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(54) Hinge and lecture room desk provided with a hinge

(57) A hinge comprises two parts (11, 12) which are rotatable relative to one another about an axis of rotation (14), are interconnected by a continuous hinge pin, and are provided with a blocking mechanism against rotation whereby the hinging angle is limited to a maximum value ($\alpha + \beta$). The hinge pin comprises a flat plate (10), and at least one of the two parts (11, 12) of the hinge has a cavity (13, 13') for accommodating the hinge plate (10). The hinge pin (10) cooperates with the edge (16) of the cavity, at least during operation, for forming the blocking mechanism against rotation.

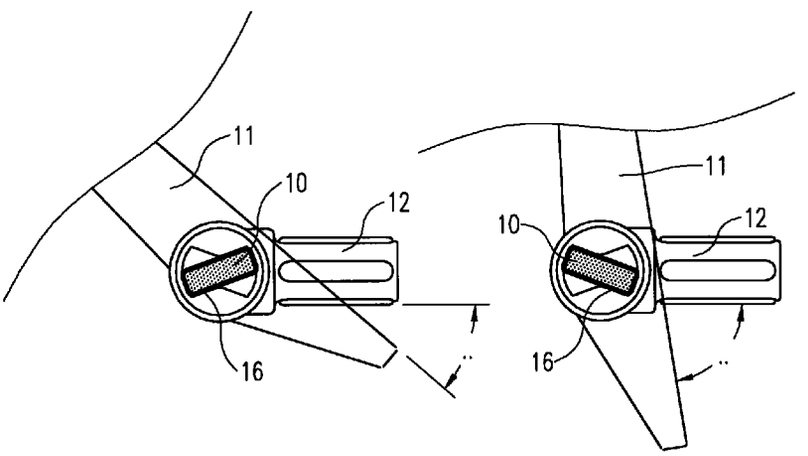

Fig.3E Fig.3F

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Description

The invention relates to a hinge comprising two parts which are rotatable relative to one another about an axis of rotation, are united by a continuous hinge pin, and are provided with a blocking mechanism against rotation by which the rotation angle is limited to a maximum value. Such a hinge can be used in a wide range of applications and is highly suitable for furniture such as, in particular, lecture room desk seats which assume an upright position upon being left by the occupant. The invention also relates to a lecture room desk provided with a hinge.

A known hinge of the kind mentioned in the opening paragraph comprises the hinge pin in the form of an external shaft in the one part, which shaft is received in a complementary, cylindrical cavity in the other part. The known hinge in addition comprises two studs on the one part which cooperate with shock absorbers on the other part so as to form a blocking mechanism against rotation whereby the maximum rotation angle of the hinge is defined.

A disadvantage of the known hinge is that the total load on the hinge transverse to the hinge pin is borne by the comparatively thin shaft. This results in a comparatively great pressure in the plane of rotation, which intensifies wear. The known hinge is in addition given a comparatively voluminous construction with the object of making it withstand loads which are usual in furniture, especially lecture room desks.

The present invention has for its object to provide a hinge of the kind mentioned in the opening paragraph in which the load in the hinge is distributed over a larger supporting surface area, so that the hinge can be more durable and compact.

According to the invention, a hinge of the kind mentioned in the opening paragraph is for this purpose characterized in that the hinge pin comprises a flat plate, in that at least one of the two parts comprises a cavity for receiving said flat plate, said cavity encompassing a space defined by a rotation of the flat plate through an angle α smaller than 180° about the axis of rotation, and in that the hinge pin cooperates with the edge of the cavity at least during operation for forming the blocking mechanism against rotation. The fiat plate of the hinge according to the invention bears at least substantially entirely on the edge of the cavity in the case of a load transverse to the hinge pin. A comparatively large supporting surface is obtained thereby which effectively distributes the load in the hinge and reduces the pressure on the hinge pin. The hinge according to the invention as a result is less liable to wear, which leads to a longer useful life. In addition, the hinge according to the invention may be of a considerably more compact construction than the known hinge for a given loading capacity. The compactness of the hinge according to the invention is further promoted by the fact that the flat plate itself acts as the blocking mechanism in conjunction with the edge of the cavity, so that no additional space is occupied by separate studs and shock absorbers as in the known hinge. The invention thus offers a particularly compact and robust hinge which, moreover, can be manufactured at a comparatively low cost price on account of its simplicity.

