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(54) Connection, for connecting structural elements with selectively variable angle and relative hinge and armchair side frame

(57) A connection (21) for connecting structural elements (1, 2) at an angle with selectively variable amplitude comprises at least one cylindrical pin (3), having two consecutive bodies (4, 5), of which a first body (4) has grooves on the outside and a second body (5) is smooth. Two arms (6, 7) have corresponding ends (6a, 7a) with holes (8, 9) through them, delimited by surfaces (10, 11) for surrounding the pin (3) and grooved like the first body (4). The arms (6, 7) and the pin (3) can move relative to one another along an axial direction (12) of the pin (3) and between two end positions. In a first end position, the first, grooved body (4) of the pin (3) and the surfaces of the arms (6, 7) are integral with one another with respect to the relative rotation about the axial direction (12) of the pin (3), whilst in the second end position at least one of the arms (6, 7) is at the second body (5) of the pin (3), so that it can rotate freely relative to the pin (3).

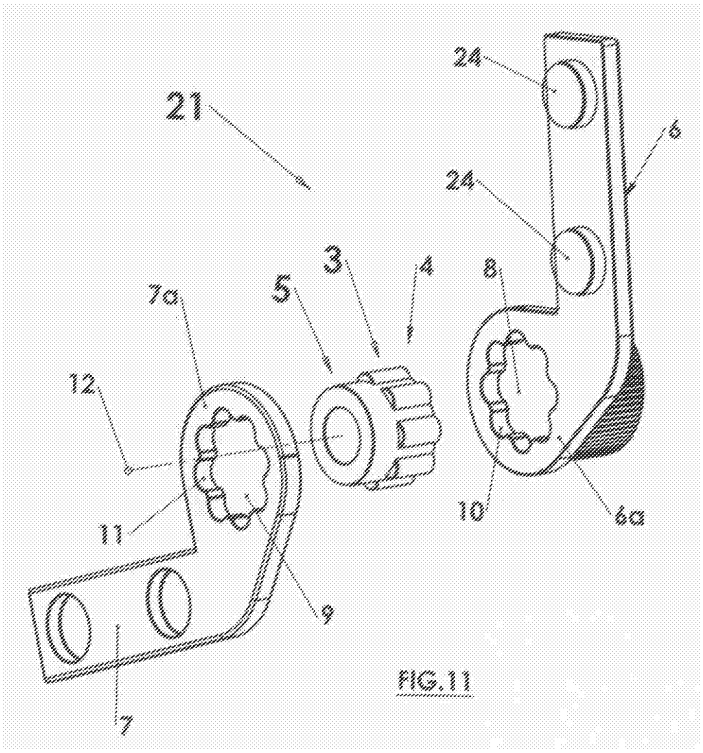

FIG.11

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Description

[0001] The present invention relates to a connection apparatus, for connecting structural elements with selectively variable angle.

[0002] The connection can advantageously be used in armchair construction technology, specifically referred to herein as an example of application. However, such a reference shall be understood to be by way of example only and does not limit the scope of the invention, since the connection in accordance with the invention can advantageously be used for general applications.

[0003] The construction technology for armchairs or sofas in particular with supporting structures, padded with soft materials then upholstered with leather or decorative fabrics, involves the widespread use of fixed, monolithic supporting structures, having an invariable configuration, with the exception in certain cases of movement only of the arms.

[0004] With such a construction the sides of the armchair or sofa are normally rigid and fixed, allowing access to the armchair seat only from the front.

[0005] Such a structure is very disadvantageous for use of the armchair or sofa by people suffering from any motor limitation, particular of the lower limbs.

[0006] In such situations, transferring the person from the armchair to a wheelchair (or vice versa) and in a sitting posture and with access from the front of the armchair is very difficult and, in some cases, even impossible without the help of other persons.

[0007] The side of the armchair with a single-piece fixed structure is also inconvenient for carrying out medical therapies which require the application, sometimes for a lengthy period (e.g.: dialysis), of therapeutic instruments to the arm of the person sitting on the armchair.

[0008] To overcome such disadvantages, the Applicant has already developed a solution to such problems involving a particular type of joint which allows the production of side structures in at least two pieces which, when necessary, can be articulated relative to one another in such a way as to allow the upper part of the side to be dropped down relative to the lower part, for more convenient use of the armchair in all of its configurations for use.

