



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
20.05.2015 Bulletin 2015/21

(51) Int Cl.:
A47C 1/032 (2006.01)

(21) Application number: **12880870.6**

(86) International application number:
PCT/ES2012/000193

(22) Date of filing: **12.07.2012**

(87) International publication number:
WO 2014/009572 (16.01.2014 Gazette 2014/03)

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

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(54) **AUTOMATIC RECLINING SEAT**

(57) This invention relates to an automatic reclining seat that can recline according to the angle desired by the weight of the user. The seat comprises a bedplate (**E**) that supports the assembly formed by the base of the seat (**S**) and the back rest (**R**). The base of the seat (**S**) also comprises two fixed rotating support points (**A** and **A'**) and two other floating points (**C** and **C'**), shared with the back rest (**R**); The back rest is also supported by springs **M** and **M'** joined to the reclining mechanism, which, in turn, is connected to the assembly made up of the base of the seat (**S**) and the back rest (**R**) by means of the floating supporting points (**C** and **C'**), said mechanism comprising connecting rods (**H** and **H'**) that are joined, by one of the ends thereof, to one of the floating points (**C** and **C'**) and the other end of each connecting rod (**H** and **H'**) being provided with a wheel (**r** and **r'**) or ferrule (**q** and **q'**) that is supported on a rail-guide (**G** and **G'**) on which said end of each connecting rod (**H** and **H'**) can slide.

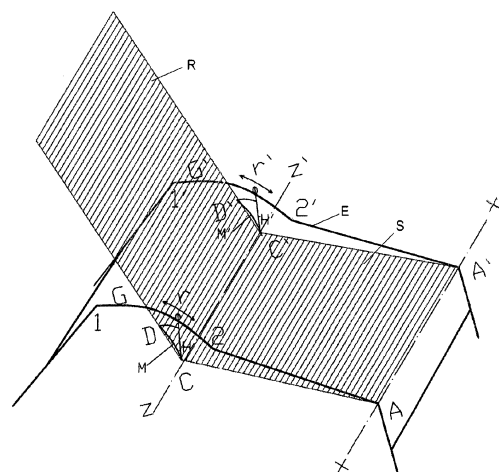


Fig. 1

Description

Technical field of the invention

[0001] This invention refers to an automatic reclining seat designed for use in the manufacturing of deck chairs, armchairs (for outdoors or indoors), seats, easy chairs, sofas, beds, etc.

Background of the invention

[0002] The main request for a reclining or reclining seat is simply for it to be practical and comfortable. The back reclining facility of a reclining seat offers a variety angles so the user can attain the most comfortable position. A seat of this type is described, for example, in document US2002/0125745. The disadvantage of this seat is that it only has a limited number of angles and the user has to get off the seat in order to adjust the angle. Therefore, such a design is not flexible enough to meet the user's needs. As a result of these defects, some inventors have redesigned the foldable reclining seat to correct the aforementioned problems. Chinese patent number CN2346300Y introduced an adjustment device situated on a guiding lever, this adjustment device allows users to adjust the recline angle of the foldable seat as they wish. This adjustment device does not have the limitations of the recline angle when adjusting the seat, which means it offers more adjustment options and the defect of the conventional foldable reclining chair is resolved, which does not offer such flexibility. However, the conventional foldable reclining seat has another defect, given that the support frame does not have a fixed mechanism. Therefore, this support frame often slides freely as a result of the weight imbalance and the unstable centre of gravity, when users are adjusting the recline angle of the seat or when they are simply lying on the chair. It also requires users to manipulate it in order to adjust the recline angle.

[0003] Patent ES2307115T3 also describes a foldable reclining chair that enables users to adjust the recline angle as they wish and also enables them to use it safely.

[0004] However, conventional reclining chairs or seats need to be manipulated by the user in order to adjust the recline angle, which is normally limited to a series of positions. In this invention, a chair is described that can be automatically reclined to the desired angle safely and comfortably, simply with the user's weight, without having to manipulate the reclining mechanism.

Invention description

[0005] This invention relates to an automatic reclining seat, made up of three main elements: a bedplate, made up of the base of the seat and the back rest and the reclining mechanism.

[0006] The bedplate is the structure or element that supports the assembly formed by the base of the seat

and the back rest, both of which are joined to the reclining mechanism. The structure or bedplate has four support points that support the assembly formed by the base of the seat and the back rest: Two rotating points on each side of the front part of the seat and two support points that slide along a rail-guide, also on each side, but in this case on the upper rear part of the bedplate. This rail-guide can be attached to the side of the bedplate or it can form a part thereof, which is decided during the manufacturing process.

[0007] The base of the seat and the back rest are the elements that support the user's body and they are joined together sharing a supporting point; the base of the seat and the back rest can be joined together by means of a hinge mechanism between the two parts, either with a hinge directly incorporated into both elements or with hinges joined laterally or any other type of hinge mechanism.

[0008] The base of the seat consists of two floating supporting points shared with the back rest and situated at the ends of the axle that joins the back rest with the base.

[0009] The back rest is supported by the two aforementioned floating support points and by another two points supported by springs and joined at the lower end to the reclining mechanism.

[0010] The two floating support points that are shared by the base of the chair and the back rest are attached to the reclining mechanism. The reclining mechanism includes a connecting rod joined at one end to each floating point and at the other end it is equipped with a wheel or ferrule that is supported on a rail-guide and along which it can run or slide respectively.

[0011] The back rest is supported on the connecting rod with the help of the spring, which enables the back rest to move more or less together with the connecting rod that supports it, in such a way that the point of balance is re-established by allowing the connecting rod to get as close as possible to the body's centre of gravity.

[0012] The back rest is always supported on the spring, enabling the distance between the wheel or ferrule at the end of the connecting rod and the back rest to vary in accordance with the weight and the physical constitution of each user. The varying degree of pressure on the spring, depending on the weight of each user results in the distance increasing or decreasing in such a way that the wheel or ferrule follows the centre of gravity of that person and restores the balance.