The angle through which the plate can rotate in the cavity is equal to the angle α enclosed by the hinge cavity. The rotation angle can be increased through a widening of the cavity. Widening of the cavity, however, has the disadvantage that the relevant part of the hinge will become less robust because of the loss of material and the resulting reduction of the supporting surface of the hinge plate. To counteract this, a preferred embodiment of the hinge according to the invention is characterized in that the other part also comprises a cavity for receiving the flat plate therein, encompassing the space defined by a rotation of the flat plate about the axis of rotation through an angle β smaller than 180°, and in that the hinge pin is accommodated unconstrained in both cavities. In this case the hinge pin is rotatable not only through an angle α in the one part of the hinge, but also through an angle β in the other part. The total angle of rotation of the hinge is thus given by the sum of the two angles, $\alpha + \beta$. The angle β may be equal to α, but it may also be chosen to be smaller or greater, if so desired. If the two angles are the same, a doubling of the angle of rotation is achieved for a given cavity size and with the supporting surface remaining the same. The resulting increase in the total rotation angle thus does not detract from the robustness and durability of the hinge.

To achieve an optimum distribution of forces, and accordingly a maximum strength, and also for aesthetic reasons, the cavity has a depth which is at least equal to the length by which the hinge plate projects from the other part of the hinge. The torque acting on the hinge is as small as possible then, and the hinge pin is not visible from the outside.

The parts of the hinge may be manufactured from any suitable material. To improve the durability and loading capacity, however, a special embodiment is based on a metal at least for the hinge pin, said pin in particular being manufactured from steel.

The parts of the hinge according to the invention can be readily manufactured on account of their simplicity in usual manufacturing processes such as, for example, a suitable (die) casting process. The internal strength of the hinge allows for a particularly compact design. A special embodiment of the hinge according to the invention is accordingly characterized in that the cavity is formed in a further solid part, and in that said cavity has a dimension which accounts for at least 75% of an external dimension of the relevant part. The dimensions of the relevant part are scarcely larger than those of the cavity then.

The hinge according to the invention is particularly suitable for applications where the hinge is loaded transversely to the hinge pin. This is relevant especially in the case of furniture, and particularly lecture room desks. The invention accordingly also relates to a lecture room desk comprising a frame and a seat which are intercon-

nected with rotation possibility by means of a hinge according to the invention, which lecture room desk according to the invention is further characterized in that the seat extends over different lengths on either side of the hinge and is provided at the shorter side with a counterweight for raising the seat into an upright position in the unloaded state.

The invention will now be explained in more detail with reference to a few embodiments and the accompanying drawing, in which:

Fig. 1	shows a lecture room desk according to the invention;
Figs. 2A-2D	show a first embodiment of a hinge according to the invention as used in the desk of Fig. 1; and
Figs. 3A-3F	show a second embodiment of a hinge according to the invention.

The Figures are purely diagrammatic and not always true to scale. Some dimensions are particularly exaggerated for greater clarity. Corresponding parts have been given the same reference numerals as much as possible in the Figures.

Fig. 1 shows a lecture room desk according to the invention comprising a frame 1 in which a seat 2 is fastened with hinging possibility. For this purpose, the frame is mounted on two supports 3 which are each connected to the frame 1 by means of a hinge 4. The seat here extends on either side of the hinge, the shorter side being provided with a counterweight 5 for raising the seat into an upright position in the unloaded state, as shown.

The parts of the hinge 4 are shown in Figs. 2A-2D in cross-section and comprise two parts 11, 12, made from aluminium in the present example, which can rotate relative to one another and are interconnected by a continuous hinge pin 10. In practice, the first part 11 of the hinge serves as a support for the seat 2, while the other part 12 of the hinge 4 is securely fastened to the frame 1.

