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(54) **ROTARY JOINT**

(57) A joint is described for hinging two parts of a chair, comprising a first member and a second member, which are rotatable relatively and integral respectively with the two parts.

A coupling member which passes through the first and second members to hold them axially together and pivot them about a common rotation axis. To fix angular positions, the first member and the second member comprise respectively a first surface and a second surface which face each other, wherein the first surface comprises a projection and the second surface comprises a seat, or vice versa, the projection being configured to be able to snap into the seat to lock the first and second members in a stable relative angular position, and said axis is perpendicular to the first and second surfaces.

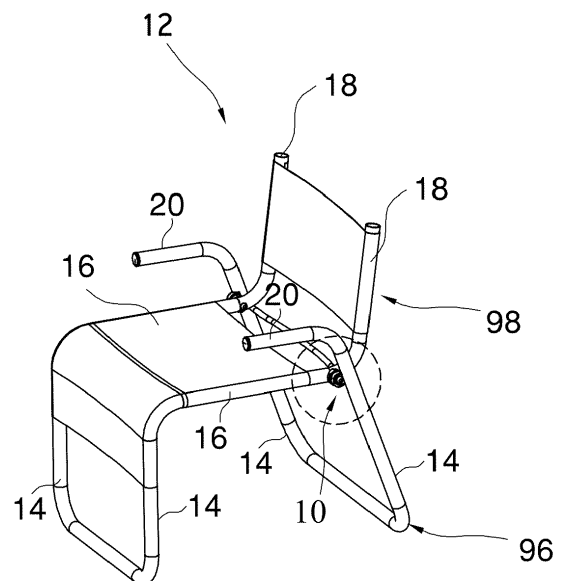


Fig. 1

Description

[0001] The invention refers to a rotary joint, and to a furniture item comprising the joint.

[0002] Folding chairs such as picnic chairs, taken as an example here, are often foldable and collapsible to take up less space during transport. The chair frame is made with a pair of suitably curved metal tubes hinged together with a rivet or screw.

[0003] A problem with these chairs is that the relative position of the tubes is unstable at the end-of-travel positions, and there is no intermediate adjustment between the two end-of-travel positions. Conversely, it would be desirable to improve the stability of these chairs and provide less coarse adjustments.

[0004] The main object of the invention, defined in the attached claims in which the dependent ones define advantageous variants, is to improve this state of the art.

[0005] Particular object is to create a joint to solve at least one of the aforementioned problems.

[0006] Particular object is to create an improved folding chair or table.

[0007] At least one object is achieved by a joint for hinging two parts of a furniture item, comprising

- a first member and a second member, which are relatively rotatable and integral with the two parts respectively,
- a coupling member that passes through the first and second members to hold them axially together and pivot them about a common rotation axis.

[0008] To fix angular positions of the joint the first member and the second member comprise respectively

a first surface and a second surface which face each other (and for example are sliding on each other), wherein the first surface comprises a protrusion and the second surface comprises a seat, or vice versa, the projection being configured to be able to snap into the seat to lock the first and second members in a stable relative angular position; and said axis is perpendicular to the first and second surfaces.

[0009] Advantageously, the structure of the joint allows it to have one, two or more stable angular positions for the first and second member, defined by the number of seats (which may be one or more arranged along a circumferential arc with constant or variable angular pitch). The joint thus avoids the accidental positioning of the first and second members in an unwanted position.

[0010] Preferably the first member, on a portion opposite the first surface, comprises a first concavity to house therein in a complementary manner one of the two parts, the first concavity facing away from the coupling member (in a direction opposite the coupling member). More preferably the concavity is provided with a fastening member

for fixing one of the two parts therein.

[0011] In a variant, which maximizes the coupling stability, also or only the second member, on a portion opposite the second surface, comprises a second concavity to house therein in a complementary manner the other of the two parts, the concavity facing away from the coupling member (in a direction opposite the coupling member). More preferably, the second concavity is provided with a fastening member for fixing the other of the two parts therein.

[0012] The joint allows said parts to be hinged in various ways, according to the arrangement of said concavities with respect to the rotation axis. In a variant, said axis is arranged so as to be incident on the surface of one or each of said concavities, preferably incident on the center of one or each of said concavities. In a different variant, said axis is arranged so as to remain external to the surface of one or each of said concavities.

[0013] In particular, but not only, said parts are elements of furnishing accessories such as folding chairs and tables.

[0014] In a variant, one or each concavity is a surface complementary to a lateral surface of a cylinder or prism.

