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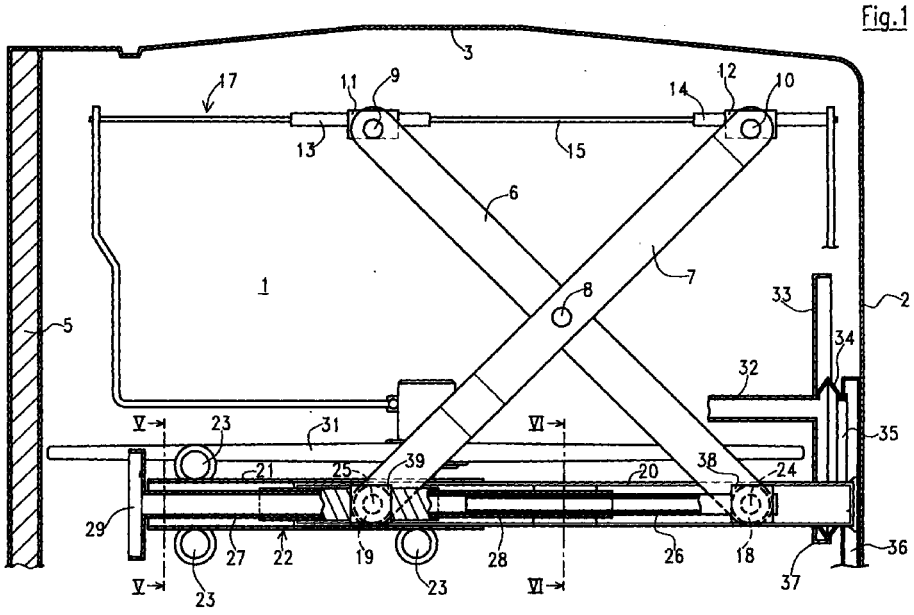
(54) Device for the adjustment in height of the upper rack of a dishwasher

(57) The invention has as an object a device for the adjustment in height of the upper rack of a dishwasher. The device comprises two pairs of cross levers (6-7) hinged to each other at a center line (8) that extends in height inside the washing tub along respective side walls of the same. The levers (6-7) have first ends that are suitable for the support of the upper rack (17) and second ends that are controlled to be drawn near and apart from each other by a pair of screw devices (28) that extend horizontally along said side walls of the machine and are provided with control elements (29) that are accessible from the front of the machine.

Fig.1



EP 1 051 944 A1

Description

[0001] The present invention concerns a device for the adjustment in height of the upper rack of a dishwasher.

[0002] There are commercially available dishwashers having upper rack that is positionable at different heights inside the washing tub in order to allow to adapt the load capacity of the dishwasher to the dimensions of the ware to be washed.

[0003] In most cases the useful positions are two, distant 40 mm or sometimes 65 mm one from the other, and the movement of the upper rack is carried out manually with the aid of a knob device that is fixedly mounted with the structure of the rack and can be coupled by snap with the fixed structure of the machine in predetermined positions.

[0004] Obviously the adjustment in height of the rack can be carried out only with the rack extracted from washing tub and free of load, because otherwise the knob device would not be operable due to the excessive weight of the dishes.

[0005] In a dishwasher of the Applicant that takes advantage of the teachings of the Italian patent application n. MI98A 001390 of June 18 1998 there is provided for the possibility to choose among more than two positions of adjustment of the upper rack, in particular among positions of maximum and minimum height that are distant 65 mm and two intermediate positions that are distant about 21.7 mm from each other.

[0006] Even in this case, however, the movement of the rack is entrusted to a pair of knobs that are operable with the rack out and free of load.

[0007] In view of this state of the art, object of the present invention is now to realise a device that allows to adjust the upper rack of a dishwasher in height, by placing it in any position between two maximum and minimum height extreme ones, even with loaded rack and without having to extract it from the washing tub.

[0008] According to the invention such object is reached with an adjustment device characterized in that it comprises two pairs of crossed levers that are hinged to each other at a center line that extend in height inside the washing tub along respective side walls of the same, said levers having first ends operating for the support of the upper rack and second ends that are controlled to be drawn near and apart from each other by a pair of screw devices that extend horizontally along said side walls of the machine and are provided with control elements that are accessible from the front of the machine.

