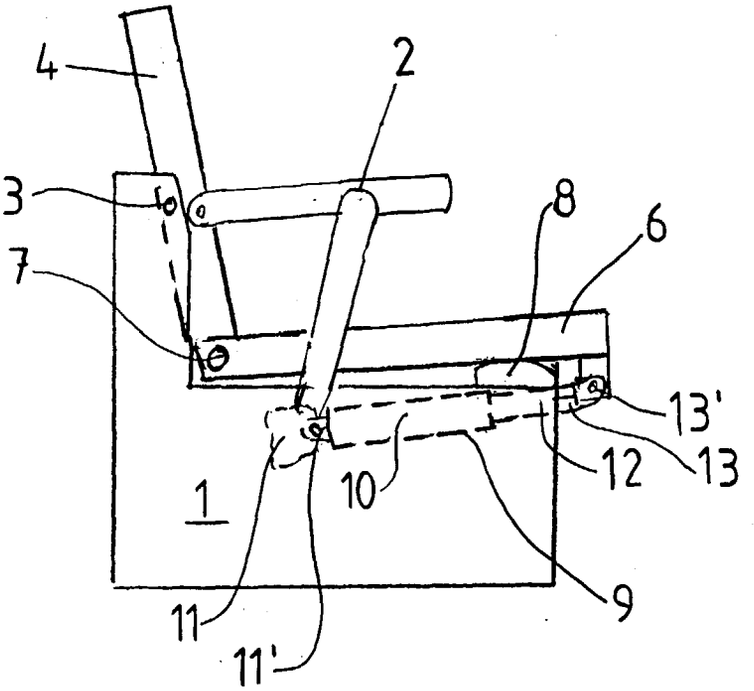

FIG.1

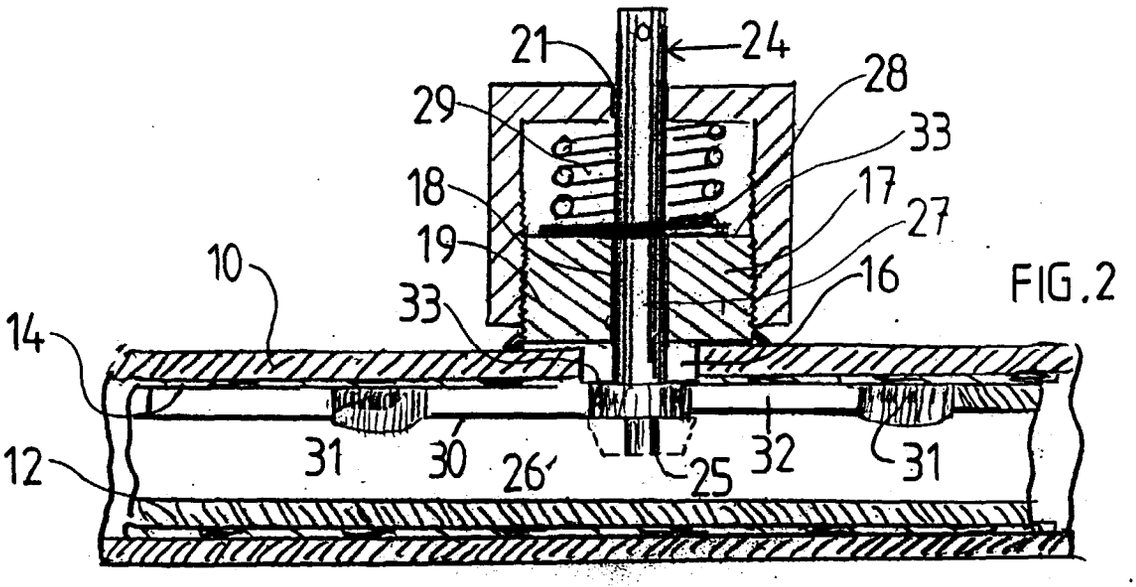

FIG.2

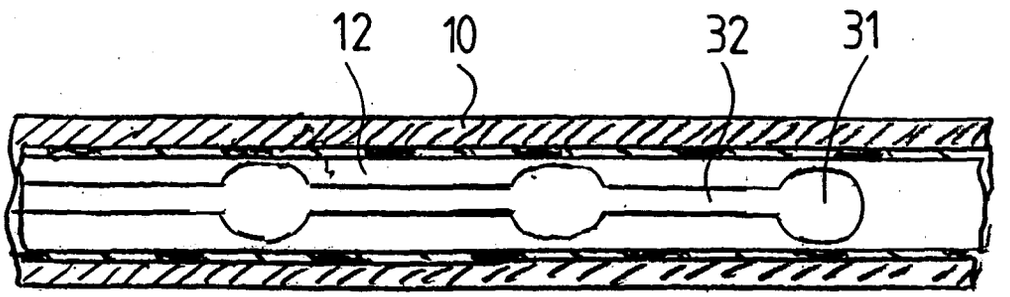

FIG.3

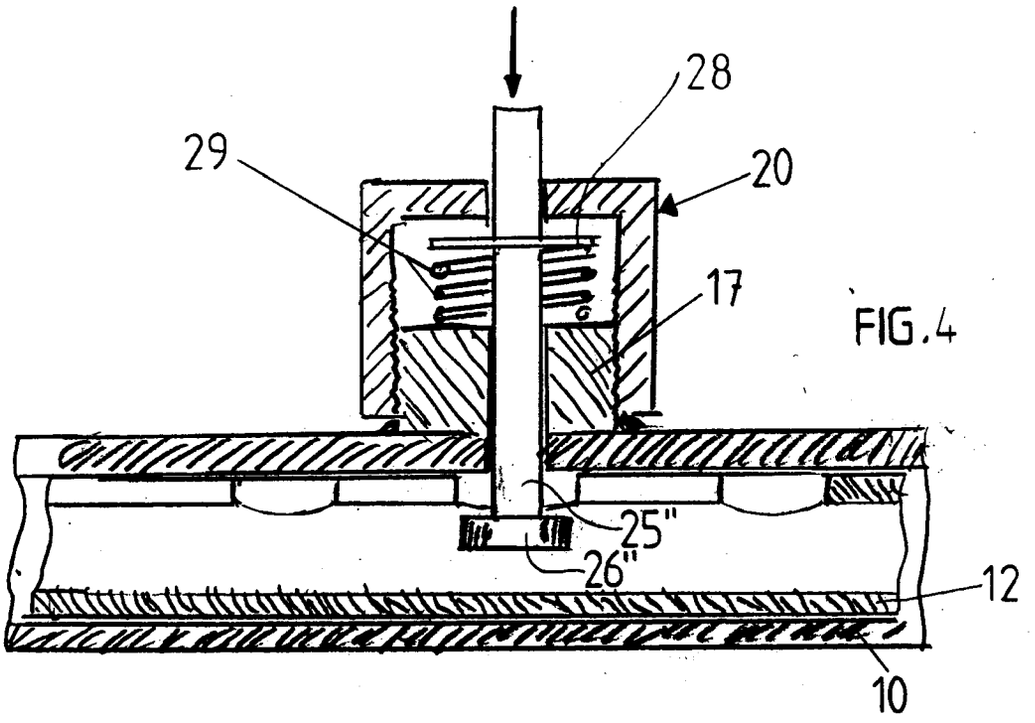

FIG.4

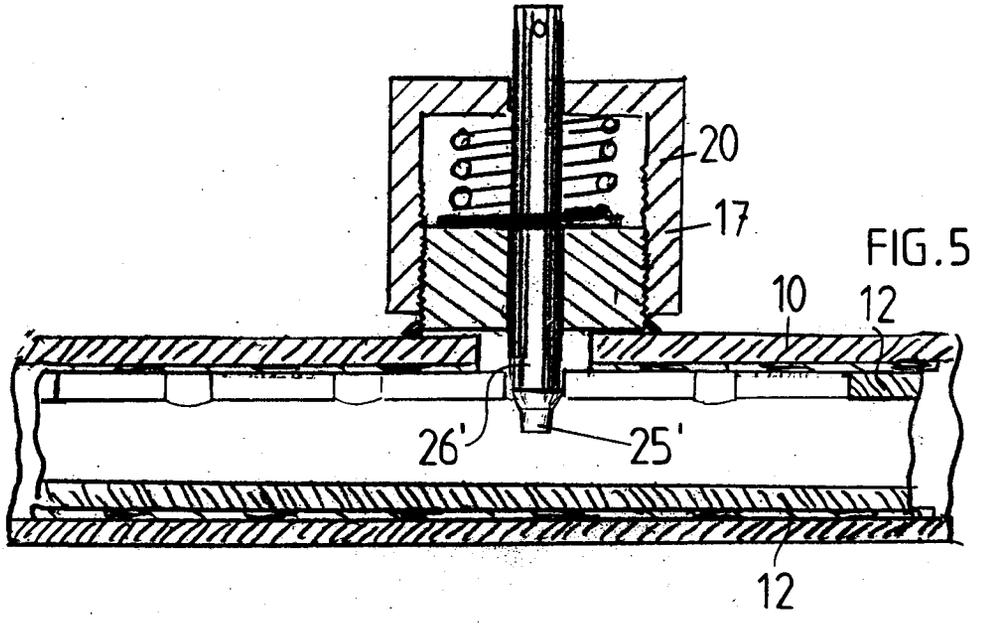

FIG.5

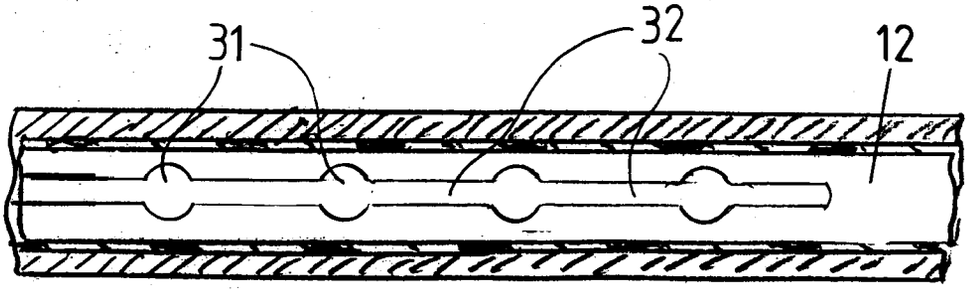

FIG.6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 97 11 7020

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.6)
X	US 2 099 460 A (BELL) * the whole document *	1,5	A47C1/026
Y		1,4	
A		2,3	
Y	GB 860 760 A (J. HARMAN HUNT) * the whole document *	1,4	
A		2,3	
A	FR 63 647 E (DUCROT) * the whole document *	6	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A47C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	17 February 1998	VandeVondele, J

CATEGORY OF CITED DOCUMENTS

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