[0015] In a variant, the first and second surfaces have substantially the same area.

[0016] In a variant, the first and second surfaces have an extension equal to the width, considered in a plane orthogonal to said axis, of the member to which they belong.

[0017] In a variant, the coupling member comprises means for locking one of said parts in one or each of said concavities.

[0018] In a variant, the coupling member is a pin or a telescope screw.

[0019] In a variant, said concavities are arranged so that a plane passing through the rotation axis intersects them, and for example cuts them in half, and/or they face opposite directions along the rotation axis.

[0020] In a different variant, said concavities are arranged so as to face away from a plane passing through the rotation axis.

[0021] In a variant, the first and second members are two blocks hinged together along a central axis.

[0022] In a variant, the first and second members are approximately L-shaped, are hinged together at one end or semi-portion of the L, and have said concavity between the two wings (or segments) of the L.

[0023] In a preferred variant, the projection is movable relative to the first surface for retracting into the first surface, e.g. along a direction orthogonal to the first surface. In a more preferred variant, the movable protrusion is coupled to an elastic member, the elastic member being mounted in the first member to bias the movable protrusion outwards of the first surface.

[0024] In another preferred variant, the projection is fixed on the first surface.

[0025] Another aspect of the invention is a furniture item, such as a folding chair or table, comprising:

two relatively mobile parts and the aforementioned joint coupled between the two parts to connect them.

[0026] Another aspect of the invention is a furniture item, such as a folding chair or table, comprising

- two movable parts which respectively comprise a first member and a second member which can be relatively rotated,
- a coupling member that passes through the first and second members to hold them axially together and pivot them about a common rotation axis;

wherein

the first member and the second member comprise respectively a first surface and a second surface which face each other (and for example are sliding on each other), wherein the first surface comprises a protrusion and the second surface comprises a seat, or vice versa, the projection being configured to be able to snap into the seat to lock the first and second members in a stable relative angular position; and said axis is perpendicular to the first and second surfaces.

[0027] All the variants defined for the components of the joint are applicable to the furniture item.

[0028] The advantages of the invention will be even clearer from the following description of a preferred system, wherein

- Fig. 1 shows a folding chair,
- Fig. 2 shows a detail of the chair in fig. 1;
- Fig. 3 shows a detail of the chair in fig. 1 in a different configuration (with one leg of the chair rotated to its end-of-travel position);
- Fig. 4 shows a cross-sectional view of a joint,
- Fig. 5 shows a three-dimensional view of the joint in fig. 4;
- Fig. 6 shows a cross-sectional view of a second joint,
- Fig. 7 shows a three-dimensional view of a third joint;
- Fig. 8 shows a cross-sectional view of the joint in fig. 7.

[0029] In the figures equal elements are indicated by equal numbers, and in order not to crowd the drawings sometimes only some numbers are shown.

[0030] A rotary joint 10 (see dotted circle in fig. 1 and enlargements in figs. 2-4) is applicable for example to a chair 12. The chair 12 has e.g. a tubular frame that defines four legs 14, two sides 16 of a seat, two sides 18 of a backrest and two armrests 20. In particular, a first folded tubular member 98 forms the front legs 14, the sides 16 of the seat and the sides 18 of the backrest, while a second tubular member 96 forms the rear legs 14 and the

armrests 20.

[0031] To collapse the chair 12, the rear legs 14 are hinged to the sides of the seat 16 via the rotary joint 10. The rotary joint 10 comprises a first member 32 and a second member 30 that are relatively rotatable, and the rear legs 14 are fixed to the member 32 and the sides 16 of the seat are fixed to the member 30.

[0032] Each member 30, 32 comprises respectively (fig. 4) a surface 34 and a surface 36 which face each other and for example are slidable on each other.

[0033] A central pin 28, e.g. a telescope screw, crosses and stably joins the two members 30, 32 while allowing them to rotate relatively. The longitudinal axis of the central pin 28 coincides with an X axis of relative rotation for the members 30, 32. The X axis is orthogonal to the surfaces 34, 36.

[0034] In the surface 36 (or 34) a, e.g. ball, dowel 40 is installed which is radially offset with respect to the X axis and whose head protrudes from the surface 36 (or 34) and can engage one or more complementary seats 42 provided on the opposite surface 34 (or 36).

[0035] The seats 42 are arranged along an arc that the dowel 40 travels when the two members 30, 32 rotate on each other about the X axis.