[0009] With the adjustment device according to the invention it is possible to adjust the height of the upper rack without the limitation of pre-established positions, without need to extract the rack from the washing tub and also, taking advantage of the lever effect of the two pairs of levers that are functionally interposed between the rack and the screw devices, without the need to free the rack of its load of dishes.

[0010] The characteristics of the present invention will be made more evident by the following detailed description of a possible embodiment thereof, that is illustrated as a non limiting example in the enclosed drawings, in which:

Figure 1 shows the upper part of a dishwasher machine with the upper rack in position of maximum lift, as sectioned according to a median plane that goes from the front to the rear of the machine;
Figure 2 shows the same dishwasher as sectioned as in Figure 1 with the upper rack in position of maximum lowering;
Figure 3 shows the same dishwasher as sectioned according to a cross plane with the upper rack in position of maximum lift;
Figure 4 shows the same dishwasher as sectioned as in Figure 3 with the upper rack in position of maximum lowering;
Figure 5 shows a magnified detail of the adjustment device according to the invention that is provided in the aforesaid dishwasher, in section according to the line V-V in Figure 1;
Figure 6 shows another magnified detail of the adjustment device according to the invention in section according to the line VI-VI of Figure 1.

[0011] In Figures 1-4 there is shown the upper part of the washing tub 1 of a dishwasher machine that has a back wall 2, a top panel 3, two side walls 4 and a front closing door 5.

[0012] Along the side walls 4 two couples of rectilinear levers 6-7 extend in height, that are crossed at a center line in a fulcrum point 8. The upper ends of each couple of levers 6-7 are turningly hinged in 9-10 on sleeves 11-12 that are capable to slide along bushings 13-14 that are fixed on a longitudinal bar 15 of the upper rack 17 of the dishwasher. The lower ends are in turn provided with wheels 18-19 that are slidingly housed in respective inner 20 and outer tubular parts 20, 21 (figure 5) of a telescopic guide 22 that extends horizontally along a respective side wall 4 of the washing tub, projecting from the back wall 2 of the washing tub in order to be additionally supported and guided by pairs of bearing wheels 23 supported by the respective side wall of the tub. The aforesaid lower ends of the levers 6-7 are in addition hinged in 24-25 on respective supports 38 and 39 that are controlled to be brought near or far from each other, parallel to the telescopic guide 22, by a screw device 28. The latter is made up of an internal part 26, that is externally threaded, to which the support 38 is fixed, and of an external part 27, that is internally and externally threaded, tat is in screw engagement with the internal part 26 and with the support 39. The external part 27 of the screw device 28 is fixed for rotation to a control knob 29 that is accessible from the front of the machine, once the closing door 5 is open.

[0013] The upper rack 17 turningly bears a rotor or

impeller 31, that is fed with water through a horizontal duct 32 that ends with a flange 33 having essentially vertical extension, with which a bellows sealing gasket 34 can be engaged, that is open frontally, placed in front of a vertically elongated opening 35 of a fixed feeding ramp 36 that extends vertically along the middle line of the back wall of the tub. The vertical extension of the opening 35 and of its gasket 34 is substantially equal to the maximum excursion in height of the rack 17 and the one of the flange 33 is substantially equal to twice said maximum excursion. In addition the relative position of the opening 35 and of the flange 33 is such as that the opening 35 gets to be in correspondence of the lower end of the flange 33 when the rack 17 is in the position of maximum height and in correspondence of the upper end of the flange 33 when the rack 17 is in the position of minimum height. More details on the structure and the operating mode of the coupling device, indicated as a whole by 37, made up of the flange 33, of the gasket 34 and of the opening 35 can be found in the above quoted Italian patent application n. MI98A 001390 of June 18 1998.

[0014] From the aforesaid structure the following operating mode of the adjustment device according to the invention derives.

[0015] Starting from the position of maximum lowering in Figures 3 and 4, the rotation of the control knobs 29 determines the return movement of the threaded part 26 in the threaded part 27 of the screw device 28 and the sliding of the support 29 on the threaded part 27 of the same screw device 28, with consequent mutual approach of the supports 38 and 39 and also consequent greater inclination of the levers 6-7 toward the top. The upper ends of the levers 6-7 therefore get near to each other by sliding with their sleeves 11-12 along the respective bushings 13-14 and in addition they move toward the top thus causing as a consequence the lifting of the rack 17 with relative rotor 31. The maximum lift, that is fixed by the lock 30, corresponds to the positioning of the horizontal duct 32 in correspondence of the upper end of the opening 35 and of the relative gasket 34 (Figures 1 and 2).