[0009] Said solution substantially involves two members integrating coupling means designed to render the members monolithic relative to one another with unidirectional relative movement and alignment, along a first joint configuration direction; and disengagement means, for disengaging the coupling means and rendering the members movable relative to one another; the joint also comprises articulation means designed to allow the members, disengaged from one another, to be able to rotate and translate relative to one another in a guide until they adopt at least one stable position in which one of the members movable relative to the other which is considered fixed, is angled at least along a second joint configuration direction different to the first direction.

[0010] Said solution has proved fully able to solve the problems indicated above. However, the engagement and disengagement movement necessary to pass from one joint configuration to the other have to be performed in the plane in which the members lie and with pulling and pushing actions applied in said plane and directly applied on one of the parts of the side of the armchair, in particular on the upper part, which is lifted, rotated and lowered again each time its configuration must be varied.

[0011] Such actions, when performed by a person who is standing rather than sitting on the armchair, are quite easy. However, they are not so easy if the person intending to vary the configuration of the side of the armchair is the armchair user, acting on the armchair while sitting on it and who may be obliged to act in this condition due to a disability which makes such apparently simple operations difficult or even impossible.

[0012] The aim of the present invention is therefore to overcome these disadvantages with a connection in which the connection state can be switched easily by the armchair user, without the need to lift and lower parts of the structure of the side and, in particular, by simply operating a push-button which can be operated with one finger.

[0013] The technical features of the present invention, in accordance with the above aims, are clear from the content of the claims herein, in particular claim 1, and from any of the claims directly or indirectly dependent on claim 1.

[0014] The present invention also relates to a joint hinge, according to claim 9 and according to any of the claims directly or indirectly dependent on claim 9.

[0015] The invention also relates to a structural frame according to any of the claims from 10 to 19.

[0016] The advantages of the present invention are more apparent in the detailed description which follows, with reference to the accompanying drawings which illustrate preferred, non-limiting embodiments of the invention, in which:

- Figures 1 and 2 are side elevation views of a structural frame in particular for a folding side of an armchair;
- Figure 3 is a side view of the frame of Figure 2 shown by way of example in some of its multiple possible angular configurations;
- Figures 4, 5 and 6 are respectively a plan view, an elevation view and a side view of a joint hinge for a structural frame;
- Figure 7 is a detailed view of several details from Figure 6;
- Figure 8 is a perspective assembly view of the hinge of Figures 4, 5 and 6;
- Figure 9 is an enlarged perspective view of a detail from Figure 8;
- Figure 10 is an assembly view of a connection in accordance with the invention;
- Figure 11 is an exploded perspective view of the con-

nection of Figure 10.

[0017] With reference to the accompanying drawings, in Figures 1 and 2 the numeral 25 denotes as a whole a structural frame designed to be fitted to a folding side 30 of an armchair 31.

[0018] The structural frame 25 basically comprises two structural elements 1 and 2, corresponding to two half-surfaces, interconnected rotatably about a shared direction of rotation 12, by a joint hinge 18 preferably located at the height of the armchair 31 seat 26 [Figure 2], there being the possibility of locking the hinge 18 in selectively variable angular positions, some of which are illustrated by way of example in Figure 3.

[0019] Figures 4, 5 and 6 show in particular that the hinge 18 basically comprises a cylindrical tubular casing 16, at the ends of which there are two rotary connections 21, connected to one another by a rod 17 housed in the casing 16.

[0020] The two connections 21 are substantially located at the adjacent vertices 32 of the two half-surfaces 1 and 2.

[0021] Figures 7, 8 and 9 and, even more clearly Figures 9, 10 and 11 show how each connection 21 basically comprises: a cylindrical pin 3, with two bodies 4 and 5 consecutive and monolithic with one another. A first body 4 has grooves on the outside. The second body 5 is smooth.

[0022] The connection 21 also comprises two arms 6 and 7 having corresponding ends 6a and 7a with holes 8 and 9 through them, delimited by surfaces 10 and 11 for surrounding the pin 3, grooved like the first body 4 and designed to fit together with it, with the possibility of relative linear sliding, parallel with an axial direction 12 of the pin 3.

[0023] The surfaces 10 and 11 which fit together are preferably cylindrical and are: convex on the first body 4, and concave on the holes 8 and 9 of the arms 6 and 7.