[0036] The members 30, 32 can be coupled to the tubular members 98, 96 in various ways. In the illustrated example, the member 32 comprises a concavity 44 in which a bracket 90, integral with the tubular member 96, can be snugly housed and fixed. For example, the central pin 28 is exploited to fix the bracket 90: it has a hole into which the central pin 28 is inserted.

[0037] The member 30 instead comprises a concavity 46 whose surface is complementary to the lateral surface of a cylinder (and of the tubular member 98), i.e. the radius of curvature of the concavity 46 is equal to that of the tubular member 98. Thus the concavity 46 is adapted to receive the tubular member 98 in a stable way.

[0038] E.g. the central pin 28 is exploited to fix the tubular member 98 in the concavity 46: the central pin 28 passes through the tubular member 98 and holds it in the concavity 46.

[0039] The members 30, 32 are preferably provided respectively with an abutment 48, 50, e.g. placed on the surfaces 34, 36. The abutments 48, 50 are configured to collide with each other after a certain relative rotation of the members 30, 32 thus defining an angular end-of-travel position for the joint 10.

[0040] From the foregoing it is understood that by manually moving the tubular members 98, 96 closer or further apart, the first member 32 rotates with respect to the second member 30, bringing the dowel 40 from one of the seats 42 into another. When the dowel 40 has arrived inside the new seat 42 it blocks the relative angular position of the members 30, 32, and consequently of the tubular members of the chair 12 connected to them.

[0041] The number of seats 42 determines the number of stable positions for the first and second members 32, 30. When there is only one seat 42 a second angular

position between the first and second members 30, 32 corresponds to the angular end-of-travel position.

[0042] In a variant, see fig. 6, a joint 50 differs from the joint 10 because it has a first member 52 different from the first member 32. Here the first member 52 also has a concavity 56 whose surface is complementary to the lateral surface of a cylinder (and of the tubular member 96), like the concavity 46. Thus both members 52, 30 are adapted to directly receive the external surface of the respective tubular member in a stable manner and snugly.

[0043] The concavities 46, 56 are intersected by a plane passing through the X axis, and face a direction axially opposite to the X axis.

[0044] A third variant is the joint 60 of fig. 7 and 8, useful e.g. to articulate tubular members 88, 90 which form the legs of a table. The joint 60 comprises a first member 62 and a second member 64, approximately L-shaped, which are relatively rotatable. Each member 62, 64 comprises respectively (fig. 4) a surface 66 and a surface 68 which face each other and slide on each other.

[0045] A central pin 70, e.g. a telescope screw, crosses the surfaces 66, 68 and stably joins the two members 62, 64 on a semi-portion of the L while allowing them to rotate relatively. The longitudinal axis of the central pin 70 coincides with an X2 axis of relative rotation for the members 62, 64. The X2 axis is orthogonal to the lying planes of the surfaces 66, 68 and parallel to the axes of the tubular members 88, 90.

[0046] The surfaces 66, 68 respectively house a dowel and seats like the dowel 40 and the seats 42, with the same conformation and function.

[0047] The members 62, 64 can be coupled to the tubular members 88, 90 in various ways. In the illustrated example, each member 62, 64 comprises a concavity 70, 72 like the concavity 46 to snugly accommodate and fix therein the respective tubular member 88, 90, e.g. via screws 86.

[0048] The concavities 70, 72 are respectively on each half-space identified by a plane passing through the X2 axis, and face a direction opposite the X2 axis.

[0049] From the foregoing it is understood that by manually moving the tubular members 88, 90 closer or further away from each other, the first member 62 is rotated with respect to the second 64, thereby causing the dowel to jump from one of the seats to another and establishing a relative angular position of the members 62, 64.

[0050] This variant allows the rotation of the tubular members 88, 90 about the X2 axis while maintaining their axes parallel. That is, the X2 rotation axis always remains parallel to the axes of the tubular members 88, 90 and the axes of the tubular members 88, 90 can be moved closer to - or away from - the X2 rotation axis.

[0051] Preferably the dowel 40 is pushed by an elastic member 100, e.g. a spring, towards the outside of the surface 34; but for example the mechanical deformation of the seat 42 can also be sufficient.

[0052] The elastic member 100 allows the resistance

of the joint to be modulated during a variation of stable angular position.

[0053] The joint may be applied to articulate tubular or non-tubular structures, with circular or polygonal cross-section, or other, by changing the profile of the concavities 46, 56, 70, 72 accordingly.

