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(71) Applicant: **Aktiebolaget SKF**
415 50 Göteborg (SE)

(72) Inventors:
- **Gallucci, Francesco**
  10042 Nichelino (TO) (IT)
- **Scaltriti, Gianpiero**
  10135 Torino (IT)
- **Mola, Roberto**
  10129 Torino (IT)

(74) Representative: **Di Francesco, Gianni et al**
Ing. Barzanò & Zanardo Milano S.p.A.
Corso Vittorio Emanuele II, 61
10128 Torino (IT)

(54) **Regulation device for the upper rack of a dishwasher**

(57) Regulation device (1) for the upper rack (2) of a dishwasher suitable for regulating an operating position of the upper rack (2) itself and presenting a regulation plate (5) defining a number of operational washing positions of the upper rack (2) itself, and a selecting element (20), which is integral with the rack (2) and which is coupled in selectively disengageable fashion to the regulating plate (5) in order to permit the selective regulation of each operational washing position; at least one vertical guide track (10) being coupled in sliding fashion to the selecting element (20), and one or more revolving elements (50) being interposed between the vertical guide track (10) and the selecting element (20) themselves.

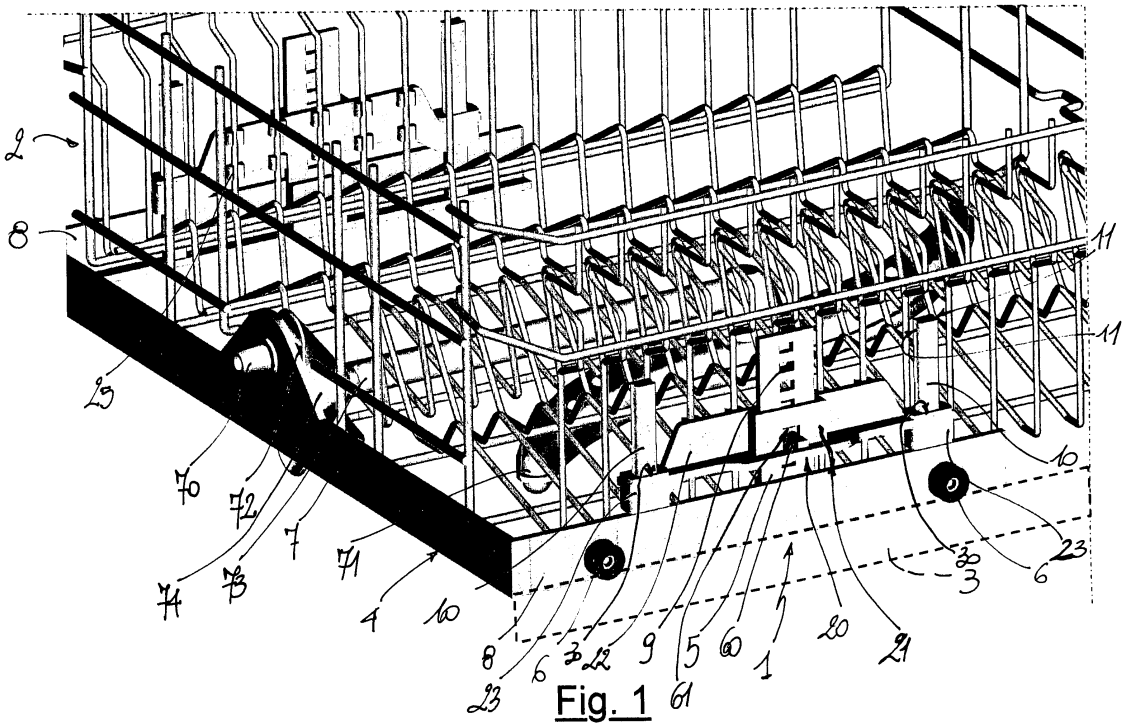

Fig. 1

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Description

[0001] The present invention relates to a regulation device for the upper rack of a dishwasher.

[0002] The American patent No. US 5,860,716 describes a regulation device for the upper rack of a dishwasher which is suitable for regulating an operating position of the upper rack in terms of height in relation to a tub of the dishwasher and comprising for each side of the upper rack itself:

- a support frame which is coupled in disengageable fashion to the tub by means of the interposition of a pair of rollers, and provided with a regulating plate which defines a number of operational washing positions of the rack itself; and
- a selecting element, which is integral with the rack and which is coupled in selectively disengageable fashion to the regulating plate in order to permit the selective regulation of each operational washing position.

