

(19)



(11)

**EP 2 444 570 A1**

(12)

**EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**25.04.2012 Bulletin 2012/17**

(51) Int Cl.:  
**E04H 4/08 (2006.01)**

(21) Application number: **10189556.3**

(22) Date of filing: **01.11.2010**

(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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(30) Priority: **25.10.2010 CZ 20100776**

**(54) DEVICE FOR MANIPULATION OF A THERMO-ISOLATING COVER FOR A SPA**

(57) Device for manipulation of a spa cover comprising a thermo-insulating cover (2) suitable to cover a spa vessel between a covering position and an opened position, said cover comprising at least one pair of thermo-insulating segments, each formed of a carrier segment (21) and a carried segment (22), being connected together in a hinged manner, the carrier segment (21) being rotatable mounted to the spa and coupled with a rotating

drive (4), wherein in between the carrier segment (21) and the carried segment (22) is mounted a first controlled drawbar (36), its ends being rotatable and slidably mounted to their corresponding cover segments, the end of the first drawbar (36) on the carrier segment (21) being rotatable connected with a first end of a second control drawbar (35), the second end of said second control drawbar being rotatable connected with an auxiliary arm (32) rotatable mounted with respect to the spa.

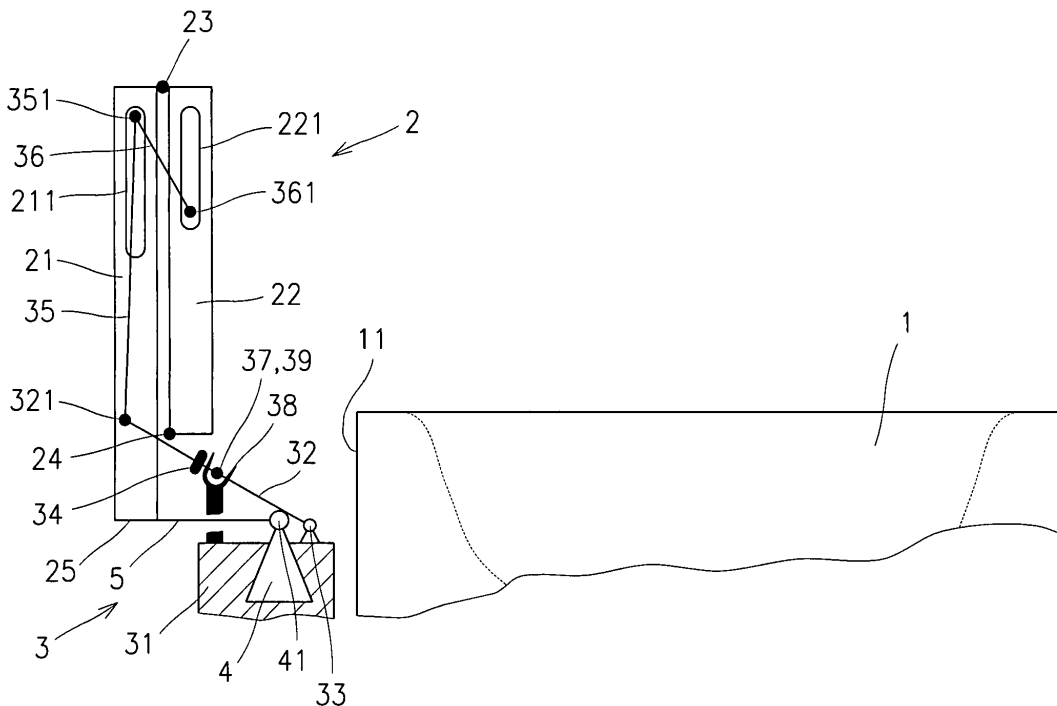


Fig. 1

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**Description****Technical field**

[0001] The device for manipulation with thermo-insulating cover of the spa vessel between its covering position and opened position and vice versa, whereas the thermo-insulating cover comprises at least one pair of thermo-insulating segments formed of carrier segment and carried segment, which are together connected in a hinged manner, and in covering position are lying by their bottom sides on circumference of the spa vessel, whereas the carrier segment is coupled with manipulation frame of the spa by means of rotatable drive for change of angle between the bottom surface of carrier segment and abutting surface created on upper edge of the spa vessel at shifting the carrier segment from covering position into opened position and backward.