[0016] By reversing the rotation of the control knobs 29, the inverse movement of the supports 38 and 39 and therefore of the levers 6-7 is obtained, that tilt toward the bottom in a greater way and determine the lowering of the rack 17 up to the position of minimum height corresponding to the positioning of the horizontal duct 32 which feeds the rotor 31 in correspondence of the lower end of the opening 35 and of its gasket 34 (Figures 3 and 4).

[0017] Any intermediate position between the one of maximum height in Figures 1 and 2 and the one of minimum height in Figures 3 and 4 is however obtainable by adequately adjusting the revolutions of the knobs 29.

[0018] One should note that the adjustment in height of the rack 17 can be carried out even with the rack inserted in the washing tub and a load of dishes. That is obtained owing to the fact that the rotation of the knobs 29 can take advantage of the leverage effect of the two pairs of levers 6-7 in order to determine the variation in height of the rack with a reduced effort of rotation being applied to the knobs 29.

Claims

1. Device for the adjustment in height of the upper rack of a dishwasher the dishwasher comprising a washing tub (1) with a back part (2), two side walls (4) and a front provided with closing door (5) characterised in that it comprises two pairs of cross levers (6-7) hinged to each other at a center line (8) that extend in height inside the washing tub along respective side walls of the same, said levers (6-7) having first ends suitable for the support of the upper rack (17) and second ends controlled to be drawn near and apart from each other by a pair of screw devices (28) that extend horizontally along said side walls of the machine and are provided with control elements (29) that are accessible from the front of the machine.

2. Adjustment device according to claim 1, characterized in that said control elements (29) are made up of revolving knobs.

3. Adjustment device according to claim 1, characterized in that said second ends of the levers (6-7) are hinged on respective supports (38, 39) can be brought near and apart from each other in direction parallel to the bottom of the tub (1) by means of said screw device (28).

4. Adjustment device according to claim 2, characterized in that said supports (38, 39) bears respective sliding wheels (18-19) that are engaged in telescopic guides (22) that extend horizontally along the side walls of the washing tub.

5. Adjustment device according to claim 1, characterized in that said first ends of the levers (6-7) are hinged on respective sleeves (11-12) that are slidingly mounted on slide bushings (13-14) that are fixed to the upper rack (17).