[0024] The arms 6 and 7 and the pin 3 can move relative to one another along the axial direction 12 of the pin 3, between two end positions, in a first of which the first, grooved body 4 of the pin 3 and the surfaces of the arms 6 and 7 are integral with one another with respect to the relative rotation about the direction of rotation 12 on the pin 3. In contrast, in the second end position at least one of the arms 6 and 7 is at the second body 5 of the pin 3, so that it can rotate freely relative to the pin 3 and on the smooth surface of the second body 5 of the pin 3, while the other arm 6 or 7 continues to be integral with the pin 3, that is to say with its first body 4.

[0025] Each pin 3 comprises collars 13 for delimiting the end positions of the relative movement of the pin 3 and the arms 6 and 7.

[0026] The hinge 18 also comprises elastic reaction means 14 [Figure 6] interacting between the casing 16 and the rod 17, and means 20 for controlling the movement of the rod 17 relative to the casing 16. Said movement occurs due to the prevalence of a driving force applied to the rod 17, countering the opposite reaction of the elastic means 14.

[0027] The control means 20 can preferably be operated manually using a push-button and are designed, when operated, to control the movement of the pins 3 between the two end positions. In one of said end positions, the arms 6 and 7 are engaged with the first, grooved body 4 without the possibility of relative rotation about the direction 12. The two half-frames 1, 2 remain in this stable condition once one of the relative angular positions illustrated in Figure 3 has been assigned to them. In the second end position, one of the arms 6 and 7 arrives on the smooth body 5 of the pin 3, so that the arm 6 or 7 can rotate freely about the direction 12, able to be positioned at any angle to the other arm 7 or 6 which is kept integral with the first body 4 of the pin 3. In said end position, the two half-frames 6 and 7 are able to move by rotating relative to one another, in this way allowing variations, in the side 30 of the armchair 31, in the angle of one half-frame 1 relative to the other half-frame 2.

[0028] In practice, if the half-frames 1 and 2 of the frame 25 are made with tubular elements 23, the arms 6 and 7 of a connection 21 are associated with adjacent tubular elements 23 of the two half-frames 1 and 2 by axial insertion in the relative cavities. The arms 6 and 7 remain centred in the cavity, in a stable condition, due to their projections 24 extending from each of the arms 6 and 7 parallel with the direction of rotation 12 of the hinge 18, making contact with the opposite inner walls of the tubular elements 23.

[0029] Figures 6, 7 and 9 show what is described below as regards operation of the relative rotation of the arms 6 and 7 which allows the half-frames 1 and 2 to be positioned with the desired relative angular orientation. If the hinge 18 is structured in such a way that there are two connections 21 aligned along the shared direction of rotation 12 of the half-frames 1 and 2 and integral with one another due to the presence of the rod 17 inserted between them, and if it is structured in such a way that the pins 3 of the two connections 21 are made in such a way that their first and second bodies 4 and 5 correspond in an orderly way along the shared direction 12 of the hinge 18, a single operation of rod 17 movement can be used to move both of the hinge 18 pins 3, so that the two connections 21 simultaneously reach the locking or free rotation position for one half-frame 1 relative to the other 2.

[0030] For this purpose, one of the pins 3 may advantageously have a front surface 15 designed to allow the armchair 31 user, with just the fingers of one hand, to push against the opposite force of the elastic means 14 so as to bring the hinge 18 to the switching conditions, that is to say, to a condition such that it allows the upper half-frame 1 of the side 30 to be angled even just by gravity and, if necessary with just the aid of a very limited horizontal push applied by the user with his body. Such a feature is particularly advantageous and convenient for all armchair 31 users, but even more advantageous for a disabled person who can angle the upper part of the

side, on his own, and using just his fingers, without having to ask others to help.

[0031] The invention fully achieves the expected results and has relatively simple construction, with evident advantages in terms of economical construction and safe, lasting operating reliability. The latter features, to be hoped for in general, are even more appreciated considering that the invention is designed to be applied preferably, but without limiting the scope of the invention, in the padding of an armchair 31, no longer accessible from the outside after construction of the armchair 31.

[0032] The invention described above is susceptible of industrial application and may be modified and adapted in several ways without thereby departing from the scope of the inventive concept. Moreover, all details of the invention may be substituted by technically equivalent elements.