[0003] In the regulation device which has just been described, the regulating plate is defined by a prismatic track which is provided with a catching element for each operational position, while the selecting element is defined by a slide which is connected in sliding fashion to the track, and is provided with an elastic tongue which is suitable for being snap engaged in the catching elements and is also suitable for being manually disengaged in the case that it is necessary to regulate the height of the rack.

[0004] The regulation device which is described in the American patent No. US 5,860,716 presents a disadvantage due to the fact that the substances which generally circulate inside a dishwasher are substantially detrimental to the regular functioning of the device itself. In fact, the slide and the track are directly coupled to each other and the resulting rasping friction, which is not so great at the beginning, tends to increase with the effect of wear and tear, and is further increased by the fact that foreign bodies or other contaminants might eventually be deposited between the two elements.

[0005] The aim of the present invention is to produce a regulation device for the upper rack of a dishwasher, which will be free of the above-descried disadvantages.

[0006] According to the present invention, a regulation device for the upper rack of a dishwasher will be produced, which is suitable for regulating an operating position of the upper rack itself and comprising at least one regulating plate defining a number of operational washing positions of the rack itself; and at least one selecting element, which is integral with the rack and is coupled in selectively disengageable fashion to the regulation plate in order to permit the selective regulation of each operational washing position; the regulation device being characterised by the fact of comprising, in addition, at least one vertical guide track which is coupled in sliding fashion to the said selecting element, and one or more revolving elements which are interposed between the vertical guide track and the selecting element themelves.

[0007] The regulation device which is described in the American patent No. US 5,860,716 presents a further disadvantage which is due to the fact that the regulation of the upper rack sometimes takes place when the upper rack is fully loaded, which means that the regulating plate is subjected to relatively high levels of mechanical stress which might cause it to break and consequently lead to the need for costly repairs.

[0008] With the aim of rendering the upper rack more stable and making it easier to guide, the American patent No. US 6,974,040 describes a regulation device for the upper rack which comprises two regulating plates which are arranged parallel to each other at a determined distance from one another, a selecting element for each plate, and a control lever, which is connected to the two selecting elements in order to disengage the selecting elemento from the relative plates and permit the regulation of the height of the upper rack.

[0009] Whicle the regulation device which is described in the American patent No. US 6,974,040 resolves the problem of the above-mentioned disadvantage, there is still the problem of the wear which is suffered by the coupling between the slide and the track, as well as which the structure presented is substantially complex and, therefore, relatively costly to produce.

[0010] A further aim of the present invention is to produce a regulation device for the upper rack of a dishwasher which will provide an easy, stable mobility of the upper rack, even when the upper rack itself is loaded, and which will be both robust and cost-effective to produce.

[0011] In order to comply with this aim, the above-defined regulation device will thus, preferably, comprise two guide tracks which are parallel to each other and which are engaged in respective housings obtained through the selecting element; each housing defining a respective housing for the said revolving elements.

[0012] The present invention will now be described with reference to the attached drawings, which illustrate a non-limiting form of embodiment of the present invention, in which:

- FIGURE 1 is a perspective view from above of a preferred form of embodiment of the regulation device for the upper rack of a dishwasher according to the present invention;
- FIGURE 2 is a perspective view on an enlarged scale of a detail which is shown in FIGURE 1; and
- FIGURE 3 is a perspective view on an enlarged scale of a further detail which is shown in FIGURE 1.

[0013] With reference to FIGURE 1, the number 1 indicates a regulation device for the upper rack 2 of a dishwasher in its entirety, of which only two horizontal tracks for the extraction of the upper rack 2 itelf are illustrated for reasons of simplicity.

[0014] The device 1 is interposed between the tracks 3 and the rack 2 in order to regular an operating position of the rack 2 itself, or rather to regulate the height of the rack 2 in relation to the tracks 3, and comprising, in the form of embodiment which is illustrated, a support frame 4 and, for each side of the rack 2, a regulating plate 5 which is integral with the frame 4 and which defines a number of operational washing positions of the rack 2 itself.