Fig.1

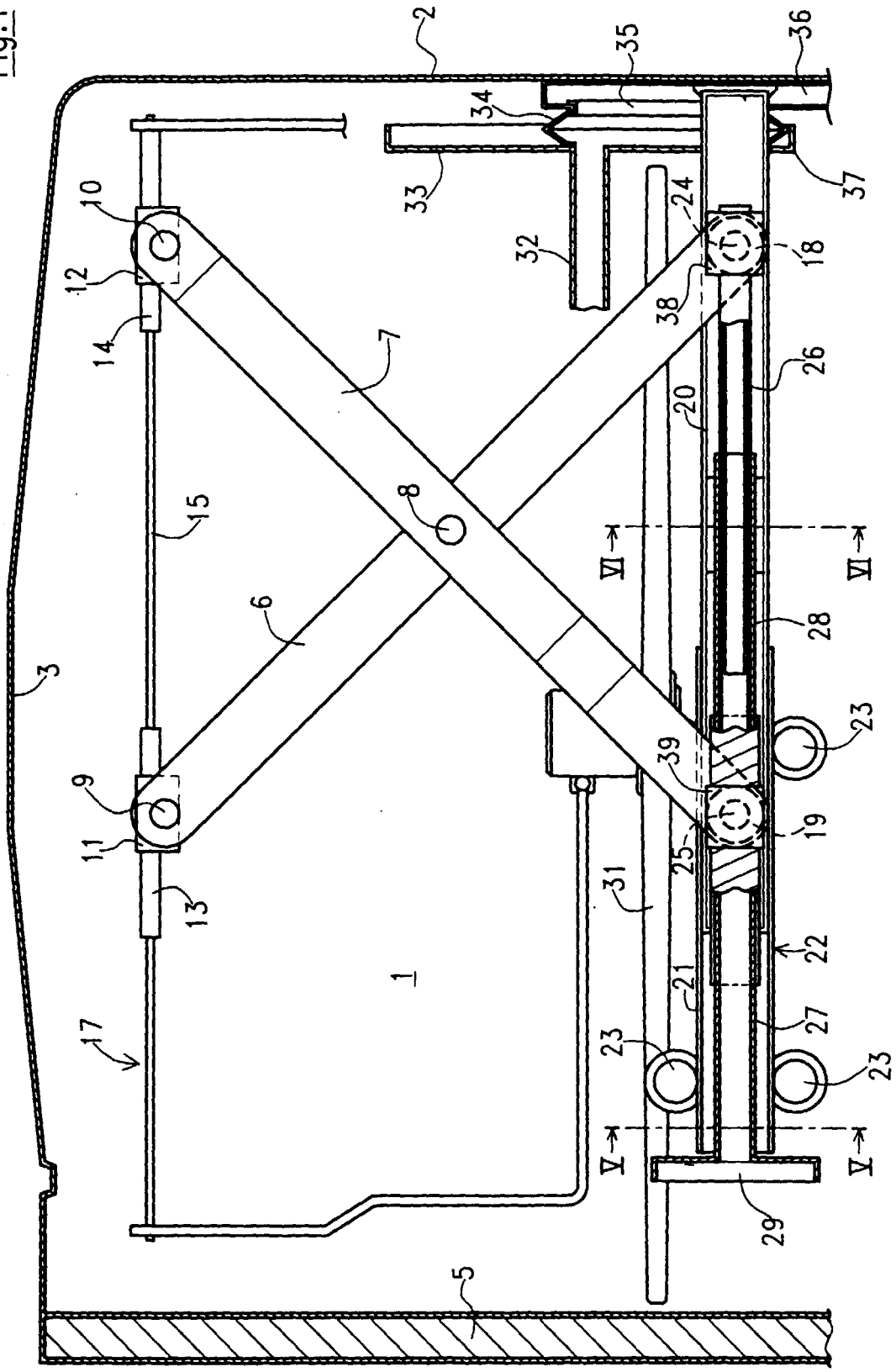

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