According to the invention, the hinge pin 10 comprises a flat plate which in the present example is integral with the corresponding part 11 of the hinge 4 and can rotate freely in a cavity 13 provided in the second part 12 of the hinge 4. The plate here projects by a length of approximately 35 mm and has a width and thickness of approximately 30 and 10 mm, respectively. The dimensions and the material of the hinge pin 10 are thus adapted to a usual load of the hinge in a lecture room desk, but they may indeed be varied at will without departing from the scope of the invention in order to, for example, provide an optimum performance in any other specific field of application.

The cavity 4 encompasses the shape defined by a rotation of the hinge plate 10 through an angle α about an axis of rotation 14, a certain clearance being provided for safeguarding an unhampered rotation of the hinge plate 10. If so desired, the cavity 13 may be less deep or especially deeper than the length over which the hinge plate 10 extends. For an optimum distribution of forces and for aesthetic reasons, however, the cavity is preferably as deep as the length over which the hinge plate 10 projects from the first part 11 of the hinge. In that case the torque in the hinge is a minimum and the hinge pin is not visible from the outside. In the present example, the cavity has a depth of approximately 40 mm, which offers an ample tolerance for accommodating length variations of the hinge pin 10. The cylindrical parts 15 in which the cavity 13 and the plate 10 are formed in this example have an external diameter of approximately 40 mm and are thus hardly any bigger than the hinge cavity 13 as far as the diameter is concerned. This renders the hinge extremely compact in comparison with known hinges with the same or a similar loading capacity.

The shape and dimension of the cavity imply that the maximum angle of rotation of the plate 10 therein is substantially equal to α. Figs. 2C and 2D show the two parts 11, 12 united so as to form the hinge, with the hinge 4 drawn in its extreme positions, the angle α of approximately 81° in this case being indicated. In these extreme positions, the hinge plate 10 cooperates with the edge 16 of the cavity 16 so as to form a blocking mechanism against rotation, whereby the rotation angle is limited to the value α. If so desired, shock absorbers may be mounted in the cavity for damping the impact of the hinge. The maximum angle of rotation will be somewhat smaller than α then, depending on the thickness of the shock absorbers used.

Since the hinge plate 10 in the extreme positions of the hinge bears on the edge 16 of the cavity with a major portion of its surface area, the forces arising therein transversely to the hinge plate 10 are distributed over a comparatively large surface area. The loading capacity of the hinge according to the invention is as a result comparatively high in a relatively compact embodiment already. This is advantageous especially in the case of furniture, where the outward appearance of the hinge may play a major role.

A preferred embodiment of the hinge according to the invention is shown in Figs. 3A-3F, where Figs. 3A-3D show the hinge parts individually and Figs. 3D-3F show the hinge parts assembled together. In contrast to the embodiment described above, the hinge plate 10 here is not integral with one of the two parts 11, 12 of the hinge, but instead both parts have a respective cavity 13, 13' in which a separate, loose hinge plate 10 is freely accommodated. The hinge plate 10 has a length, width and thickness of 70, 30 and 10 mm, respectively and is made from steel for a better load resistance. The two other parts 11, 12 of the hinge comprise aluminium, as in the previous example.

According to the invention, the two cavities 13, 13' substantially encompass the space defined by a rotation of the hinge plate 10 through angles α and β about the axis of rotation 14, the cavities again being designed a little wider to provide the clearance necessary for the hinge plate 10. The two angles α, β, and thus the cavities 13, 13' may be chosen to be the same, as in the present example, but they may alternatively be mutually different,

if so desired. In this example the angles α, β each have a value of approximately 40.5°.