[0015] The frame 4 is coupled in extractable fashion to the tracks 3 by means of at least two rollers 6 for each side of the rack 2, and comprises a transverse rear bar 7 and, for each side of the rack 2, a bracket 8 which is integral with and transverse to the bar 7. Each racket 8 is parallel to the relative track 3, and is integral with the relative plate 5, which extends transversely towards the top of the bracket 8 itself, and presents a number of catching elements 9 which are arranged vertically spaced from each other in order to each define a relative operating position of the upper rack 2.

[0016] The frame 4 comprises, in addition, for each side of the rack 2, two vertical guide tracks 10, which are integral with the relative bracket 8 and which extend transervsely towards the top of the bracket 8 itself, and are arranged parallel to each other opposite the relative plate 5 and at a determined distance from the plate 5 itself. Each guide track 10 presents a substantially flattened shape in a direction which is parallel to the tracks 3, and comprises, in addition, two longitudinal shaped grooves 11, which are obtained opposite the track 10 itself as well as opposite the relative plate 5, and which extend for the whole of the length of the track 10.

[0017] The device 1 comprises, in addition, for each side of the rack 2, a selecting element 20, which is integral with the rack 2 and which is coupled in selectively disengageable fashion to the regulating plate 5 in order to permit the selective regulation of each operational washing position.

[0018] Each selecting element 20 comprises a central body 21 and two arms 22, which extend in opposite directions from the central body 21 itself and present, at the respective free ends 23, a respective tubular housing 30 which is engaged by a relative track 10.

[0019] In addition, the selecting element 20 is provided with a number of clips 25 which are distributed along the body 21 and the arms 22 in order to be snap hooked to the mesh elements which make up the rack 2.

[0020] According to what is better illustrated in FIGURE 2, each housing 30 presents a base wall 31 which is provided with a hole 32 which is shaped substantially like the external profile of the relative track 10, two lateral walls 33 which are arranged facing and parallel to the relative grooves 11, and an upper opening 34, which is also engaged by the relative track 10 but which, unlike the hole 32, is not shaped like the external profile of the track 10 itself in that, in correspondence with each groove 11, a passage 35 of defined dimensions is left.

[0021] Finally, each housing 30 comprises a plate 36, which is engaged and crossed by the relative track 10, and is arranged in such a way as to close the relative opening 34.

[0022] Finally, each device 1 comprises a number of revolving bodies 50, which are preferably but not necessarily spherical bodies, and which are housed inside the housings 30 in such a way as to form a row 51 for each groove 11 inside each housing 30.

[0023] Thus, it results that each row 51 is substantially compressed between a relative wall 30 and a relative groove 11, and is suitable for sliding inside the relative groove 11 in order to permit a gentle, but at the same time stable, movement of the rack 2 from one operating position to another. The revolving bodies 50 are inserted into the housings 30 by means of the passages 35, and are closed inside the housings 30 themselves by means of the mounting of the plates 36.

[0024] In the form of embodiment which is illustrated in the attached drawings, each row 51 is made up of three revolving bodies: it is obvious, however, that the number of revolving bodies 50 in each row 51 may be varied from one particular case to another and is used here purely as an illustration.

[0025] In addition, according to a form of embodiment of the device 1 which is not illustrated, each track 10 may present a single groove 11, just as, in addition, each bracket 8 may be provided with a single track 10, which would then co-operate with the track 10 of the other bracket 8 in order to maintain and support the rack 2 in the correct operating position.

[0026] According to what is better illustrated in FIGURE 3, the device 1 comprises, in addition, an elastic element 60 which is mounted in rotatable fashion on the body 21, and mounted in passing fashion through a window 61 which is obtained in the body 21 itself in order to be snap inserted into inside one of the catching elements 9. The contemporary insertion of each elastic element 60 into a relative catching element 9 determines the positioning of the rack 2 in a relative operating position and, more particularly, the raising of the rack 2 occurs by simply pulling the rack 2 itself and thus causing the progressive insertion and disinsertion of the elastic elements 60 in the various catching elements 9, while the lowering of the rack 2 occurs by preventively disengaging each elastic element 60 from the relative catching element 9 and maintaining it in a disengaged state against the elastic return action of the elastic element 60 itself for the entire operation of lowering the rack 2 itself.