Claims

1. A connection for connecting structural elements (1, 2) at an angle with selectively variable amplitude, **characterised in that** it comprises at least one cylindrical pin (3), having two consecutive bodies (4, 5), of which a first body (4) has grooves on the outside and a second body (5) is smooth; two arms (6, 7) with corresponding ends (6a, 7a) having holes (8, 9) through them, delimited by surfaces (10, 11) for surrounding the pin (3) and grooved like the first body (4); the arms (6, 7) and the pin (3) being able to move relative to one another along an axial direction (12) of the pin (3) and between two end positions, in a first of which the first, grooved body (4) of the pin (3) and the surfaces of the arms (6, 7) are integral with one another with respect to the relative rotation about the axial direction (12) of the pin (3), and in the second end position at least one of the arms (6, 7) being located at the second body (5) of the pin (3), so that it can rotate freely relative to the pin (3).

2. The connection according to claim 1, **characterised in that** one of the arms (6, 7) is permanently engaged with the first, grooved body (4) of the pin (3) .

3. The connection according to either of the foregoing claims, **characterised in that** the pin (3) comprises at least one collar (13) delimiting the relative movement of the pin (3) and the arms (6, 7).

4. The connection according to any of the foregoing claims, **characterised in that** it comprises elastic means (14) designed to oppose the relative movement of the pin (3) and the arms (6, 7), countering an opposing force which drives the movement.

5. The connection according to claim 4, **characterised in that** the pin (3) has a surface (15) for application of the force opposing the elastic means (14).

6. The connection according to any of the foregoing claims, **characterised in that** the first, grooved body (4) and the holes (8, 9) through the arms (6, 7) have surfaces (10, 11) which fit together, sliding in a linear fashion.

7. The connection according to claim 6, **characterised in that** the surfaces (10, 11) which fit together are cylindrical.

8. The connection according to claim 7, **characterised in that** the surfaces (10, 11) which fit together are convex on the first body (4) and concave on the holes (8, 9) of the arms (6, 7).

9. A joint hinge, **characterised in that** it comprises a tubular casing (16), a rod (17) housed in the casing (16) and at its opposite ends having two cylindrical pins (3), in which each pin (3) has two consecutive bodies (4, 5), a first body (4) with grooves on the outside and a second body (5) which is smooth, the pin (3) being associated with two arms (6, 7) having corresponding ends with holes (8, 9) through them, delimited by surfaces (10, 11) for surrounding the pin (3) and grooved like the first body (4); the hinge (18) also comprises elastic reaction means (14) interacting between the casing (16) and the rod (17), means (20) for controlling rod (17) movement relative to the casing (16), operated using a push-button and designed to control the movement of the pins (3) between two end positions, in a first end position the first, grooved body (4) of the pin (3) and the surfaces of the arms (6, 7) being integral with one another with respect to the relative rotation about the axial direction (12) of the pin (3), in the second end position at least one of the arms (6, 7) reaching the second body (5) of the pin (3) so that it can rotate freely relative to the pin (3).

10. A frame comprising structural elements (1, 2) corresponding to two half-surfaces, interconnected rotatably about a shared direction of rotation (12), **characterised in that** it comprises at least one connection (21), each arm (6, 7) of which is integral with a respective half-surface.

11. The frame according to claim 9 or 10, comprising two connections (21) aligned along the shared direction of rotation (12) of the half-surfaces.

12. The frame according to claim 11, **characterised in that** at least one connection (21) is located at one of the vertices (32) of the half-planes.

13. The frame according to claim 11 or 12, **characterised in that** the pins (3) of the two connections (21)

are integral with one another.

14. The frame according to claim 13, **characterised in that** the first and second bodies (4, 5) of the two pins (3) have positions which correspond in an orderly way along the shared direction (12), so that they can be configured in the relative motion with respect to their arms (6, 7) identically to one another after a single operation of the relative movement.

15. The frame according to any of the foregoing claims, **characterised in that** at least one of the half-frames is made with tubular elements (23), there being the possibility of axially inserting a corresponding arm (6, 7) of one or each connection (21) in a tubular element (23).

16. The frame according to claim 15, **characterised in that** one or each arm (6, 7) of the connection (21) has stabilising projections (24) inside the tubular element (23) designed to receive said arm (6, 7).

17. The frame according to claim 16, **characterised in that** one or each projection (24) projects from a corresponding arm (6, 7) parallel with the direction of rotation (12) of the pin (3).