[0054] The members 30, 32, 52, 62, 64 may be made, for example, of metal, such as aluminum or steel, plastic, composite materials.

[0055] Note that the action of the elastic member 100 pushing on the dowel 40, and therefore on the respective concave seat, also allows the elimination of axial play.

[0056] Generally speaking, the ball dowel 40 represents a possible solution but not the only one to obtain the result described above. A variant envisages that the protrusion of the dowel 40 is replaced by an equivalent protrusion integrally provided on the second member 34, 64. The thrust of such convex protrusion towards a corresponding concave seat could for example be ensured by the entire tubular structure 96, curved to give a certain pre-load and guarantee such thrust.

[0057] The members 32, 30, 52, 62, 64, may also be integrated into the tubes 96 and 98, for example in the case of a chair produced by injection molding or milling.

Claims

1. Joint for hinging two parts, e.g. of a chair or table, comprising:
 - a first member and a second member, which are rotatable relatively and integral respectively with the two parts,
 - a coupling member which passes through the first and second members to hold them axially together and pivot them about a common rotation axis;
 the first member and the second member comprising respectively
 - a first surface and a second surface which face each other, wherein the first surface comprises a projection and the second surface comprises a seat, or vice versa,
 - the projection being configured to be able to snap into the seat to lock the first and second members in a stable relative angular position; said axis being perpendicular to the first and second surfaces.
2. Joint according to claim 1, wherein the first and/or second member on a portion opposite to said relative surface comprises a concavity for accommodating therein one of the two parts in a complementary manner, the concavity facing away from the coupling member.
3. Joint according to claim 2, wherein the concavity is

provided with a fastening member for fixing one of the two parts therein.

4. Joint according to any preceding claim, wherein said axis is arranged so as to be incident on the surface of one or each of said concavities. 5
5. Joint according to any preceding claim 1 to 3, wherein said axis is arranged so as to remain external to the surface of one or each of said concavities. 10
6. Joint according to any preceding claim, wherein the first and second members on a portion opposite to said relative surface comprise one said concavity, and said concavities are arranged so that 15

a plane passing through the rotation axis intersects them and they face opposite directions along the rotation axis. 20
7. Joint according to any preceding claim 1 to 5, wherein the first and second members on a portion opposite to said relative surface comprise one said concavity, and said concavities are arranged so as to face away from a plane passing through the rotation axis. 25
8. Joint according to any preceding claim, wherein the projection is movable relative to the first surface to withdraw into the first surface. 30
9. Joint according to claim 8, wherein the movable projection is coupled to an elastic member, the elastic member being mounted in the first member to bias the movable projection outwardly of the first surface. 35
10. Furniture member, such as a folding chair or table, comprising: 40

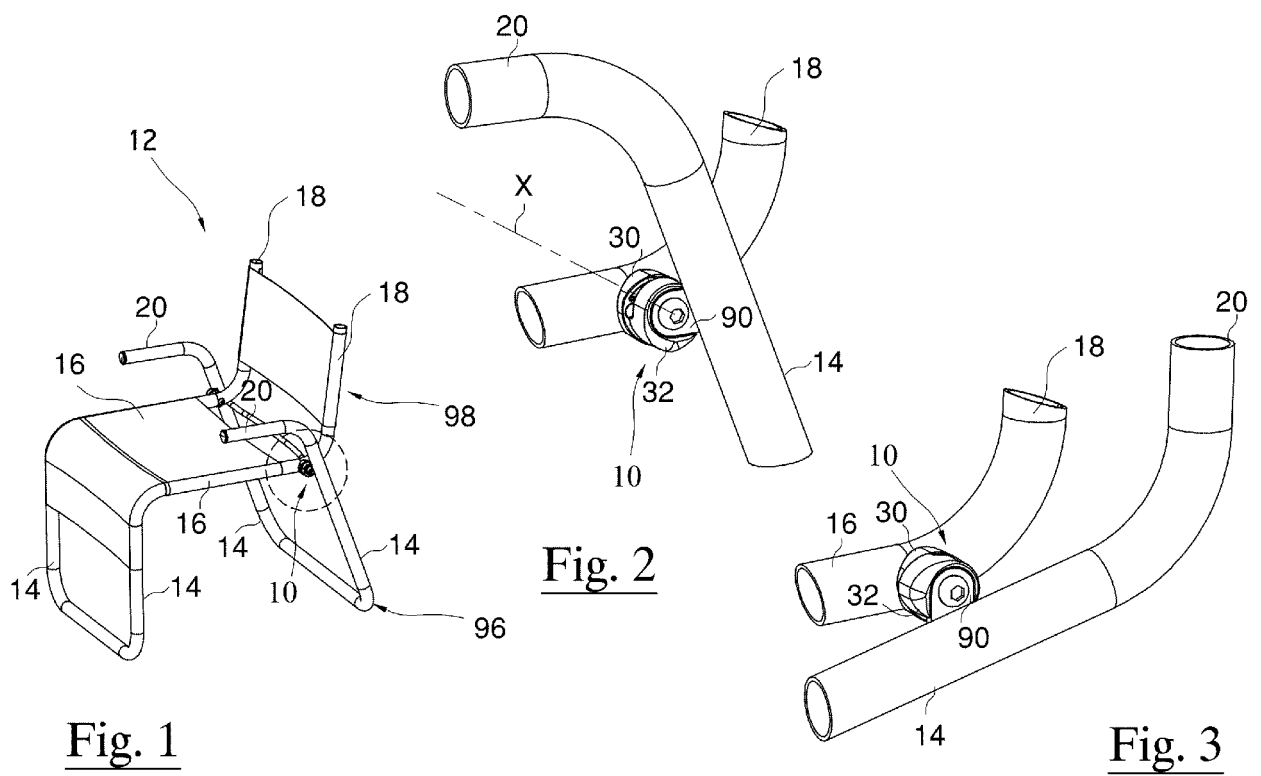
two relatively movable parts and a joint according to any of the previous claims which is coupled between the two parts to connect them. 45