[0027] According to what is yet illustrated in FIGURE 3, the device 1 comprises, finally, a hydraulic coupling 70 which is supported by the bar 7 opposite the rack 2 in order to connect the rotor 71 to a hydraulic circuit of the dishwasher, and a flexible coupling 72 which is interposed between the rotor 71 and the hydraulic coupling 70 in order to permit the regulation of the upper rack itself. In particular, the hydraulic coupling 70 is defined by a cone which tapers towards the outside of the bar 7 and which is suitable for being connected to a fixed water

supply inlet for the dishwasher, while the coupling 72 is connected on one side to the hydraulic coupling 70, and on the opposite side to a tube 73 which is made of rigid plastic material, which extends below the rack 2 until the point where it meets the entry of the rotor 71. In order to protect the coupling 72, a shield 74 has been planned, which is of a substantially conical shape and inside of which the coupling 72 itself may move freely during any operations which regulate the rack 2.

[0028] It is obvious from what has been described above that the sliding is guaranteed by the rolling of the revolving bodies 50 inside the housings 30 and along the grooves 11, or rather in the guide tracks 10 which being inserted through the housings 30 themselves also hold up the rack 2. It is possible, thanks to this rolling, to regulate the rack 2 with precision and rigidity in various operating positions.

[0029] In addition, the above-described device, other than permitting a simple, easy movement and vertical regulation of the rack 2, also means that the regulation can be carried out with precision and that this operation can be performed with ease while maintaining an optimum rigidity of the rack 2 when it is fully loaded.

[0030] Finally, according to a form of embodiment which is not illustrated, but which is easily understandable from the above description, the device 1 may also be mounted onto a frame which is similar to the frame 4, but which is an integral part of the dishwasher and not of the device 1 itself. In addition, in a form of embodiment which is even more suitable and cost-effective, for example racks 2 of reduced dimensions, the device 1 may only comprise a single regulating plate 5 mounted in correspondence to a relative side of the rack 2, and to a single track 10 for each side of the rack 2 themselves.

[0031] It is intended that the present invention should not be limited to the form of embodiment which is herein described and illustrated, which is to be considered as an example of a form of embodiment of the regulation device for the upper rack of a dishwasher and which may instead be subject to further modifications relating to the shape and disposition of its parts, as well as to details pertaining to construction and assembly.

Claims

1. Regulation device (1) for the upper rack (2) of a dishwasher suitable for regulating an operating position of the upper rack (2) itself and comprising at least one regulating plate (5) defining a number of operational washing positions of the rack (2) itself; and at least one selection element (20), which is integral with the rack (2) and is coupled in selectively disengageable fashion to the regulation plate (5) in order to permit the selective regulation of each operational washing position; the regulation device (1) being **characterised by** the fact of comprising, in addition, at least one vertical guide track (10) which is coupled in sliding fashion to the said selecting element (20), and one or more revolving elements (50) which are interposed between the vertical guide track (10) and the selecting element (20) themelves.

2. Regulation device according to Claim 1, **characterised by** the fact of comprising two vertical guide tracks (10) which are parallel to each other and which are engaged in respective housings (30) which are obtained through the selecting element (20); each housing (30) defining a respective housing for the said revolving elements (50).

3. Regulation device according to Claim 2, characerised by the fact that each said guide track (10) presents at least one shaped longitudinal groove (11) which is obtained externally in relation to the opposite track (10) for the sliding of the said revolving elements (50).

4. Regulation device according to Claim 3, **characterised by** the fact that each said guide track (10) presents two shaped longitudinal grooves (11) which are obtained opposite the said track (10) itself for the sliding of the said revolving elements (50).

5. Regulation device according to Claims 2, 3 or 4, **characterised by** the fact that the said selecting element (20) comprises a central body (21) and two arms (22) which extends in opposite directions from the central body (21) and presenting, at their respective free ends, the said housings (30), each housing (30) containing at least one row (51) of revolving bodies (50) for each said longitudinal groove (11).

6. Regulation device according to Claim 5, **characterised by** the fact that the said guide plate (5) presents a number of catching elements (9) which are arranged vertically spaced from each other in order to each define a relative operating position of the upper rack (2); the selecting element (20) comprising an elastic element (60) which is suitable for being snap engaged in the catching elements (9) and suitable for being manually disengaged in the case of regulating the height of the rack (2).