An advantage of this embodiment over the preceding one is that the total angle of rotation of the hinge is formed here by the sum of the angles α and β, and is accordingly doubled in the present case to a value 2α. This is diagrammatically depicted in Figs. 3D-3F. The hinge is in a first extreme position in Fig. 3D. Fig. 3E shows an intermediate position in which the plate 10 has rotated through the angle β in the cavity 13' of the first part. In Fig. 3F, the plate has also rotated in the cavity 13 of the second part 12 through the full angle α, and the hinge is in the other extreme position in which the two parts have rotated relative to one another through a total angle $\alpha + \beta$ of approximately 81°. The angle of rotation has thus been doubled in this example with the two angles α, β being the same for a cavity 13, 13' of the same size as in the preceding example. The surface area of the edge 16 of the cavity 13, 13', and thus the supporting surface of the hinge plate have become larger thereby, which results in a greater loading capacity of the hinge for the same external dimensions. A particularly compact, robust and durable hinge is thus realized which can be loaded up to a comparatively high value transversely to the hinge pin 10 and is accordingly highly suitable for use in furniture, and especially in lecture room desks.

Although the invention was discussed in detail above with reference to only two embodiments, it will be obvious that the invention is by no means limited to the examples given. Many more variations and modifications are indeed possible to those skilled in the art within the scope of the invention. Alternative materials may thus be used for the hinge parts, while the parts need not all be manufactured from the same material, but a material may be chosen for each part which is ideally adapted to the specific function and load of the relevant part. Furthermore, the hinge according to the invention may be used not only in lecture room desks but also in other furniture such as, for example, collapsible table legs or arm rests; indeed, the invention is not limited to furniture at all but may be applied to all cases where parts are hinged together and their angle of rotation is limited to a predetermined maximum value.

Claims

1. A hinge comprising two parts which are rotatable relative to one another about an axis of rotation, are united by a continuous hinge pin, and are provided with a blocking mechanism against rotation by which the rotation angle is limited to a maximum value, characterized in that the hinge pin comprises a flat plate, in that at least one of the two parts comprises a cavity for receiving said flat plate, said cavity encompassing a space defined by a rotation of the flat plate through an angle α smaller than 180° about the axis of rotation, and in that the hinge pin cooperates with the edge of the cavity at least during operation for forming the blocking mechanism against rotation.

2. A hinge as claimed in Claim 1, characterized in that the other part also comprises a cavity for receiving the flat plate therein, encompassing the space defined by a rotation of the flat plate about the axis of rotation through an angle β smaller than 180°, and in that the hinge pin is accommodated unconstrained in both cavities.

3. A hinge as claimed in Claim 1 or 2, characterized in that the cavity has a depth which is at least equal to the length by which the hinge plate projects from the other part of the hinge.

4. A hinge as claimed in Claim 1, 2 or 3, characterized in that at least the hinge pin of the hinge comprises a metal, and in particular is manufactured from steel.

5. A hinge as claimed in any one of the preceding Claims, characterized in that the cavity is formed in a further solid part in at least one of the two parts, and in that said cavity has a dimension which accounts for at least 75% of an external dimension of the relevant part.

6. A lecture room desk comprising a frame and a seat, characterized in that the frame and the seat are interconnected by means of a hinge as claimed in any one or several of the preceding Claims, and in that the seat extends over a different length on either side of the hinge and is provided at the shorter side with a counterweight for raising the seat into an upright position in the unloaded state.