**Background art**

[0002] Development of massage pools and whirlpool baths (further referred to as the "spa") brings new solutions of their accessories, which would correspond to the manner of their usage and requirements of their users in connection with enlarged possibilities which such devices are providing.

[0003] Covering of small outdoor spa from the point of view of keeping cleanliness as well temperature of water has already become an obvious requirement. Covering of the spa is useful especially to maintain the water temperature which is usually higher than environment temperature also in a case of the spa positioned in interior. With respect to dimensions of the spa designated for simultaneous staying of several persons, the surface dimensions of their covers are increasing, simultaneously also their weight. This requires to solve the thermo-insulating cover of two parts, which are folding one to another at manipulation. Manipulation with such thermo-insulating covers should of course be easy also for physically less capable persons, moreover the cover in opened position should not interfere both from the point of view of installation space and of aesthetic aspect.

[0004] Recently there are known solutions which supersede the manual removing of covers and e.g. their leaning against a wall in vicinity of the spa by motoric device, which the multi-part cover folds and deposits outside the spa contour. For rising the parts of the thermo-insulating cover, its folding and depositing outside the spa contour there serve relatively complicated mechanisms comprising more kinematic couples, at which a change of their mutual position is achieved by motoric motion.

[0005] For example a modern solution according to CZ 19692 U1 removes the two-part thermo-insulating spa cover by means of rotatable drive of the basic part of the cover, to which the second part of the cover is connected by a hinge. Mutual swinging motion of the basic part and

the second part of the cover is provided by means of a pneumatic cylinder, by whose effect in a certain range of positions of cover parts are mutually apposed one to another. The device is complicated both from the point of view of quantity of parts used, as well from the point of view of controlling the synchronisation of rotating motion of the basic part of the thermo-insulating cover and the addition motion of its second part derived by bringing a pressure air to one or second face of piston of the pneumatic cylinder.

[0006] The goal of this invention is to remedy shortcomings of the background art by simplifying the machine parts of the device, and thus to obtain a higher reliability.

**Principle of the invention**

[0007] The goal of the invention has been achieved by a device for manipulation with the thermo-insulating cover of the spa vessel between its covering position and opened position and vice versa, whose principle consists in that on the carrier segment and on the carried segment of thermo-insulating cover is by its ends rotatably and slideably mounted a controlled drawbar, whose end on the carrier segment is rotatably connected with one end of the control drawbar, whose second end is rotatably connected with auxiliary arm which is rotatably mounted with respect to the spa.

[0008] By interaction of the driving and driven drawbar and their coupling with rotatable drive the structure of manipulation device is considerably simplified.

[0009] On the carrier segment at least one slotted guidance is arranged, in which by means of the guide piece is rotatably and slideably mounted the joint of end of the control drawbar with end of the controlled drawbar and on the carried segment at least one slotted guidance is arranged, in which by means of the guide piece the end of the controlled drawbar is mounted rotatably and slideably.

[0010] The slotted guidance coupled with guide pieces of rotating hinges of the joints, possibly with the ends of control drawbars, provide an exact guiding of drawbars with respect to segments of the thermo-insulating cover and they ensure a safe achieving of both the covering and opened position of the thermo-insulating cover. The carrier segment is with the rotating drive coupled by means of a fixed arm, while for coupling of the auxiliary arm with the rotating drive the auxiliary arm is provided with a means for carrying the auxiliary arm by the fixed arm during shifting the thermo-insulating cover from opened into covering position and backwards.

[0011] Through this it is possible at the beginning of covering the spa vessel, before a contact of the cover with upper circumference of the spa vessel is achieved, to control a trajectory of motion of the carried segment of the cover.

[0012] Mechanism for controlling of mutual position of the carrier and carried segment comprises at least one control drawbar, one controlled drawbar, one slotted

guidance arranged on the carrier segment and one slotted guidance arranged on the carried segment, whereas the control drawbar by the first end is by a hinge connected with a free end of the auxiliary arm and by the second end it is by a hinge by means of the guide piece mounted in the slotted guidance arranged on the carrier segment connected with the first end of the controlled drawbar, whose second end by means of the guide piece is mounted in a slotted guidance arranged on the carried segment. By coupling the drawbars with rotating guide pieces slideably mounted in guidance there may be achieved an advantageous course of mutual motion of both segments of the cover without usage of further driven means, for example of further controlled double-acting fluid cylinder.