[0013] The mechanism simultaneously enables the back rest to be lowered and the base of the seat to return to its horizontal position, in a reclining movement or angle from the normal position (seated) to the horizontal position (reclined) and also return to the original position.

[0014] When we refer to the base of the seat returning to a horizontal position, it is because in the normal position (seated), the base of the seat is slightly tilted downwards in the direction of the back rest, forming an approximate angle of 10° with the horizontal, while the back

rest is slightly tilted forming an approximate angle of 15° with the vertical, guaranteeing maximum comfort.

[0015] The hinge mechanism of the base of the seat with the back rest will be equipped with a bolt that enables the automatic reclining seat to be blocked in the reclined position, offering users the possibility of using it in a face down position. It is unblocked by simply pressing on the head of the bolt. This hinge mechanism or joint is made up of two leaves, one coupled to the back rest and the other to the seat.

[0016] This automatic reclining seat is designed for use in the manufacturing of deck chairs, armchairs (for outdoors or indoors), seats, easy chairs, sofas, beds, etc. and it is designed to enable the abovementioned items to be used and enjoyed without having to manipulate levers or mechanisms for intermediate positions, in such a way that users can slide backwards or forwards, completely uniformly and continuously, reaching a stable position at any intermediate point and enabling users to enjoy maximum comfort.

[0017] The position is easily changed by gently pushing backwards on the back rest or gently leaning forward until the desired position is reached. Regardless of when the user stops pushing, the seat will remain in a stable and balanced position. This balanced position is achieved by means of a sliding supporting point which is able to follow the body's centre of gravity.

Description of the diagrams

[0018] Below are some diagrams with their descriptions that will help to explain the invention and which are expressly related to a preferred embodiment of said invention and are presented by way of example but not limited thereto:

- Diagram 1: Schematic representation of this invention's automatic reclining seat in the form of an armchair.
- Diagram 2: Schematic representation of this invention's automatic reclining seat in the form of a deck chair.
- Diagrams 3 to 6 schematically represent the automatic reclining mechanism including in each case: a leaf spring mechanism, a helical spring, a compression spring and a drive spring assembly respectively.
- Diagram 7 represents the reclining mechanism's connecting rod equipped with a wheel system that runs along the rail-guide.
- Diagram 8 shows the same connecting rod equipped with a sliding ferrule on the rail guide.
- Diagram 9 shows a front view and a side view of the hinge leaf that is coupled to the back rest, joined to the connecting rod by a shared axle.

[0019] Diagram 9 also shows the hinge leaf which is coupled to the seat

- Diagram 10 shows the hinge assembly with the bolt that enables the seat to be blocked in the reclined position. The diagram references represent:

- 5 (A, A'): The seat's rotating support points
- (B): The support point for the wheel or ferrule that slides along the rail-guide
- (C, C'): Back rest and seat's floating support points
- 10 (D and D'): Support points for the back rest on the springs
- (G, G'): Rail guide (E): Bedplate
- (H): connecting rod
- (J): Hinge leaves coupled to the back rest
- 15 (K): Hinge leaf coupled to the seat
- (F) Hinge leaf housing (J) for the leaf spring (M_b) or coil spring (M_e)
- (M): spring or coil spring
- (M_b): Leaf spring
- 20 (M_e): Coil spring
- (M_c): Compression spring
- (M_d): Drive spring
- (P): pin
- (R): Back rest
- 25 (S): Base of seat
- (T): bolt
- (W): Rail guide separator
- (a): Recline angle
- (z-z'): shared axle between back rest and base of seat
- 30 (1, 1'): rear end bolt for the rail-guide
- (2, 2'): front end bolt for the rail-guide
- (d): Distance between the back rest and the upper end of the connecting rod
- 35 (n): Cap that limits the opening angle between the back rest (R) and the connecting rod
- (H)
- (q): Sliding ferrule
- (r): wheel
- (s): Bolt axle
- (t): Cap for the hinge leaf (J) coupled to the back rest
- (u): Rotating joining point between connecting rod and rod
- 45 (v): rod

• Detailed description of the invention

[0020] In order to gain a better understanding of the invention, below is a detailed description of the reclining seat that is the subject matter of the invention based on the diagrams. Diagrams 1 and 2 represent the seat in an armchair and a deck chair format respectively.

[0021] As shown, the automatic reclining seat is assembled on a structure or bedplate (E), which supports it. The base of the seat (S) and the back rest (R) are joined together by their two adjoining edges sharing the same axle (z-z') with hinges. The bedplate will be different

in each case, depending on whether it is a deck chair, an armchair, an easy chair, etc., as shown in diagrams 1 and 2. The support points that are described shall have a fixed position between them on any of the bedplates and on any of the different designs in each case.

[0022] The structure or bedplate (E) has four support points that support the assembly formed by the base of the seat and the back rest: Two rotating points (A, A') on both sides of the front part of the seat that rotate on the axle (x-x') and two support points that slide along a rail-guide (G and G'), also on both sides, but in this case on the upper back part of the bedplate. This rail-guide is also attached by its ends (1-1' and 2-2') to the bedplate (E). The aforementioned rail-guide (G and G') may be attached sideways to the bedplate (E) or it may directly form part of the bedplate (E), as decided during the manufacturing process.

[0023] Diagrams 3 to 6 schematically represent the automatic reclining mechanism including in each case: a leaf spring mechanism, a helical spring, a compression spring and a drive spring assembly respectively. The automatic reclining mechanism represented is for one of the sides, since both sides are symmetrical. When reference is made to the points of the opposing sides (A', B', etc.) diagrams 1 and 2 can be viewed.

[0024] The reclining mechanism is that which supports the base of the seat (S) and the back rest (R).