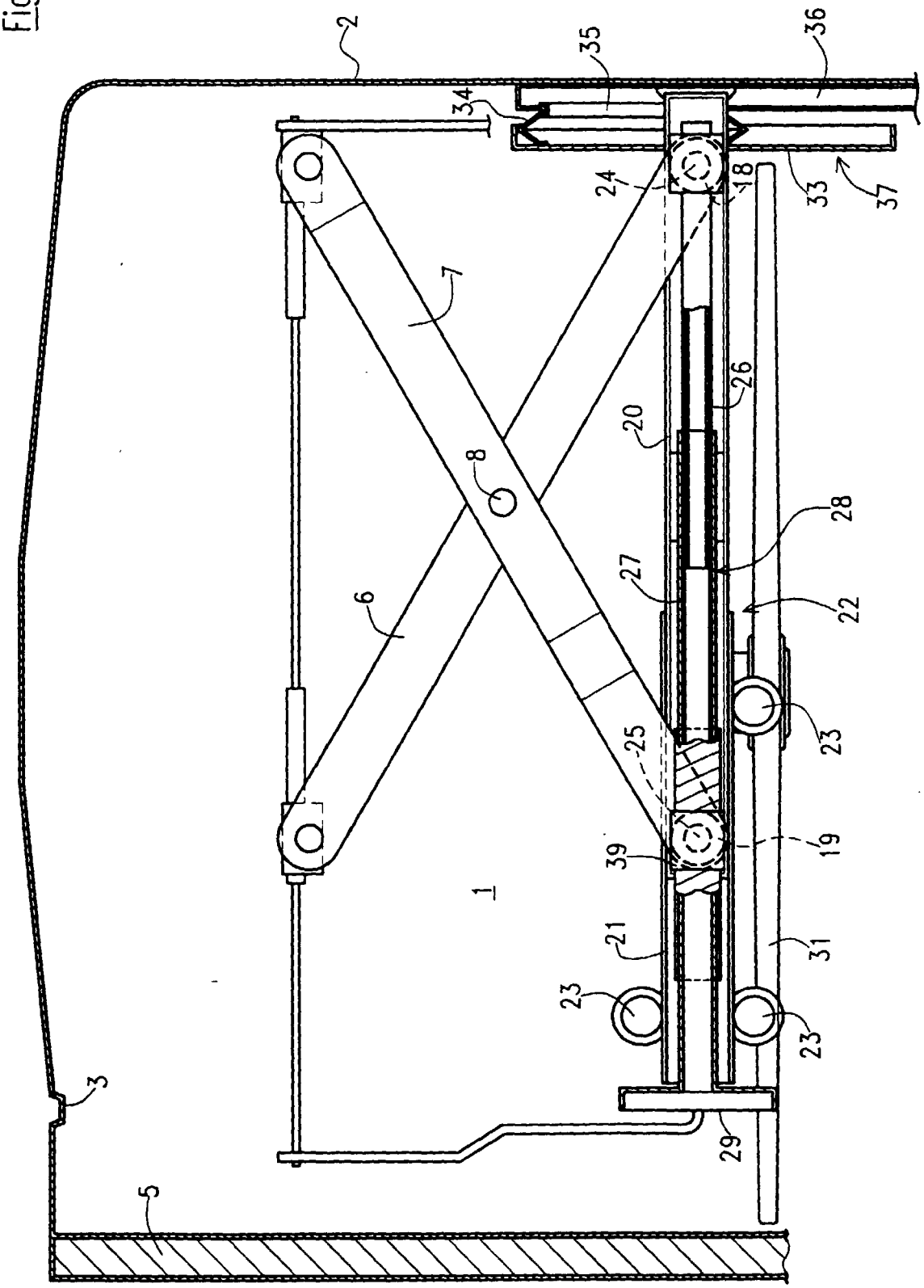
Fig.2