**[0013]** In section of the range of angular motion of the carrier segment at covering and opening of the thermo-insulating cover neighbouring with fully opened position of the thermo-insulating cover, an auxiliary swivelling arm is in rest position, at the same time its supporting surface is in contact with the stop connected in a fixed manner with manipulation frame.

**[0014]** It is especially preferred, when section of the range of angular motion of the carrier segment at covering and opening of the thermo-insulating cover neighbouring with fully opened position of the thermo-insulating cover is at least 20°. In this way it is possible to set optimum conditions for the moment of commencement of motion of the control and controlled drawbar and lifting the thermo-insulating cover into a sufficient energetic economic height before its travelling means touch the border of the spa vessel.

**[0015]** The manipulation frame at opened position of the thermo-insulating cover is vertically displaceable from the emergency position into the storage position. Through this it is possible to reduce the height of upper edge of folded segments of the cover in its opened position, which especially at positioning the spa in interior is visually pleasant.

### Description of the drawing

**[0016]** Exemplary embodiments of the device according to the invention are schematically represented in the drawing, where the Fig. 1 shows a side view to the device according to the invention with the thermo-insulating cover in opened position, the Fig. 2a a side view to the same device in the phase of beginning of covering the spa vessel, the Fig. 2b a side view to the same device in the phase of beginning of carrying the auxiliary arm by the driving arm, the Fig. 3 a sideview to the same device with the thermo-insulating cover in the covering position, and the Fig. 4 shows a front view to the spa from the Fig. 3.

### Examples of embodiment

**[0017]** The exemplary embodiment in the Fig. 1 to 4 in a side view represents the spa 1 of rectangular ground

plan provided with the thermo-insulating cover 2. The thermo-insulating cover 2 is formed of the carrier segment 21 and the carried segment 22, whose neighbouring faces are mutually rotatably connected, e.g. by hinges 23. Axis of rotating the hinges 23 is parallel with front side 11 of the spa 1. The carried segment 22 in corners opposite with respect to the hinges 23 is provided with in detail not represented travelling means 24 formed of e.g. swivelling wheels or sliders.

**[0018]** The spa 1 is equipped with manipulation equipment 3, which is coupled with the thermo-insulating cover 2 on both its lateral sides and with the output shaft 41 of rotating drive 4. The rotating drive 4 is positioned on the frame 31 of manipulation device 3. The frame 31 of manipulation device 3 is arranged outside the ground plan of the spa vessel 1 in vicinity to one of its front sides 11. The frame 31 of manipulation device is vertically displaceable from the represented standby position into the lower storage position by means of the not represented manipulation drive. In alternative embodiment the frame 31 of manipulation device with respect to the spa 1 in vertical direction is a non-movable.

**[0019]** Axis of the output shaft 41 of rotating drive 4 at the represented embodiment is parallel with the front side 11 of the spa, respective with the edge of the external front side 25 of the carrier segment 21 of the thermo-insulating cover. On the output shaft 41 of rotating drive 4 on both lateral sides of the spa 1 the driving arms 5 are mounted in a fixed manner which are firmly connected with the front side 25 of the carrier segment 21 of the thermo-insulating cover 2. In exemplary embodiment the rotating drive 4 comprises the not represented double-acting hydraulic cylinder, whose piston rod acts upon the not represented arm creating with the driving arms a two-armed lever, whose axis of rotation 5 is created by the output shaft 41.

**[0020]** On the manipulation frame 31 there is further arranged a couple of mutually parallel auxiliary arms 32 rotating with respect to the manipulation frame 31 in the hinge 33, whereas the axis of their rotation is parallel with the output shaft 41 of the rotating drive 4.

**[0021]** Auxiliary arms 32 are connected by means of the crossbar 34 being parallel with upper edge of the front side 11 of the spa 1, which the auxiliary arms 32 branches beyond the front contour of the spa 1. On free ends of auxiliary arms 32 the hinges 321 are arranged, by means of which to the auxiliary arms 32 are rotatably connected by their one end two control drawbars 35, whose second end is rotatably mounted in the guide piece 351 mounted in a sliding manner in the slotted guidance 211 attached on one and second side of the carrier segment 21 of the thermo-insulating cover 2. To the guide pieces 351 there are rotatably attached by one end the controlled drawbars 36, whose second ends are rotatably connected with the guide pieces 361 in a sliding manner mounted in the slotted guidance 221 attached on one and second side of the carried segment 22 of the thermo-insulating cover 2. The slotted guidance may also be of another known

slotted arrangement.