18. The frame according to any of the foregoing claims, **characterised in that** the half-frames are used in the structure (25) of a side (30) of an armchair (31).

19. The frame according to claim 18, **characterised in that** one or each connection (21) of the half-frames is substantially located at the height of the armchair (31) seat (26).

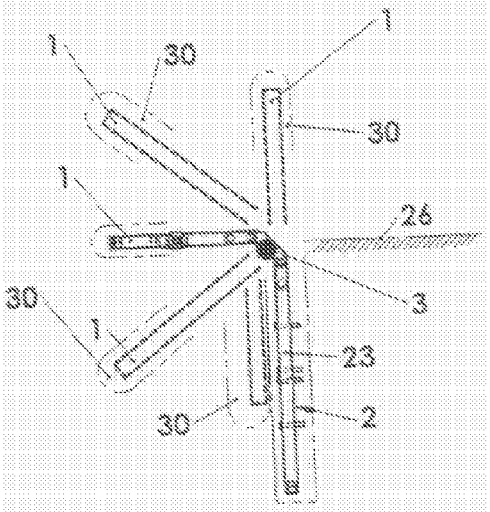

FIG.3

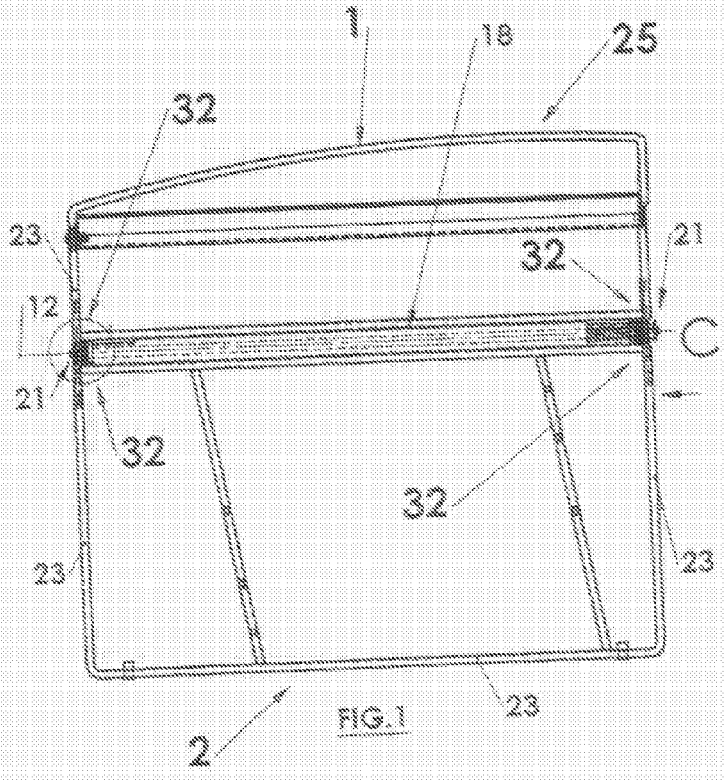

FIG.1

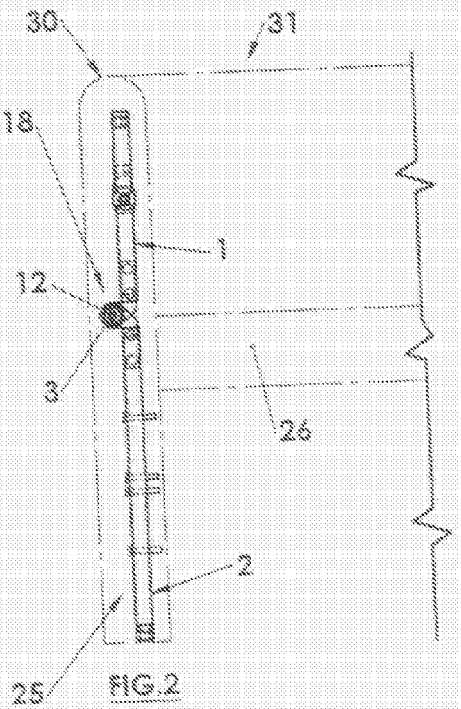

FIG.2

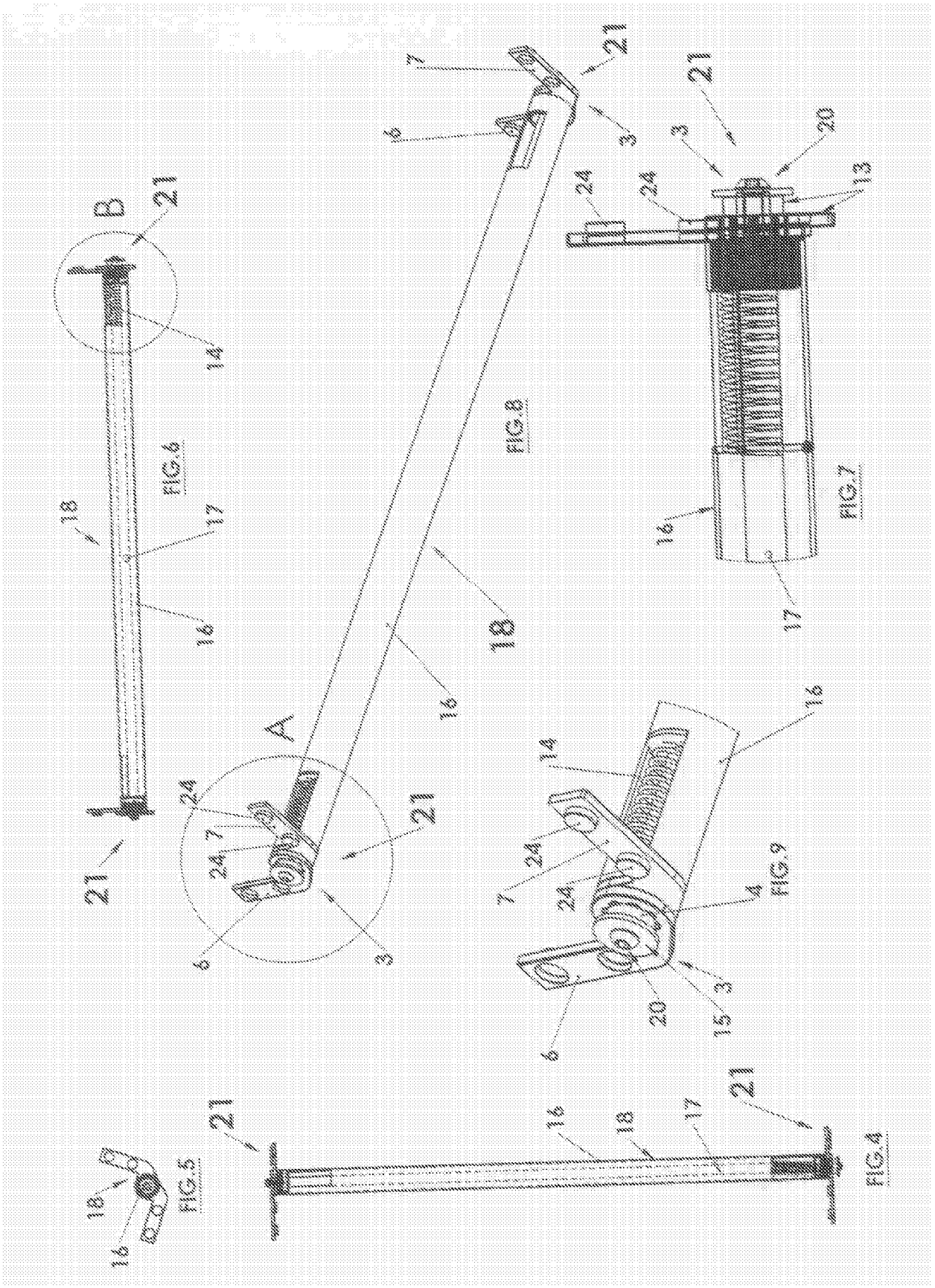
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FIG.6
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FIG.4
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FIG.5