7. Regulation device according to any of the preceding Claims whatsoever, **characterised by** the fact of comprising a hydraulic coupling (70) for connecting a rotor (71), coupled to the said upper rack (2), to a hydraulic circuit of the dishwasher, and a flexible lever (72) which is interposed between the rotor (71) and the coupling (70) in order to permit the regulation of the upper rack (2) itself.

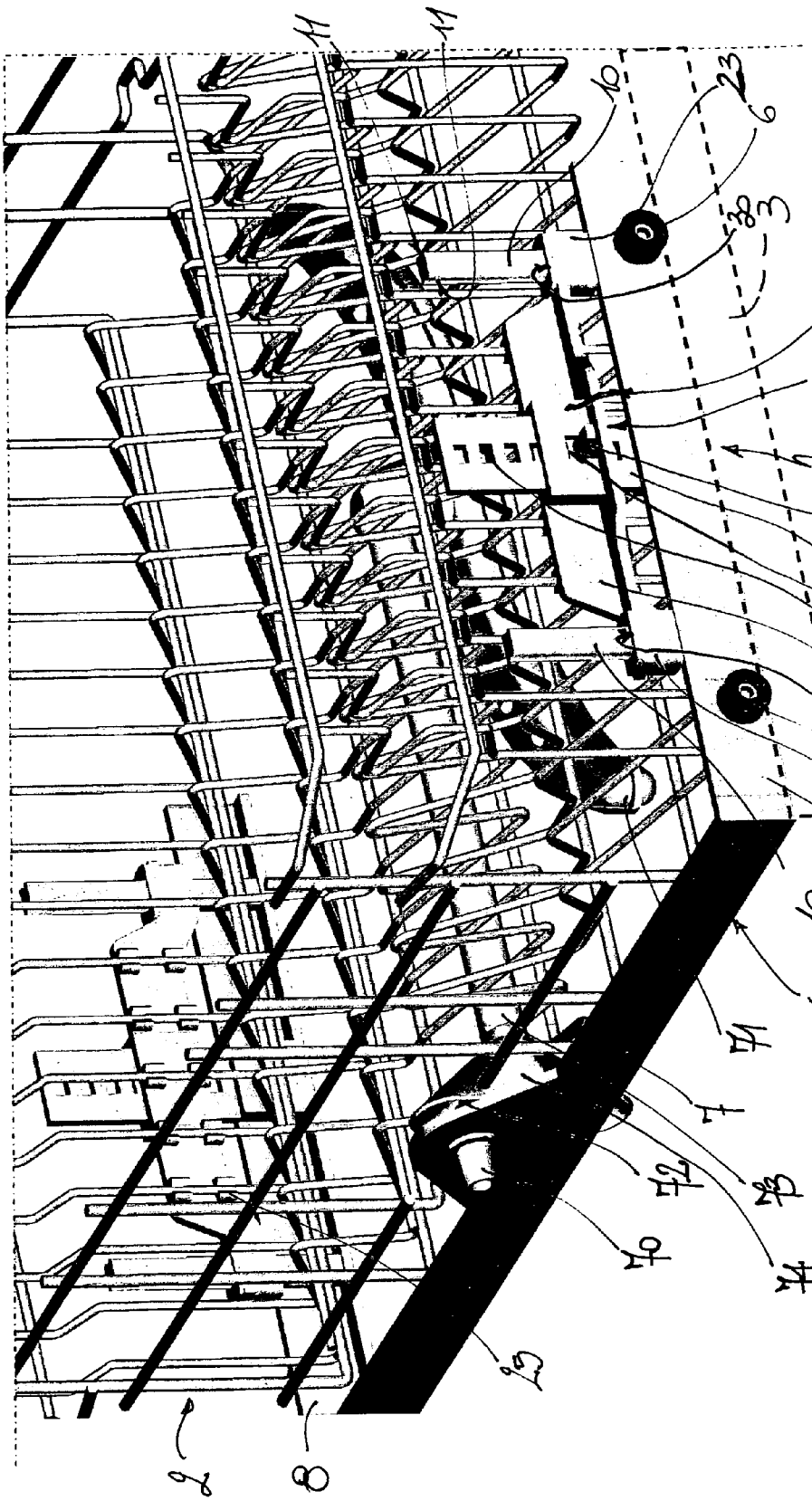

Fig. 1

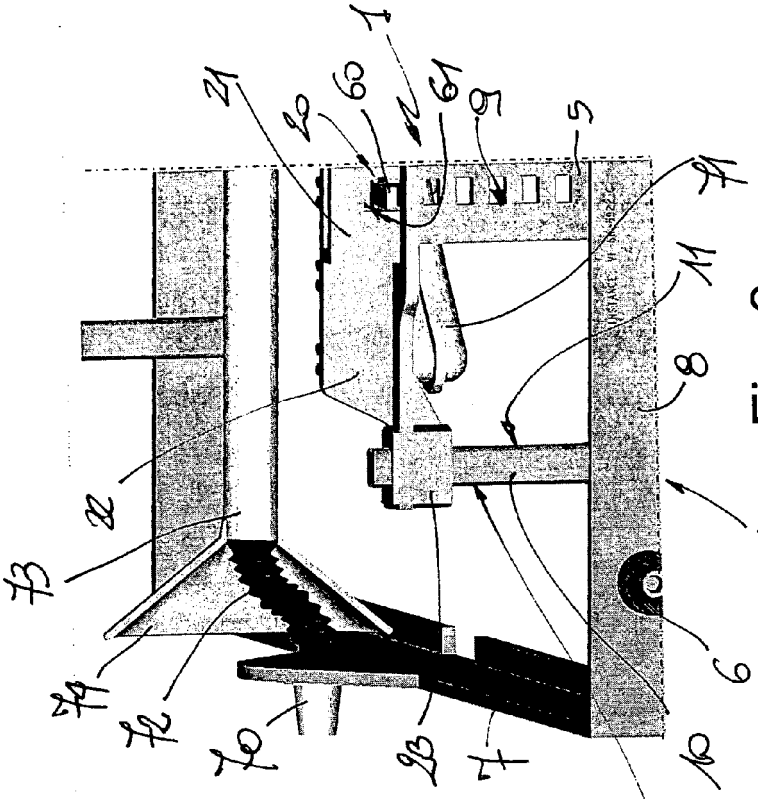

Fig. 3

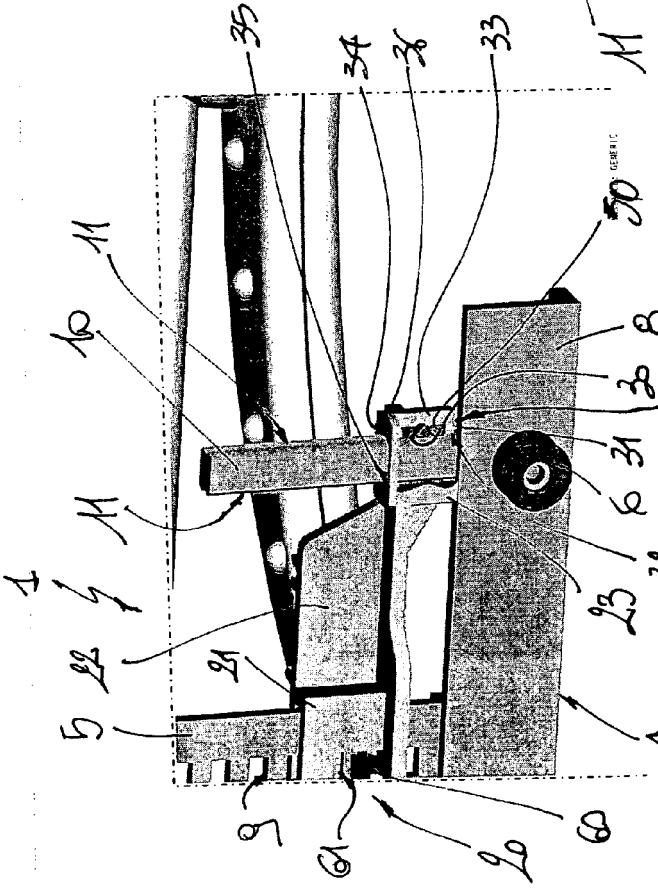

Fig. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 06 01 5003

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
D,A	US 5 860 716 A (GOOD ROBERT W [US] ET AL) 19 January 1999 (1999-01-19) * column 4, line 1 - column 8, line 35; figures *	1	INV. A47L15/50
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TECHNICAL FIELDS SEARCHED (IPC)

A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	9 January 2007	Lopez Vega, Javier

CATEGORY OF CITED DOCUMENTS

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