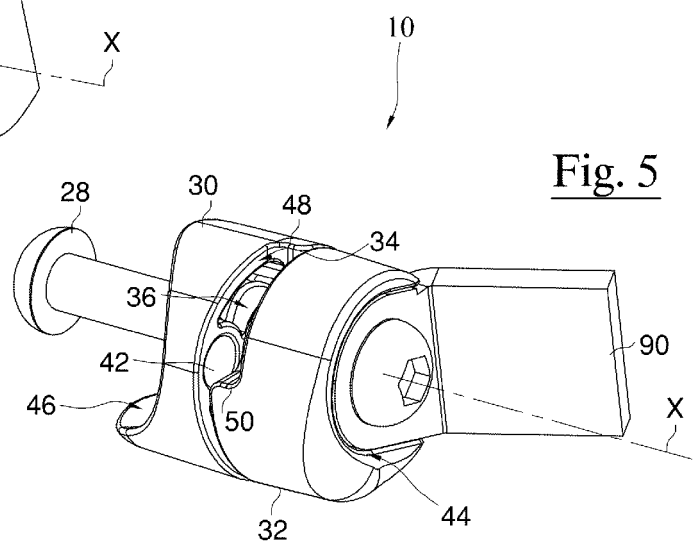
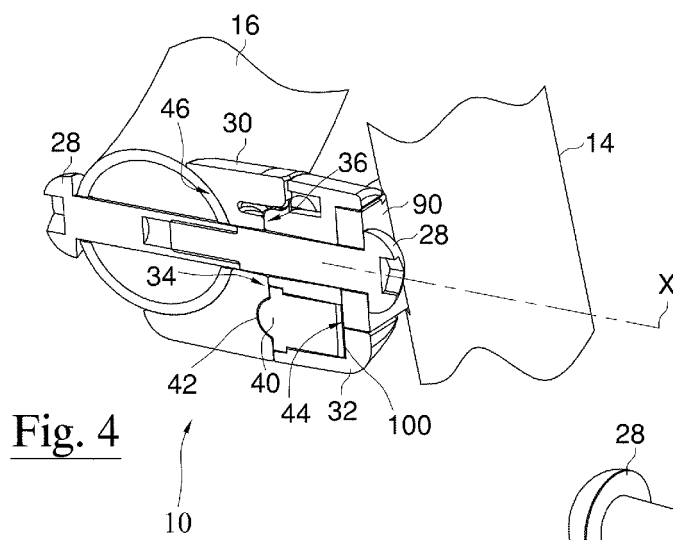
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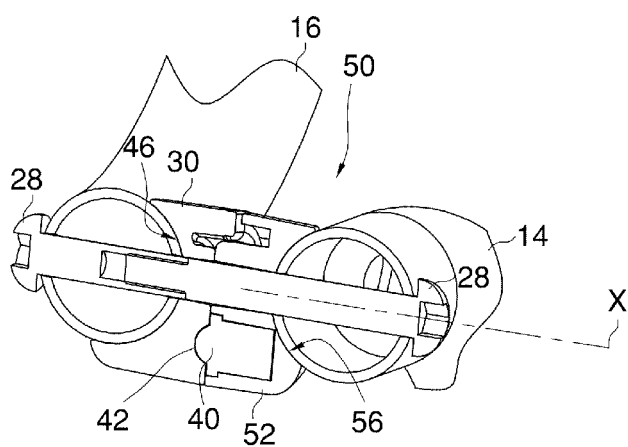