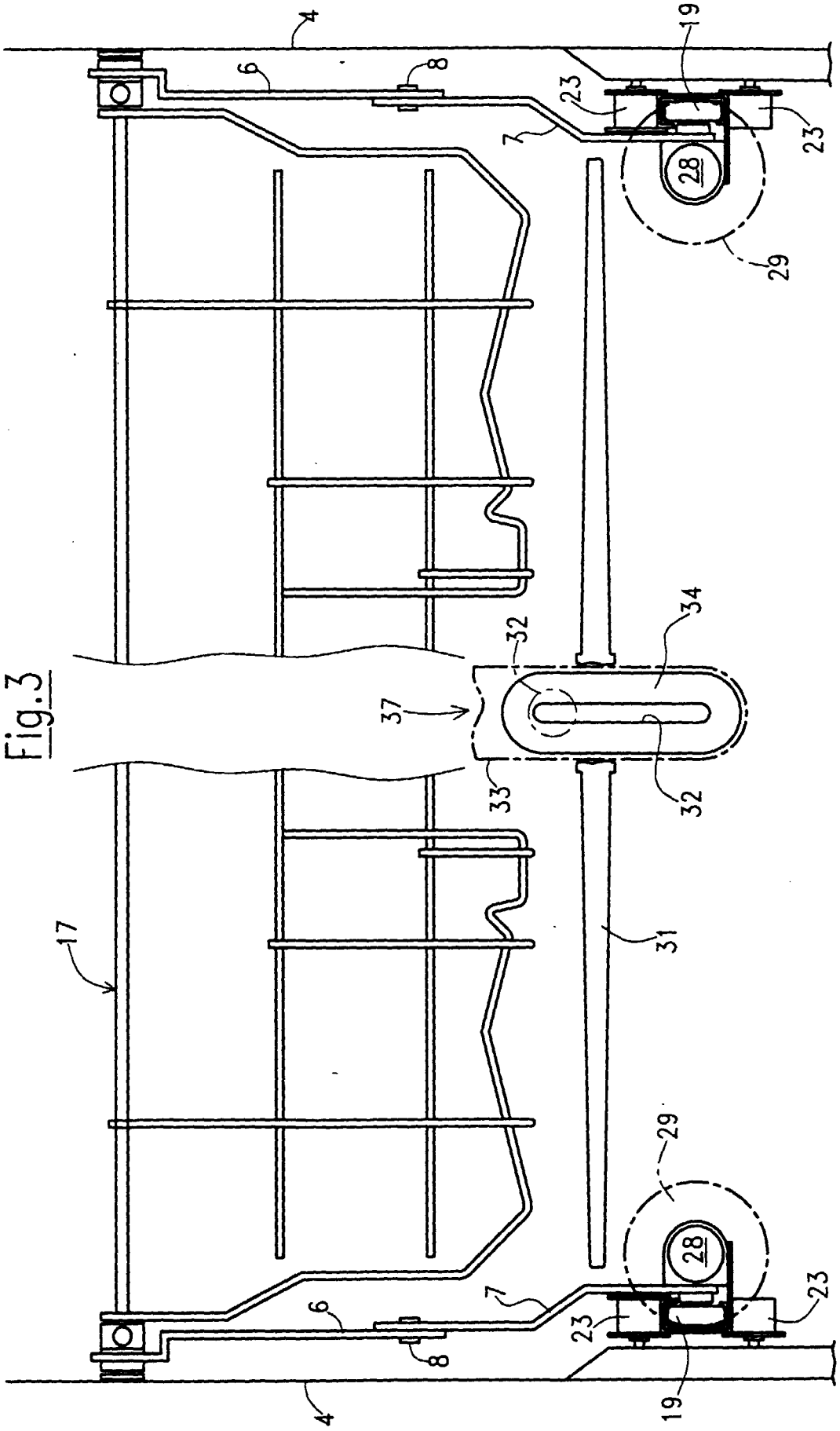


Fig.3

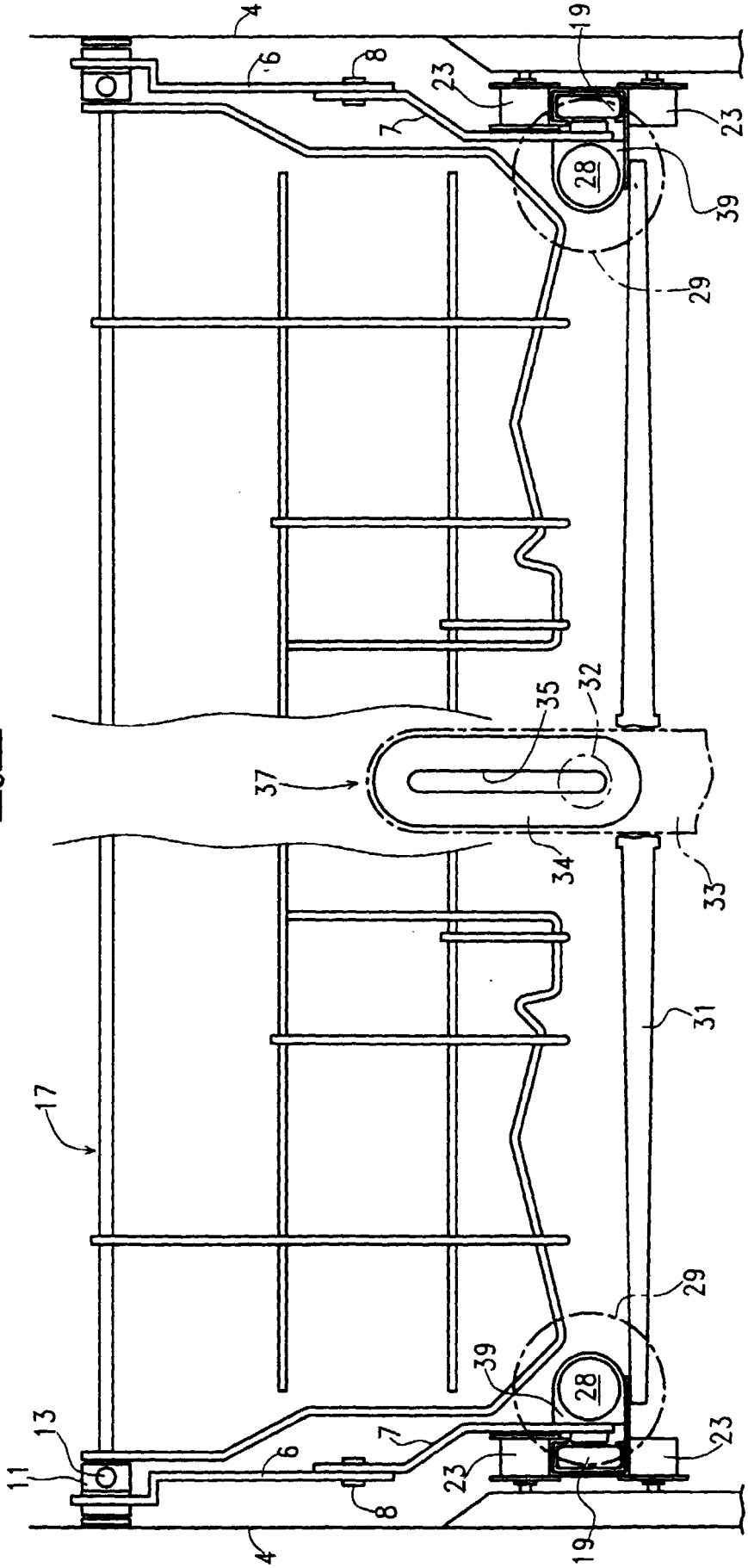


Fig.4

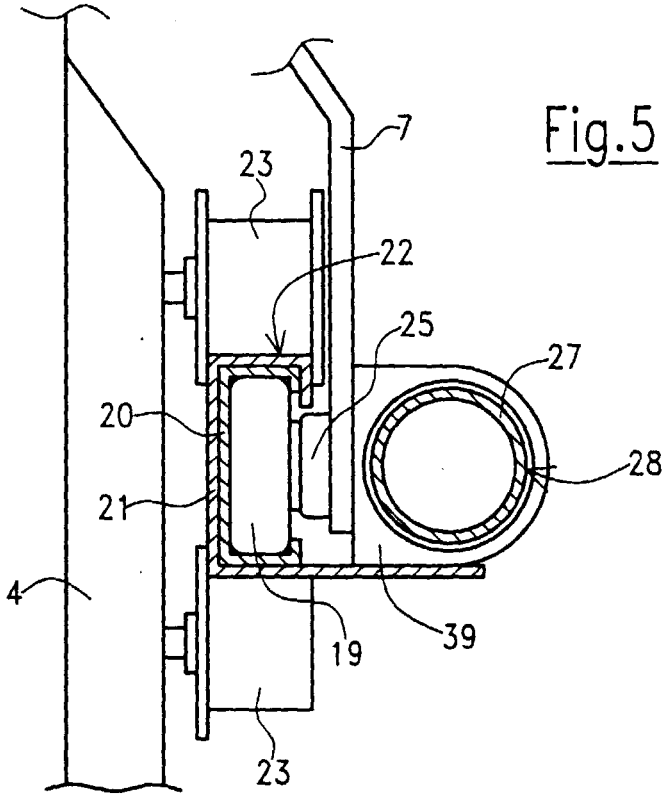


Fig.5

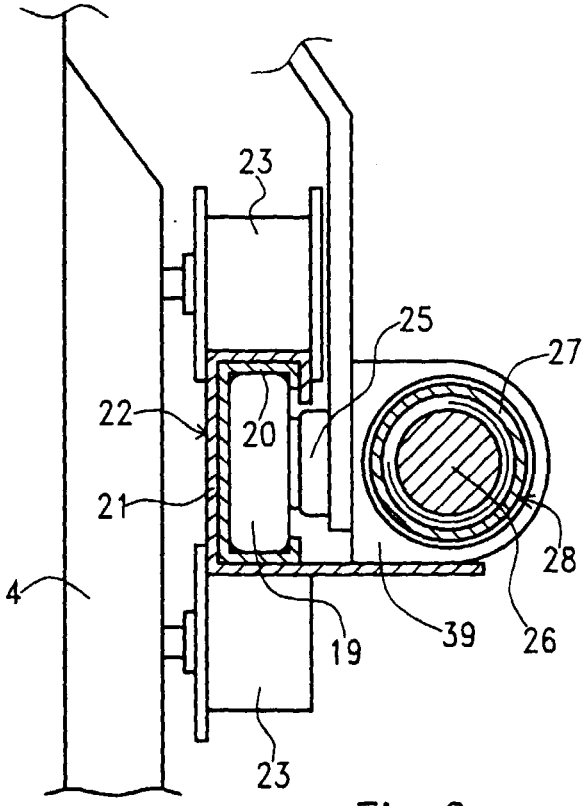


Fig.6

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EUROPEAN SEARCH REPORT

Application Number
EP 00 20 1147

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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A	EP 0 033 483 A (EURO HAUSGERAETE GMBH) 12 August 1981 (1981-08-12) * the whole document *	1	
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	5 September 2000	Norman, P

CATEGORY OF CITED DOCUMENTS

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