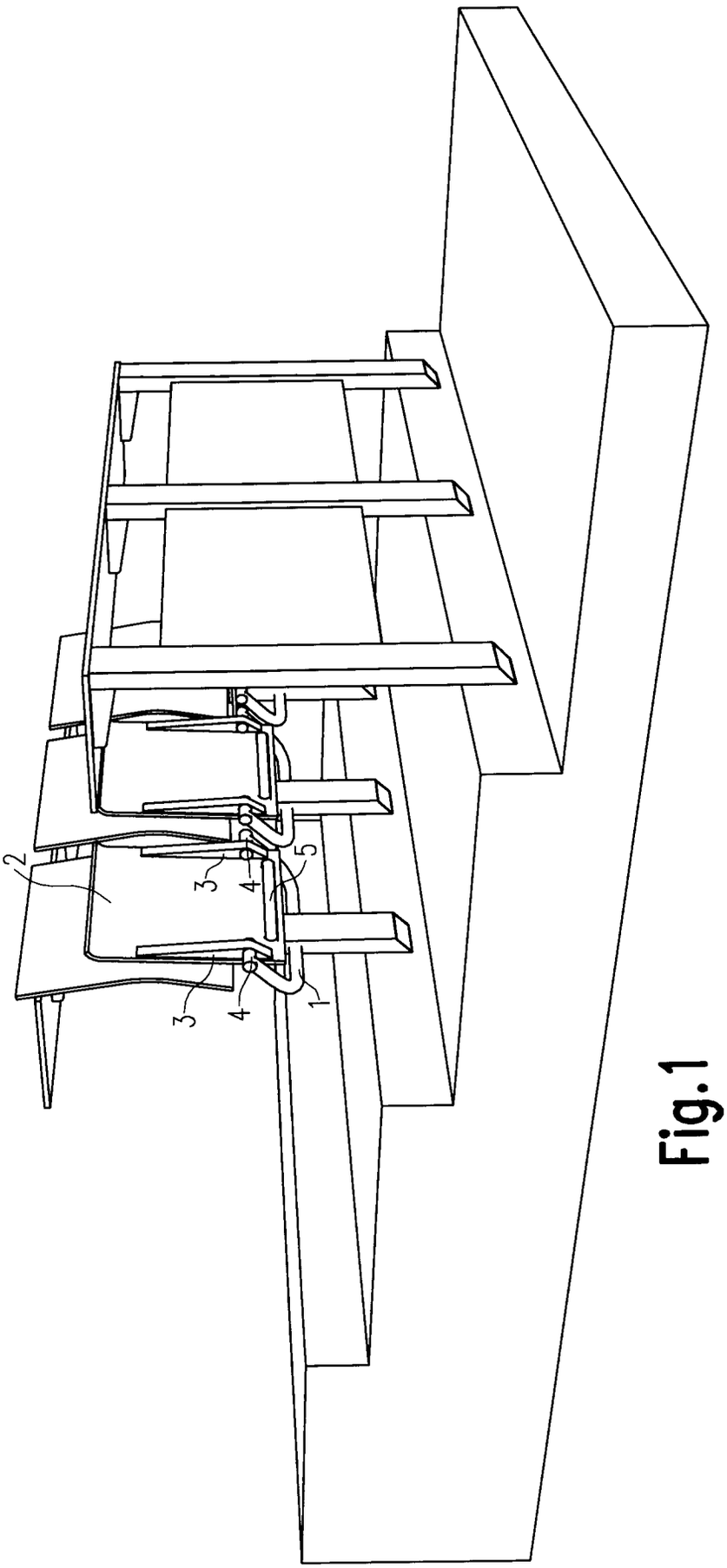

Fig.1

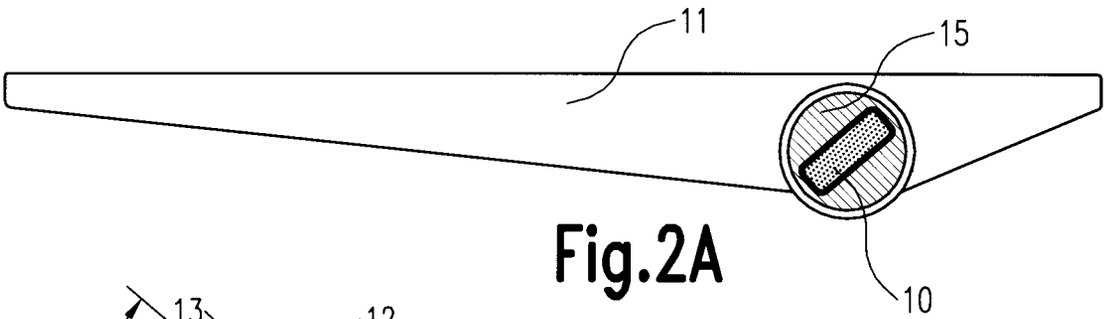

Fig.2A

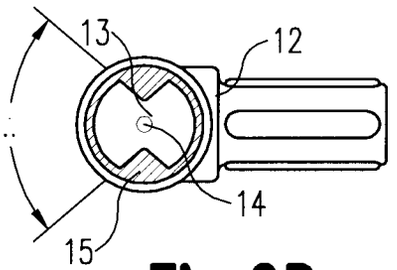

Fig.2B

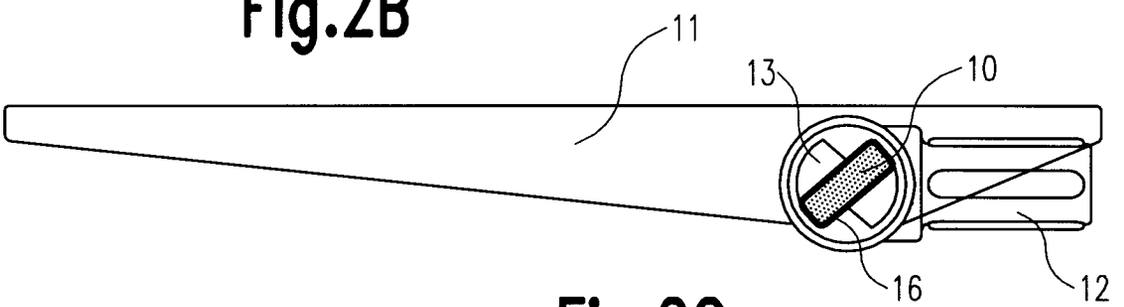

Fig.2C

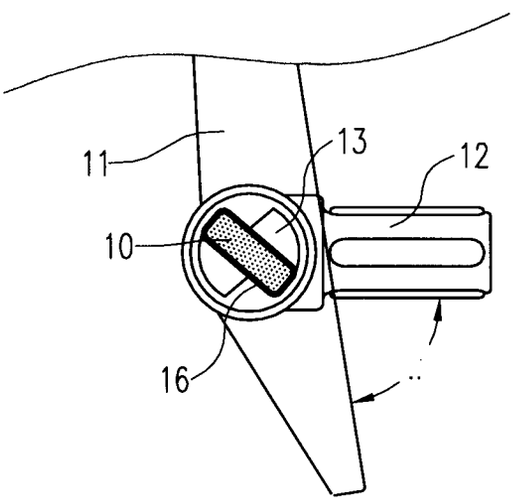

Fig.2D

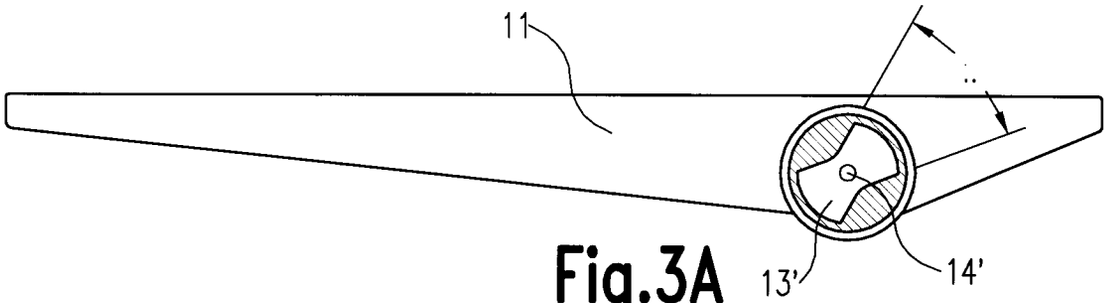

Fig.3A

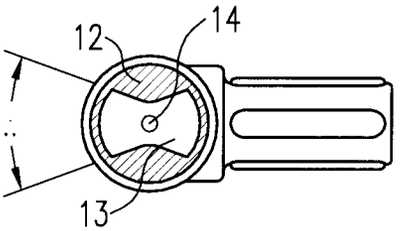

Fig.3B

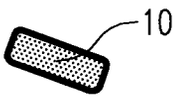

Fig.3C