Fig. 6

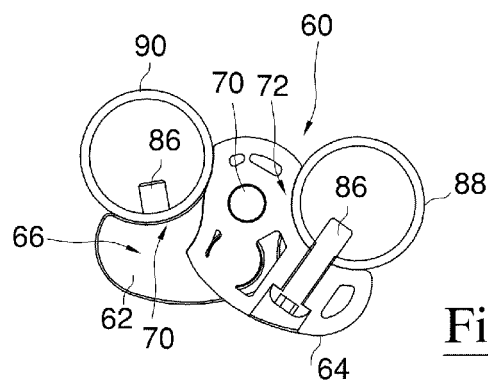
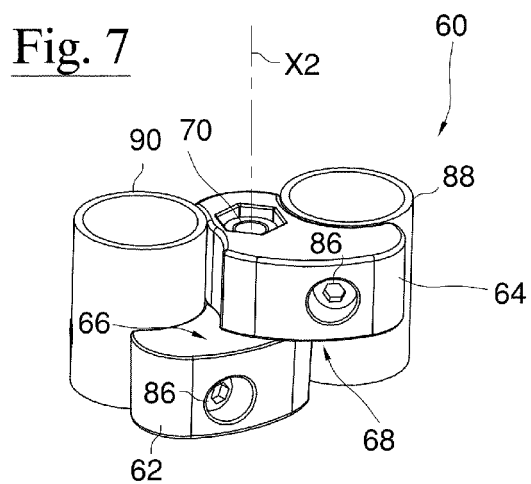


Fig. 8



EUROPEAN SEARCH REPORT

Application Number

EP 23 19 6538

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 374 375 A1 (FOX INT GROUP LTD [GB]) 12 October 2011 (2011-10-12)	1-3, 5-7, 10	INV. A47C4/20
Y	* paragraphs [0023], [0029], [0030],	8, 9	A47C5/10
A	[0033], [0034]; figures 1-7 * -----	4	
X	US 2016/192778 A1 (SHEN DONALD [CN] ET AL) 7 July 2016 (2016-07-07)	1, 8-10	
Y	* paragraphs [0001], [0034], [0041],	8, 9	
A	[0046]; figures 1-3 * -----	4	
A	US 2003/090137 A1 (PIRETTI GIANCARLO [IT]) 15 May 2003 (2003-05-15)	4	
	* paragraph [0021]; figures 5, 6 * -----		
A	US 4 613 185 A (MARCHESINI SISTO [IT]) 23 September 1986 (1986-09-23)	4	
	* column 3, line 44 - line 57; figures 5, 6 * -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			A47C

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EPO FORM 1503 03.82 (P04C01)

Place of search	Date of completion of the search	Examiner
Munich	29 January 2024	Pössinger, Tobias
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		

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 23 19 6538

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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29-01-2024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2374375	A1	12-10-2011	NONE
US 2016192778	A1	07-07-2016	CN 205655063 U 19-10-2016
		US 2016192778 A1	07-07-2016
		US 2018372269 A1	27-12-2018
		US 2019376645 A1	12-12-2019
US 2003090137	A1	15-05-2003	AT E285695 T1 15-01-2005
		CA 2405931 A1	04-04-2003
		CN 1411769 A	23-04-2003
		DE 60202416 T2	08-12-2005
		EP 1300099 A2	09-04-2003
		ES 2233757 T3	16-06-2005
		HK 1055226 A1	02-01-2004
		IT TO20010940 A1	04-04-2003
		JP 4212326 B2	21-01-2009
		JP 2003153761 A	27-05-2003
		PT 1300099 E	29-04-2005
		TW I230593 B	11-04-2005
		US 2003090137 A1	15-05-2003
US 4613185	A	23-09-1986	CA 1238263 A 21-06-1988
		EP 0133940 A2	13-03-1985
		ES 281146 U	01-04-1985
		NO 163433 B	19-02-1990
		US 4613185 A	23-09-1986