[0022] In position of fully opened thermo-insulating cover 2 according to the Fig.1 the auxiliary arms 32 abut with their supporting surfaces 37 to the stops 38 attached to the manipulation frame 31. The supporting surfaces 37 are in this position in the stops 38 locked by a not represented means. The auxiliary arms 32 are for example in the area of supporting surfaces 37 provided with a means 39 for carrying of the auxiliary arm 32 by a fixed arm 5. In exemplary embodiment this means 39 are formed of pins extending into the track of driving arms 5.

[0023] The Fig. 2a represents the thermo-insulating cover 2 in position when covering procedure of the spa 1 starts. The output shaft 41 of rotating drive 4 turns by a small angle in clockwise direction, by which in the same direction the driving arms 5 are turned, and with them the carrier segment 21 of the thermo-insulating cover 2. Due to the fact that the auxiliary arms 32 remain in the original position supported by their supporting surface 37 in the stop 38, the position of the hinge 321, around which the control drawbar 35 guided by the guide piece 351 in the slotted guidance 211 turns also in clockwise direction, is not changed. The controlled drawbar 36 by its guide piece 361 is leaning against the end of the slotted guidance 221 of the carried segment 22 of the thermo-insulating cover 2, by which this carried segment 22 turns with respect to the hinge 23 in counter-clockwise direction and both segments 21, 22 get opened by their lower ends.

[0024] The travelling means 24 of the carried segment 22 surpass the upper edge of the spa 1 and they further continue to move above the upper edge of the spa 1. Once the driving arms 5 get in contact with means 39 for carrying the auxiliary arms 32 (the Fig. 2b), the supporting surfaces 37 till this time locked in the stops 38 are unlocked, and the auxiliary arms 32 are lifted from the stops 38 and carried by the driving arms 5 in clockwise direction. Angle of turning the driving arms 5 between the fully opened position of the thermo-insulating cover 2 and the moment of their contact with auxiliary arms 32 at the exemplary embodiment creates about 25°. Opening of segments 21, 22 continues in interaction with their weight, the travelling means 24 of the carried segment 22 abut on the upper edge surface of the spa 1, on which they in further motion of the thermo-insulating cover 2 are travelling.

[0025] Closing of the thermo-insulating cover 2 is completed in position represented in the Fig. 3. The thermo-insulating cover 2 is positioned on upper edge surface of the spa 1, the segments 21, 22 abut to this surface and they thermally insulate the internal space of vessel of the spa 1.

[0026] Opening of the thermo-insulating cover 2 occurs at reverse turning the output shaft 41 of rotating drive 4, by which the carrier segment 21 starts to turn. The segments 21, 22 of the thermo-insulating cover 2 start to lift at the moment when the guide piece 361 at the end of controlled drawbar 36 rests against the end

of the slotted guidance 221 being nearer to the hinge 23 between the segments 21, 22, possibly when the guide piece 351 with a joint of the control and controlled drawbar 35, 36 rests against the end of slotted guidance 211 being more far-off to the hinge 23 between the segments 21, 22. At the moment when the supporting surfaces 37 of auxiliary arms 32 abut into the stops 38 of manipulation frame 31, the hinge 321, around which the control drawbar 35 guided by the guide piece 351 in the slotted guidance 211 was turning, now stops. At further movement of driving arms 5 into a fully opened position of the thermo-insulating cover 2 the control drawbar 35 turns around the standing hinge 321 in counter-clockwise direction and the guide piece 361 of controlled drawbar 36 draws up the carried segment 22 to the carrier segment 21 into a position shown in the Fig. 1. In totally drawn up status of the carried segment 22 to the carrier segment 21 the mechanism of drawbars 35, 36 and of slotted guidance 211, 221 causes a small motion of the supporting surface 37 of auxiliary arms 32 with respect to the stops 38 of manipulation frame 31, by which the supporting surfaces 37 of auxiliary arms 32 in the stops 38 are locked by the not represented manner for a period until a new closing of the thermo-insulating cover 2 is initiated.