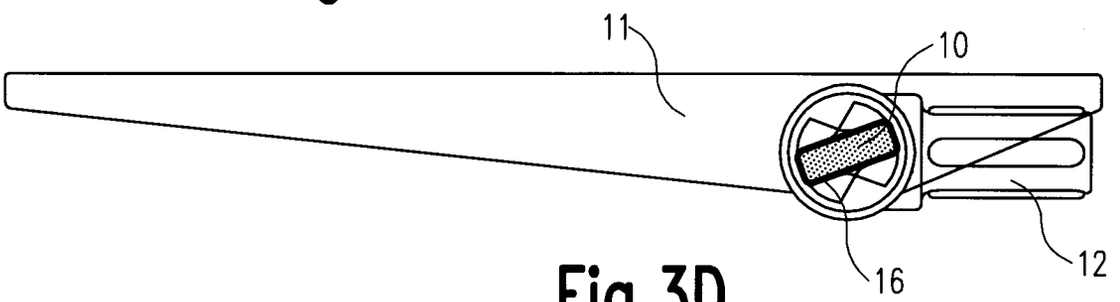

Fig.3D

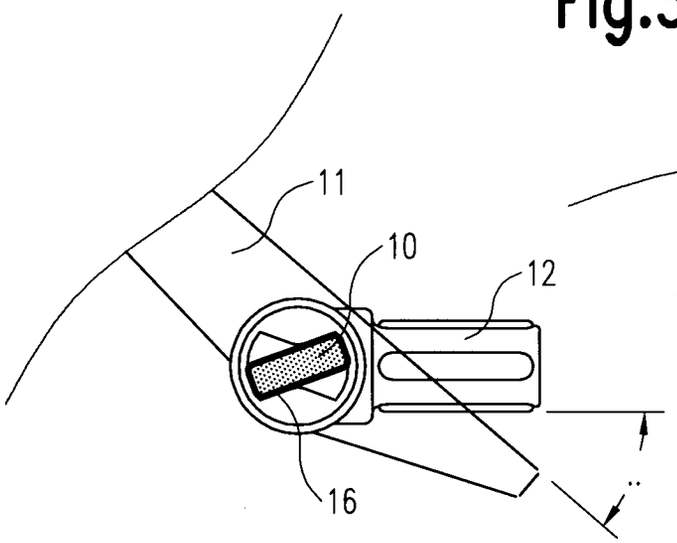

Fig.3E

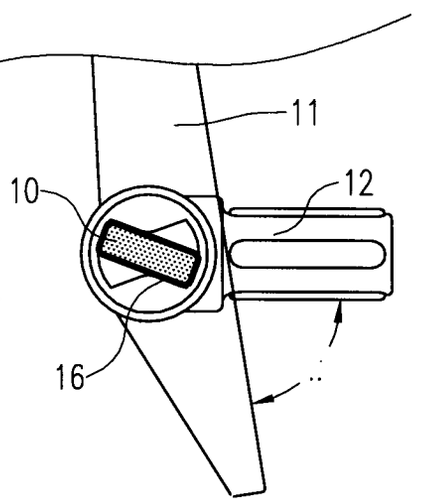

Fig.3F

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EUROPEAN SEARCH REPORT

Application Number
EP 95 20 3142

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)
A	US-A-3 727 975 (ANDERSON) 17 April 1973 * column 2, line 45 - column 4, line 68; figures 2-9 * ---	1,2,6	A47C1/121 E05D11/06
A	DE-C-17 78 744 (ZSCHOCKE-WERKE GMBH) 3 February 1972 * column 3, line 33 - column 4, line 59; figures 2-5 * -----	1,2,6	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A47C
E05D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	6 March 1996	Mysliwetz, W

CATEGORY OF CITED DOCUMENTS

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