[0025] This mechanism is made up of a connecting rod (H) equipped at one of its ends with a wheel (r) or ferrule (q), which slides along the rail-guide (G, G'). The other end has floating points (C, C') that act as a joint between the seat (S) and the back rest (R) and which slide along an arch, the centre of which is on the rotating supporting points (A, A') of the seat (S).

[0026] The seat (S) is therefore supported on four points, its two front apexes to the structure via fixed rotating elements (A and A'), and on its two rear apexes hinged to the back rest, by floating support points (C and C'), which in turn are supported by the connecting rod (H) on the rail-guide (G).

[0027] The back rest (R) is also supported by four points, two at its lower apexes to the seat, on the floating support points (C and C') as mentioned in the preceding paragraph and the other two back rest support points (D and D') which do so on a spring (M) which may be a leaf spring (M_b, as shown in diagrams 1, 2 and 3), a coil spring (M_c, as shown in diagram 4), a compression spring (M_c, diagram 5) or a drive spring (M_d, diagram 6). The effect is the same in each case.

[0028] The manufacturing process shall determine which of these is the most suitable in each case. The back rest (R) leans on the abovementioned connecting rod (H) with the help of the spring (M), which enables the back rest (R) to be moved forward more or less together with the connecting rod (H) that supports it so the point of balance is re-established by allowing the connecting rod to get as close as possible to the body's centre of gravity.

[0029] In the case of a leaf spring (M_b) or a coil spring (M_c), one of the ends would be attached between the floating support point (C) and the cotter (P) situated on the bottom part of the connecting rod (H), as shown in diagrams 3, 4 and 9. At the opposite end, the leaf (M_b) or coil (M_c) springs are anchored in both cases to the back rest (R) at the support point (D) by an eyelet or a sliding joint. A cap (n) will be inserted between the back rest and the connecting rod (H), which will limit the maximum opening between the back rest (R) and the connecting rod (H) and which in turn will ensure the spring (M) is not overloaded.

[0030] For a compression spring (M_c), as shown in diagram 5, it is guided by a rod (v) attached in turn to the connecting rod (H) at a connecting point (u) by a rotating joint, while the other end of said rod (v) remains free. The rod (v) goes through an eyelet at the support point (D) that is attached to the back rest (R).

[0031] For a drive spring (M_d), as shown in diagram 6, it is anchored to the body of the connecting rod (H) and to the back rest (R) at the support point (D) as shown.

[0032] The back rest (R) is always supported on the spring (M), enabling the distance (d) between the back rest (R) and the upper end of the connecting rod (H) that slides along the rail guide (G) to vary in accordance with the weight and physical constitution of each user. More or less pressure on the spring, depending on the weight of the user, makes the distance (d) increase or decrease so the wheel (r) or ferrule (q) coincides with the centre of gravity of the person, restoring the balance. All the variations of springs (M) may be used pursuant to the structural interest at all times.

[0033] Diagrams 7, 8, 9 and 10 show the mechanism equipped with a leaf spring in the construction plans.

[0034] Diagram 7 shows the connecting rod (H) equipped with a wheel (r) system that rides along the rail-guide (G), while figure 8 shows the same connecting rod (H) equipped with a sliding ferrule (q) on the rail-guide (G). It also shows the separator (W) that separates the rail-guide (G) from the bedplate to enable the connecting rod (H) to pass through.

[0035] The hinge is made up of two leaves: One leaf (J) coupled with the Back rest (R) and the leaf (K) coupled with the base of the seat (S).

[0036] Diagram 9 shows a leaf spring (M_b) the upper part of which is housed in the housing (F) situated at the upper end of the hinge leaf (J) coupled to the back rest.

[0037] Diagram 10 shows the hinge assembly (J, K) and the pawl (T) which is situated on each side of the seat and which enables the automatic reclining seat to be blocked in the reclined position, also allowing users to use it in a face-down position. It is unblocked by simply pressing on the head of the pawl (T).

[0038] The rotating centre of the hinge assembly, represented in diagram 10, is at the point (C) coinciding with the axle (z-z'), attached to the assembly formed by the base of the seat (S) and the back rest (R), so the hinge leaf (J) is coupled with the Back rest (R) and the hinge

leaf (K) is coupled with the base of the seat (S).

[0039] As the hinge leaf (J) is coupled with the back rest, it is equipped with the housing (F) which enables the leaf (M_b) or coil (M_e) spring to be joined to the back rest through it. The hinge leaf (K) is a symmetrical component equipped with the cap (t) that limits how far the leaf (J) can travel. The symmetrical design enables it to be used for both sides. The pawl (T) on the other hand, is attached to the hinge leaf (K) by means of an axle (s); this pawl enables the assembly formed by the seat and the back rest to be blocked in a horizontal position as shown in the aforementioned diagram.

[0040] The angle (a) is the recline angle from the sitting position to the reclined position; this movement is limited by the cap (t) in both directions.

Claims

1. Automatic reclining seat made up of a bedplate or structure (E) that supports the assembly made up of the base of the seat (S) and the back rest (R), with the base of the seat (S) and the back rest (R) sharing a supporting point (z-z') and a reclining mechanism **characterised by:**

- the bedplate (E) that houses four support points that support the assembly made up of the base of the seat (S) and the back rest (R), two of the support points are fixed (A and A') situated on both sides of the front part of the seat (S) that rotate around a supporting point (x-x') and the other two, slide along rail-guides (G and G') at both ends of the upper back part of the bedplate (E),

- the base of the seat (S) also consists of two floating support points (C and C'), which are shared with the back rest (R) and which correspond with the ends of the axle (z-z') shared by the base of the seat (S) and the back rest (R)

- The back rest is supported, not only by the aforementioned floating support points (C and C'), but also by springs (M and M') that are attached to the reclining mechanism,

- the reclining mechanism is connected to the assembly made up of the base of the seat (S) and the back rest (R) by the floating support points (C and C'), with said mechanism made up of connecting rods (H and H') joined at one end to one of the floating points (C and C') with the other end of each connecting rod (H and H') equipped with a wheel or ferrule (r y r', q and q') that is supported on or slides along the rail-guide (G and G') along which each end of each connecting rod (H and H') can run or slide, depending on whether it is a wheel or a ferrule; each connecting rod (H and H') of the reclining mechanism is attached to the springs (M and M') that

support the back rest (R).