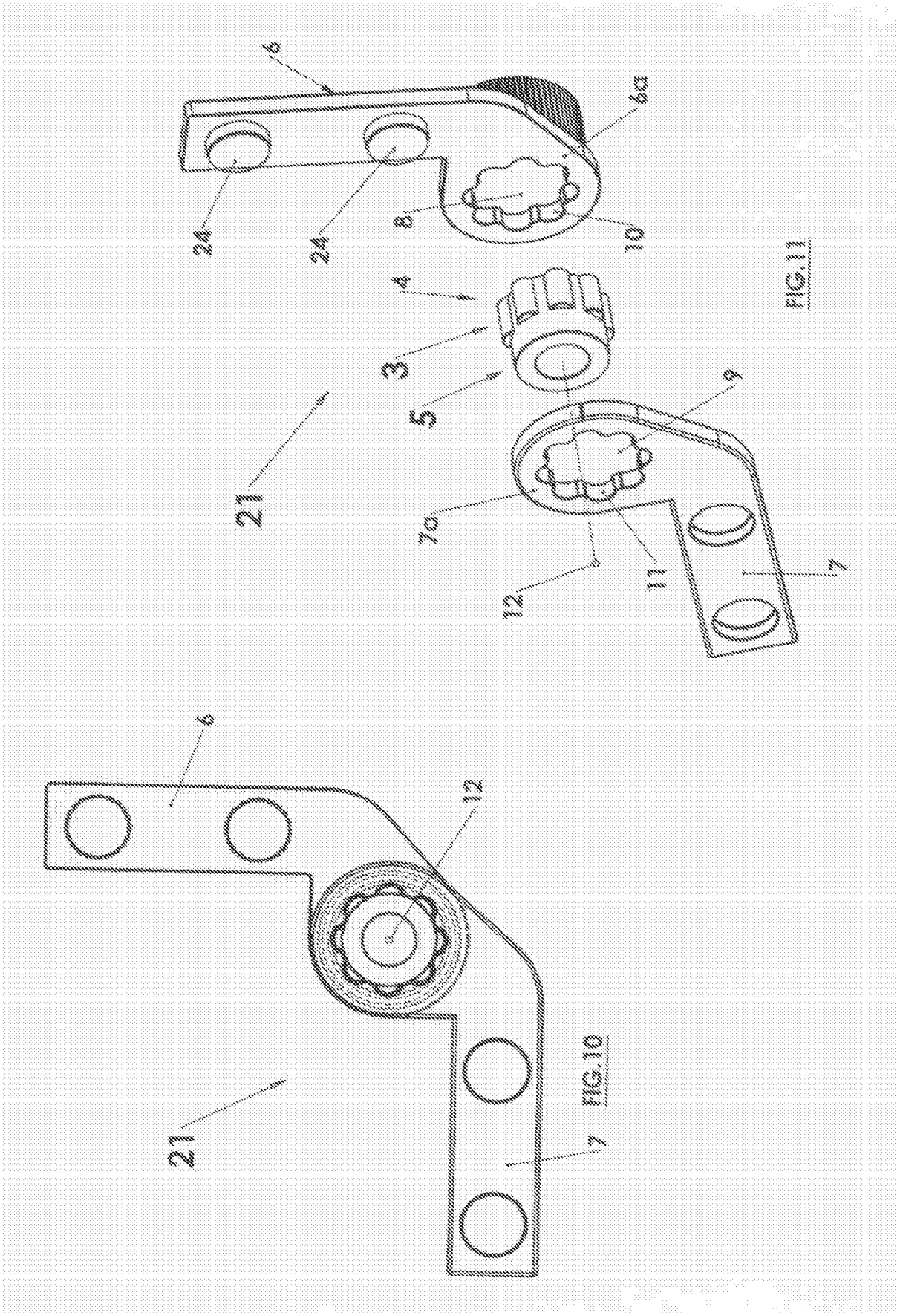

FIG.11

FIG.10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 11 3145

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 Y A	WO 97/20706 A (HENDERSONS IND PTY LTD [AU]; CARRIG JOHN FRANCIS [AU]; COPE MATTHEW AL) 12 June 1997 (1997-06-12) * page 18, lines 1-5 * * page 19, line 28 - page 20, line 4 * * page 20, line 22 - page 21, line 11; figures 5,9,10 *	1-8, 10-17 18,19 9	INV. A47C1/026 A47C17/12
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A	EP 0 566 501 A (SCOPEMA [FR]) 20 October 1993 (1993-10-20) * abstract; figures *	1,9,10	
A	US 1 842 208 A (STEFAN SCHNEIDER) 19 January 1932 (1932-01-19) * claims; figures *	1,9,10	

TECHNICAL FIELDS SEARCHED (IPC)

A47C
B60N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	7 January 2008	Amghar, Norddin

CATEGORY OF CITED DOCUMENTS

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07-01-2008

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