[0027] As regards construction of individual segments 21, 22 of the thermo-insulating cover 2, its rigidity is secured by rigidity of the manipulation device 3 especially by that, the driving arms 5, the auxiliary arms 32, the control drawbars 35 and the controlled drawbars 36 always create a couple of elements sufficiently distanced one from another, whereas the drawbars 35, 36 are arranged along the sides of segments 21, 22. Nevertheless, at sufficient rigidity and low weight of segments 21, 22, the mentioned elements could be arranged individually along one side of the thermo-insulating cover 2.

[0028] In the not represented embodiment the upper edge of manipulation frame and axis of the output shaft 41 of rotating drive 4 is on a level of upper edge of the spa 1. The carrier segment 21 is directly connected with output shaft. Motion of auxiliary arm 5 is induced by action of the rotating carrier segment 21 on the corresponding means of the auxiliary arm analogical with activity of the represented exemplary embodiment. In this embodiment, due to aesthetic reasons, it is especially preferred to transfer the thermo-insulating cover with manipulation frame into a lower position after opening the spa.

[0029] The device according to the invention facilitates opening of the folding thermo-insulating covers, because it is not necessary to couple the segments of the thermo-insulating cover by means of further motoric driven means, for example by a pneumatic cylinder.

#### List of referential markings

[0030]

1	spa
11	front side of the spa

2	thermo-insulating cover	
21	carrier segment of the thermo-insulating cover	
211	slotted guidance (of the carrier segment)	
22	carried segment	
221	slotted guidance (of the carried segment)	5
23	hinge (mutually connecting the segments)	
24	travelling means (of carried segment)	
25	external front side of the carrier segment	
3	manipulation device	
31	manipulation frame	10
32	auxiliary arm	
321	hinge (connection of control drawbar with auxiliary arm)	
33	hinge (connection of auxiliary arm with manipulation frame)	15
34	crossbar	
35	control drawbar	
351	guide piece of control drawbar (in slotted guidance of carrier segment)	
36	controlled drawbar	20
361	guide piece of controlled drawbar (in slotted guidance of carried segment)	
37	supporting surface (of auxiliary arm)	
38	stop (of supporting surface of auxiliary arm on manipulation frame)	25
39	means for carrying the auxiliary arms	
4	rotating drive (of driving arms)	
41	output shaft (of rotating drive of driving arms)	
5	driving arm (of carrier segment)	30

## Claims

1. The device for manipulation with the thermo-insulating cover (2) of the spa vessel (1) between its covering position and opened position and vice versa, whereas the thermo-insulating cover (2) comprises at least one pair of thermo-insulating segments formed of the carrier segment (21) and carried segment (22), which are together connected in a hinged manner, and in covering position are lying by their bottom sides on circumference of the spa vessel (1), whereas the carrier segment (21) with respect to the spa (1) is rotatably mounted and coupled with the rotating drive (4) for change of angle between the bottom surfaces of the carrier segment (21) and the carried segment (22) and abutting surface created on upper edge of the spa vessel (1) at their shifting from covering position into opened position and backward, **characterised in that**, on the carrier segment (21) and on the carried segment (22) by its ends is rotatably and slideably mounted the controlled drawbar (36), whose end on the carrier segment (21) is rotatably connected with one end of the control drawbar (35), whose second end is rotatably connected with auxiliary arm (32), which is rotatably mounted with respect to the spa.

2. The device according to the claim 1, **characterised in that**, on the carrier segment (21) at least one slotted guidance (211) is arranged, in which by means of the guide piece (351) is rotatably and slideably mounted the joint of end of the control drawbar (35) with end of the controlled drawbar (36), and on the carried segment (22) at least one slotted guidance (221) is arranged, in which by means of the guide piece (361) the end of the controlled drawbar (36) is mounted rotatably and slideably.

3. The device according to the claim 1 or 2, **characterised in that**, the carrier segment (21) is with the rotating drive (4) coupled by means of a fixed arm (5), whereas for coupling of the auxiliary arm (32) with the rotating drive (4) the auxiliary arm (32) is provided with a means (39) for carrying the auxiliary arm (32) by the fixed arm (5) during shifting the thermo-insulating cover (2) from opened into covering position and backwards.