2. Automatic reclining seat, pursuant to claim 1, **characterised by** springs (M and M'), which may be leaf springs (M_b), coil springs (M_e), compression springs (M_c) or drive springs (Mt).
3. Automatic reclining seat, pursuant to claim 2, **characterised by** the fact that if it has leaf hinges (M_b) or coil hinges (M_e), one end of each of the hinges is fixed between the floating support point (C) and a cotter (P) situated at the lower end of the connecting rod (H), while the other end of each spring is attached to the back rest (R).
4. Automatic reclining seat, pursuant to claim 2, characterised because, if it has compression hinges (M_c), these are guided by a rod (v and v') fixed at one end to each connecting rod (H and H') by a rotating joint, while the other end of said rod remains free; the rod passes through an eyelet at the point where the hinge attaches to the back rest (R).
5. Automatic reclining seat, pursuant to claim 2, characterised because, in the case of drive hinges (M_t), each hinge is attached by one of its ends directly to the body of each connecting rod (H and H') and by the other end to the back rest (R).
6. Automatic reclining seat, pursuant to claim 1, characterised because between the back rest (R) and each connecting rod (H and H') there is a cap (n and n') that limits the maximum opening between the back rest (R) and each connecting rod (H and H') and which, in turn, will protect the spring from overloads.
7. Automatic reclining seat, pursuant to claim 3, characterised because it includes a hinge assembly with a pawl (T) at each side of the seat that enables the automatic reclining seat to be blocked in the reclined position, with the hinge being made up of two leaves, one leaf (J) coupled with the back rest (R) and another leaf (K) coupled with the base of the seat (S) and where the hinge leaf (J) coupled with the back rest is equipped with a housing (F) that enables the leaf hinge (M_b) or coil hinge (M_e) to be joined to the back rest (R) with the help of this hinge leaf (J) and where the hinge leaf (K) is equipped with a cap (t) that limits the movement of the leaf (J); the pawl (T) is attached to the hinge leaf (K) by an axle (s).

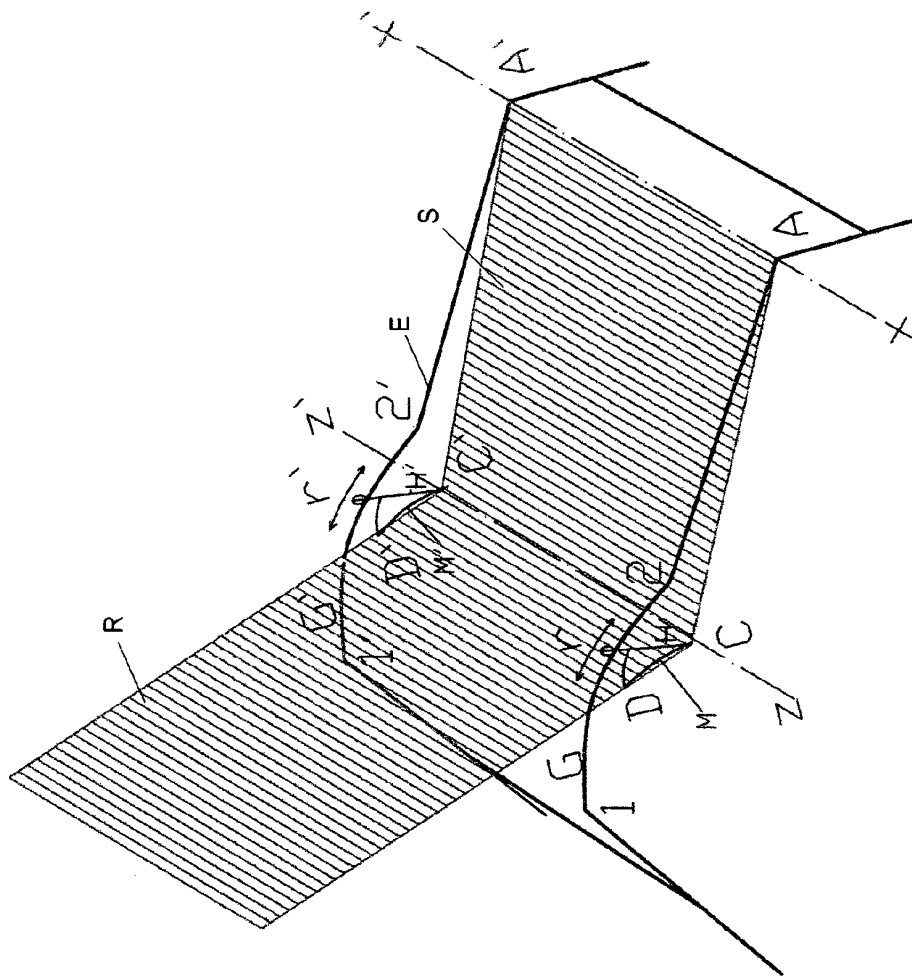


Fig. 1

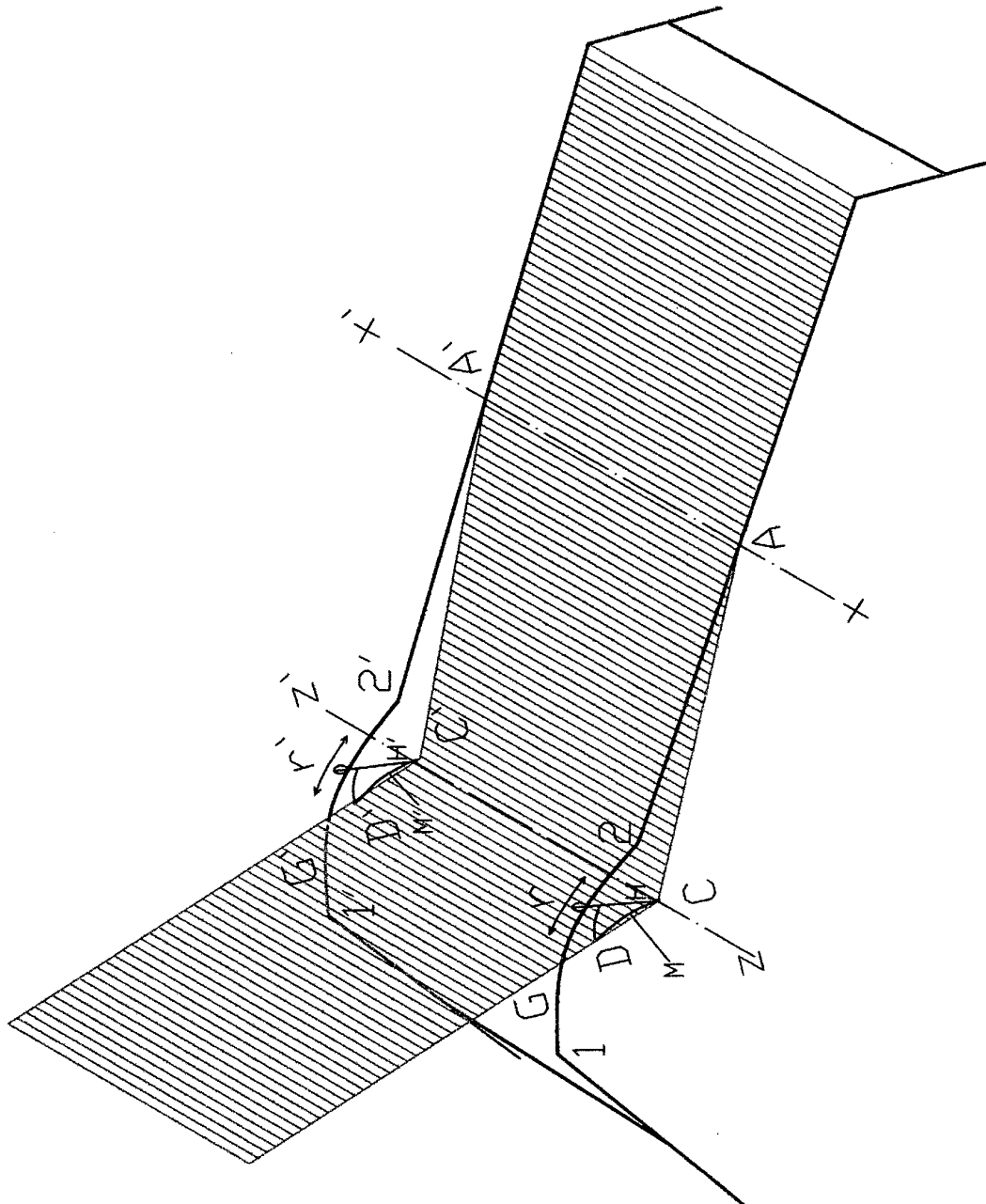


Fig. 2

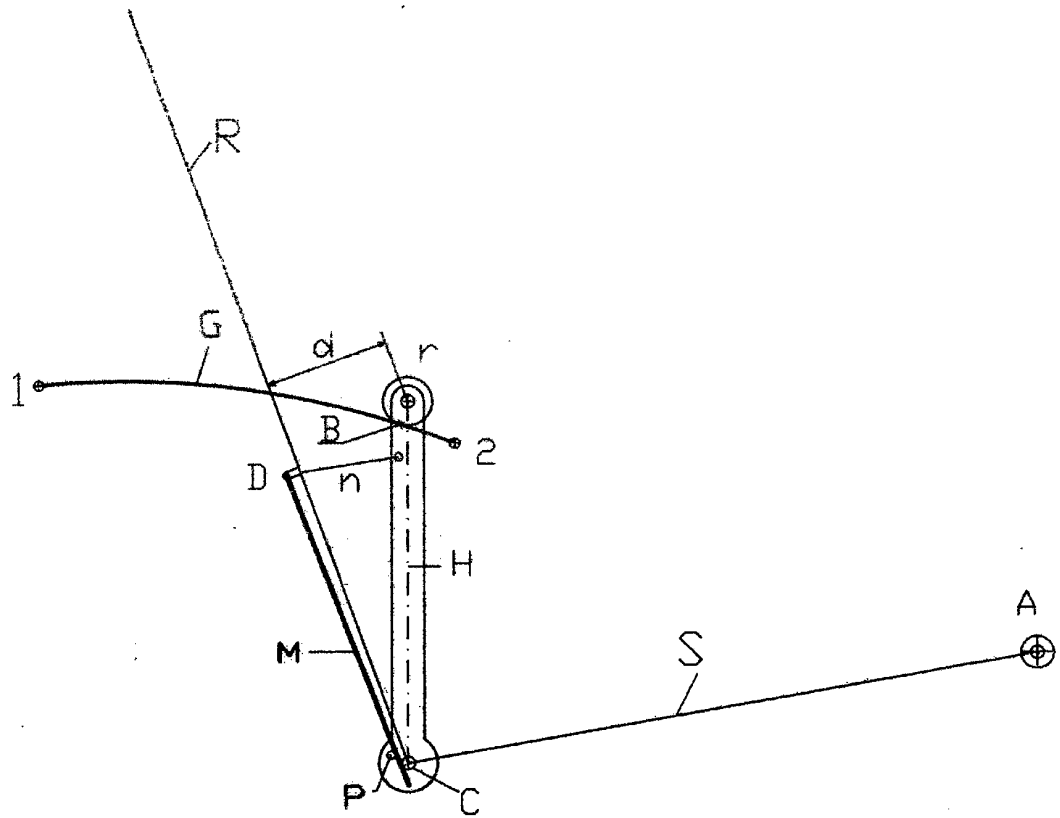


Fig. 3

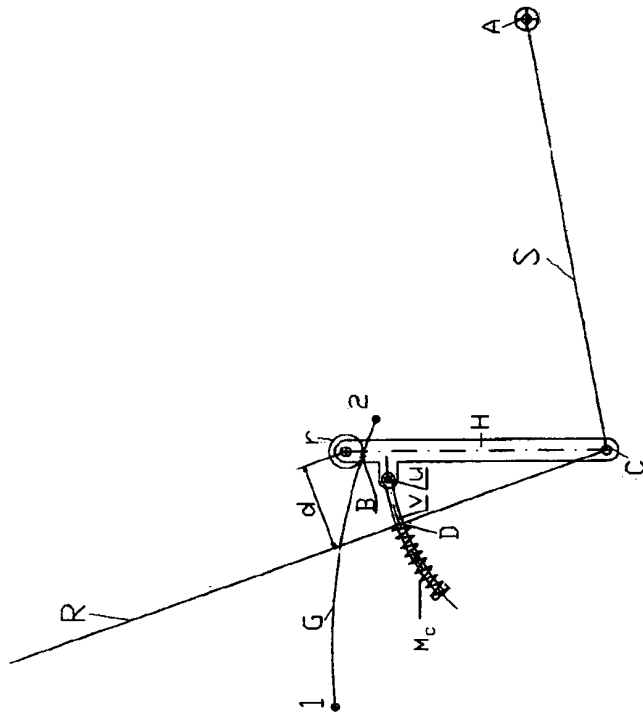


Fig. 5

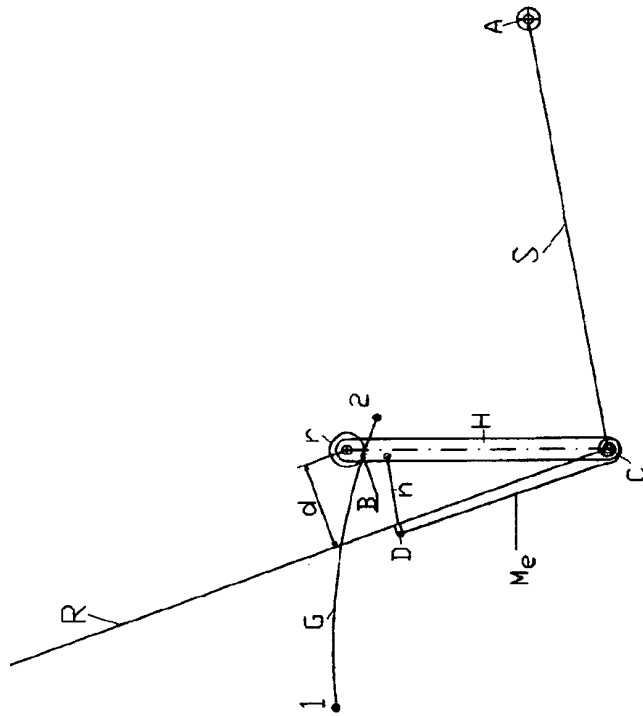


Fig. 4

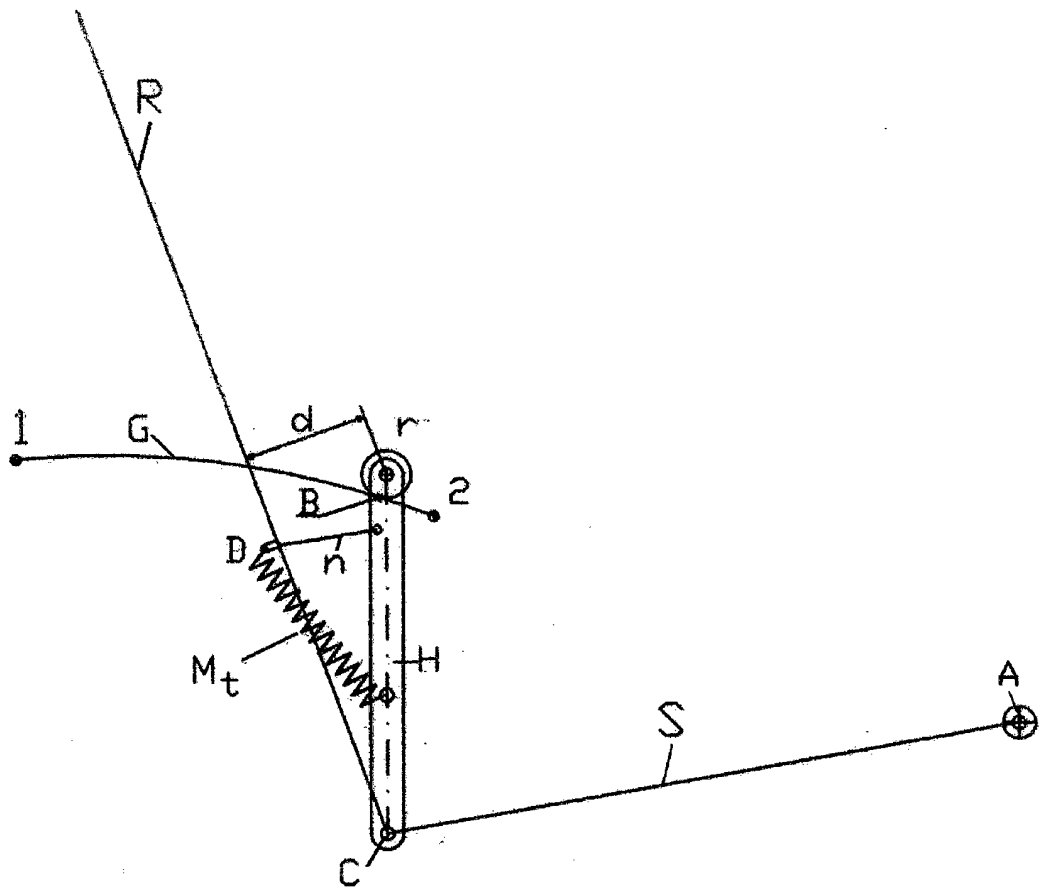


Fig. 6

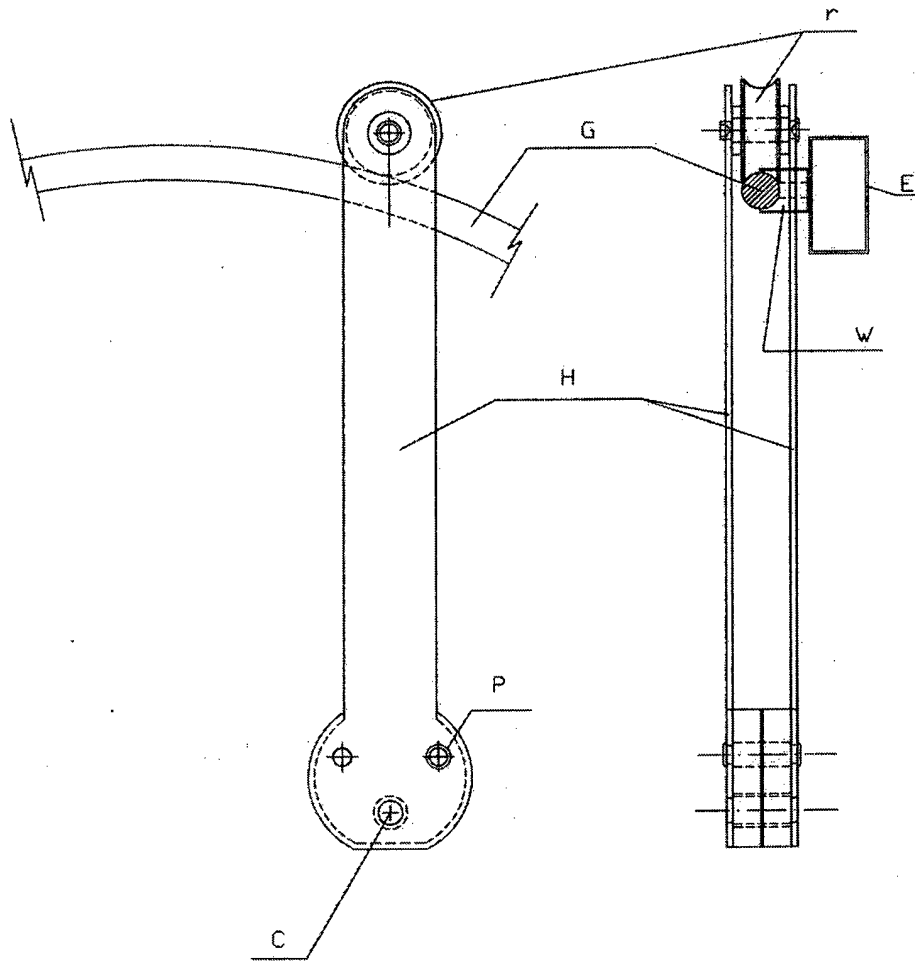


Fig. 7

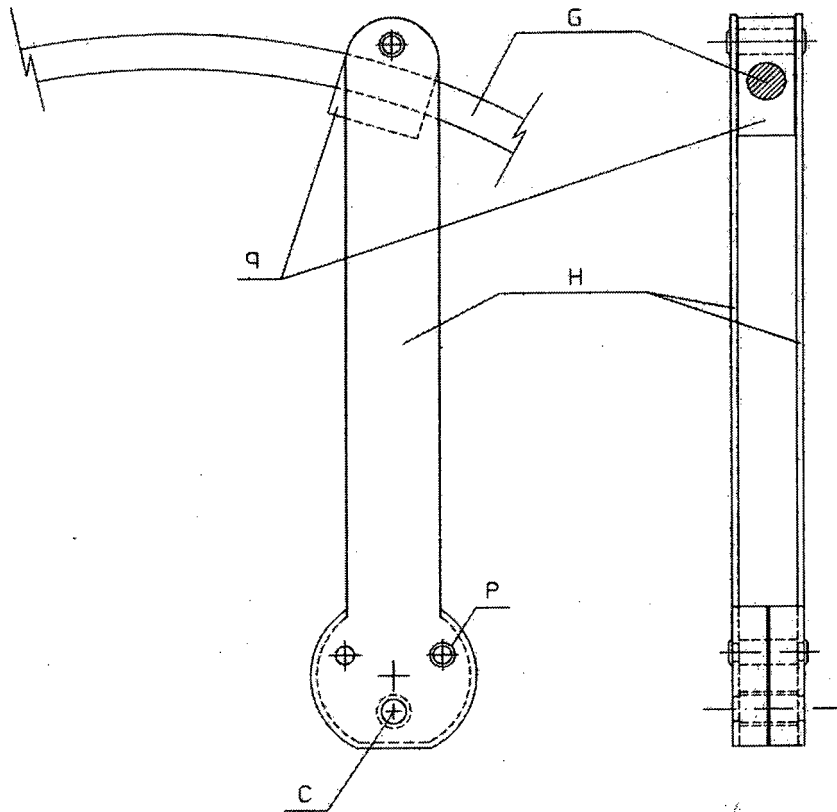


Fig. 8

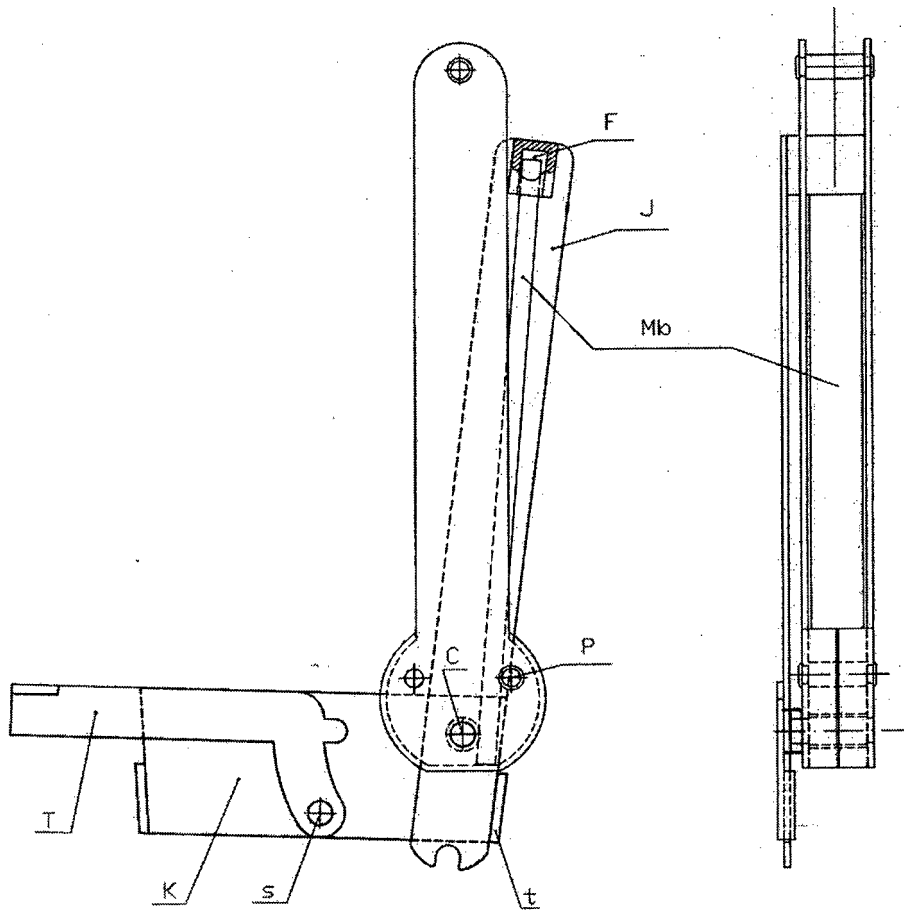


Fig. 9

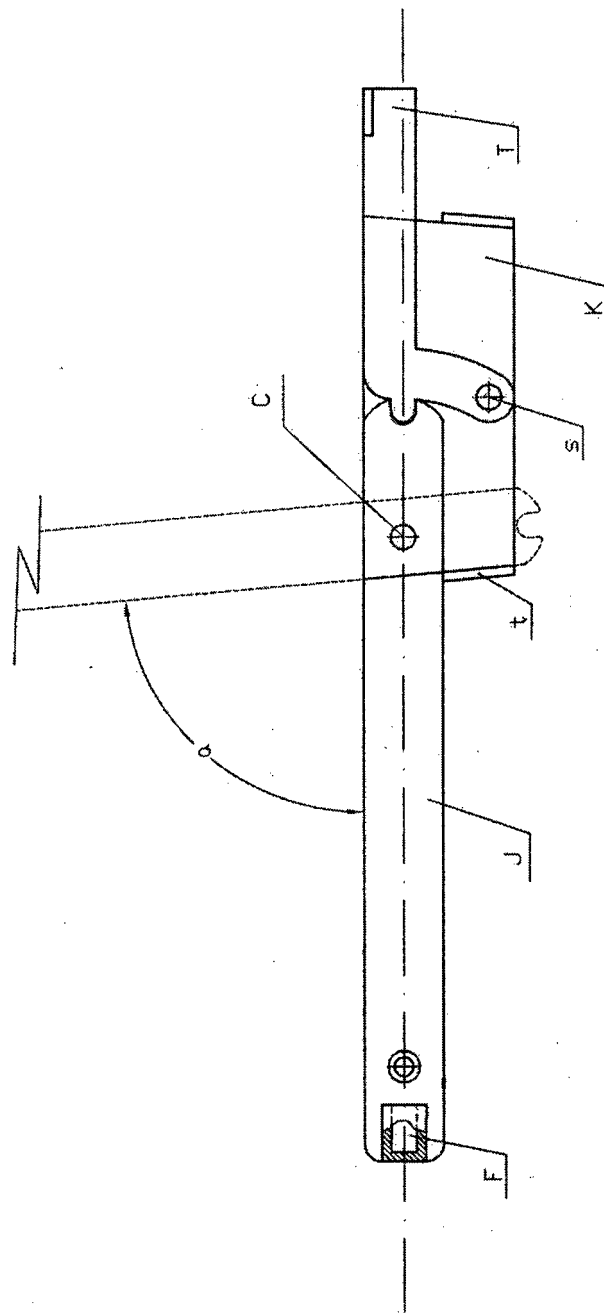


Fig. 10

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2012/000193

A. CLASSIFICATION OF SUBJECT MATTER

A47C1/032 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A47C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	ES 2024114 A6 (CUENCA REDONDO CARLOS) 16/02/1992, description; figures.	1
A	ES 1010601 U (JEANINE AGNELLO AZZARELLI) 16/01/1990, description; figure 1.	1
A	EP 1410738 A1 (ICF SPA) 21/04/2004, description; figures.	1
A	WO 9112750 A1 (S ASBJOERNSEN & JAN LADEA) 05/09/1991, abstract; figures.	1
A	ES 363163 A1 (KERSTHOLT) 16/11/1970, description; figure 8a.	1

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search
23/11/2012Date of mailing of the international search report
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2012/000193

C (continuation).			DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of documents, with indication, where appropriate, of the relevant passages			Relevant to claim No.	
A	ES 2076547 T3 (STAL & STIL A/S) 01/11/1995, description; figura1.			1	

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Information on patent family members

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