4. The device according to the claim 2 or 3, **characterised in that**, in section of the range of angular motion of the carrier segment (21) at covering and opening of the thermo-insulating cover (2) neighbouring with fully opened position of the thermo-insulating cover (2) the auxiliary swivelling arm (32) is in rest position, at the same time its supporting surface (37) is in contact with the stop (38) connected in a fixed manner with manipulation frame (31).

5. The device according to the claim 4, **characterised in that, the** section of the range of angular motion of the carrier segment (21) at covering and opening of the thermo-insulating cover (2) neighbouring with fully opened position of the thermo-insulating cover (2) is at least 20°.

6. The device according to any of the previous claims, **characterised in that, the** manipulation frame (31) at opened position of the thermo-insulating cover (2) is vertically displaceable from the emergency position into the storage position.

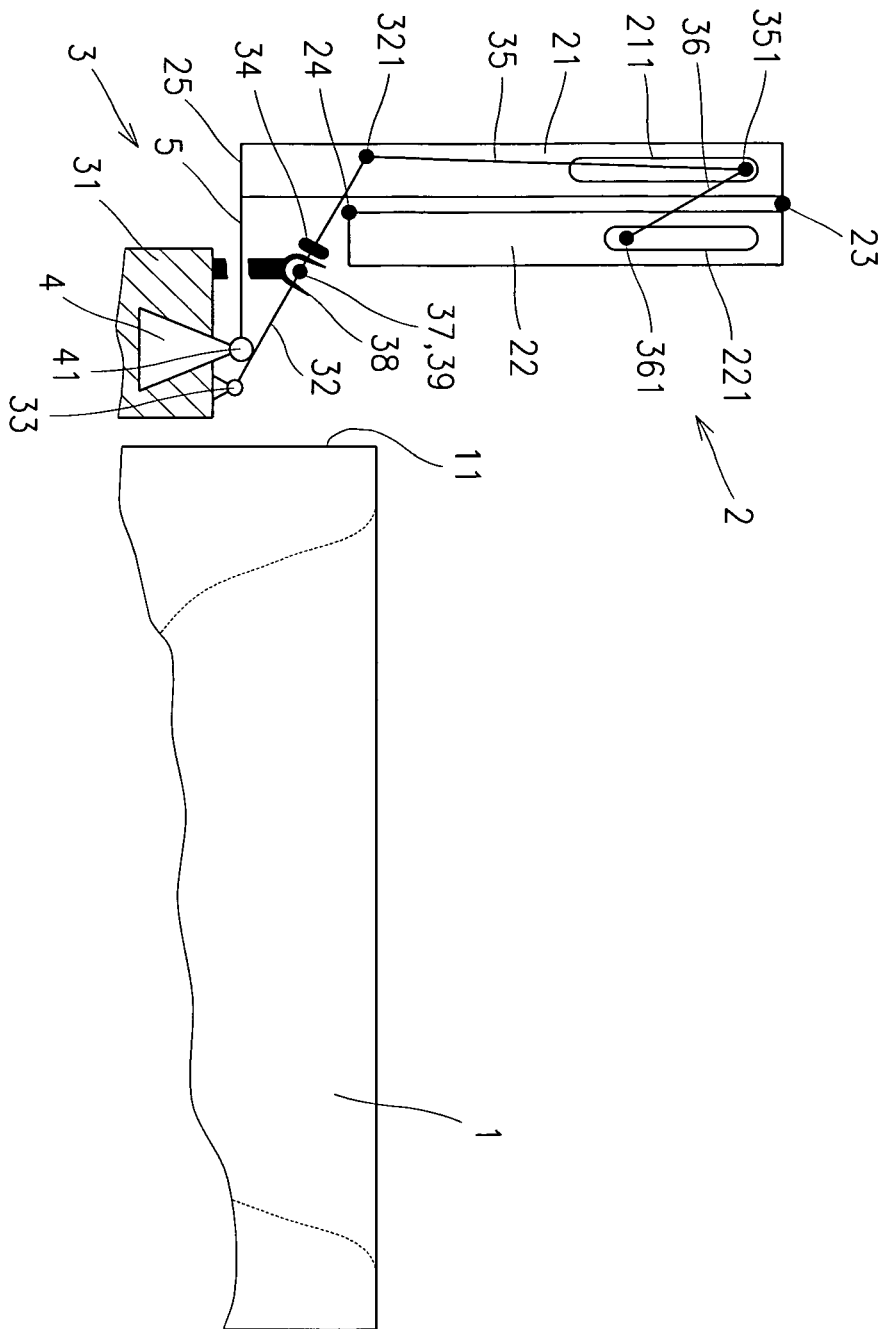


Fig. 1

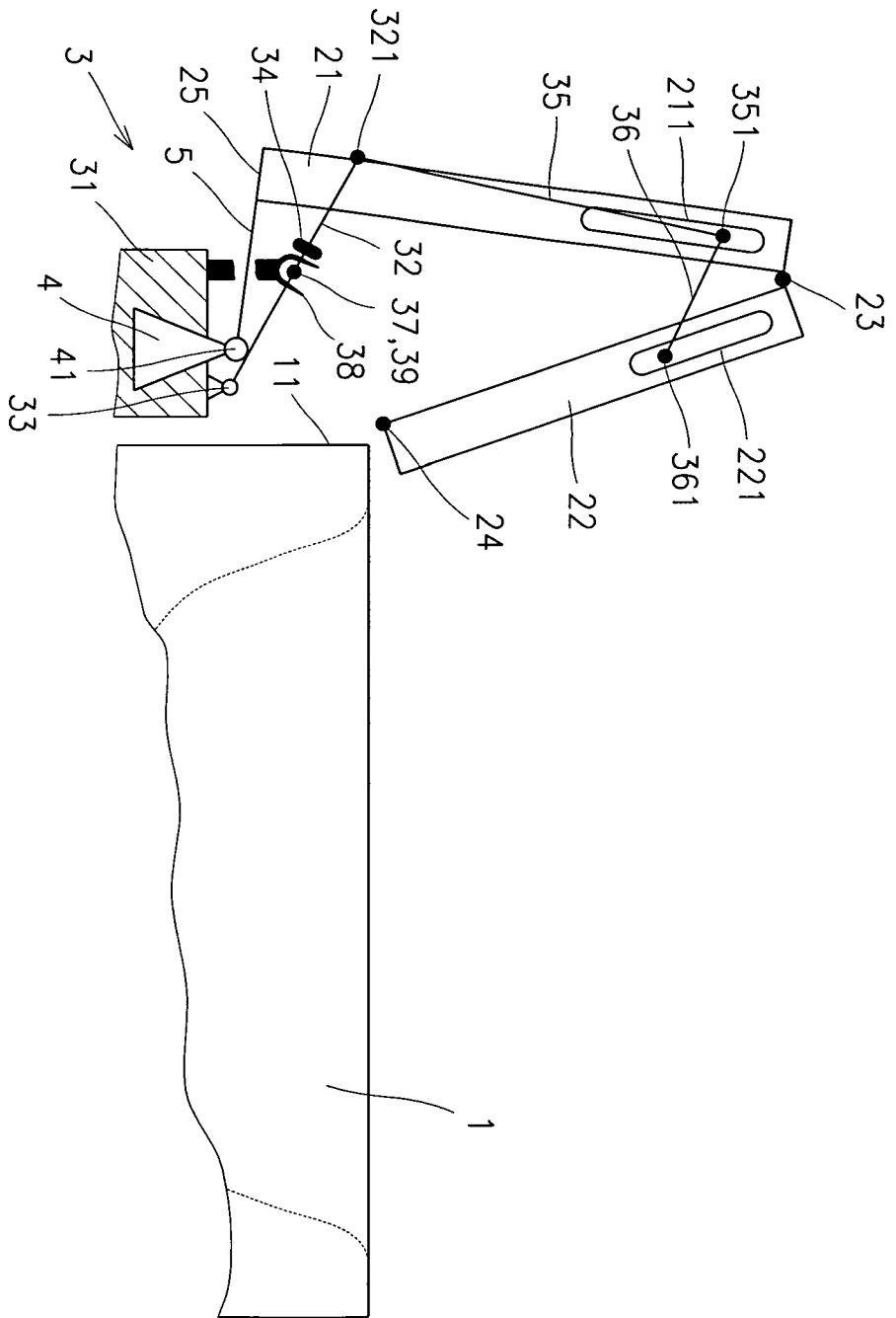


Fig. 2a

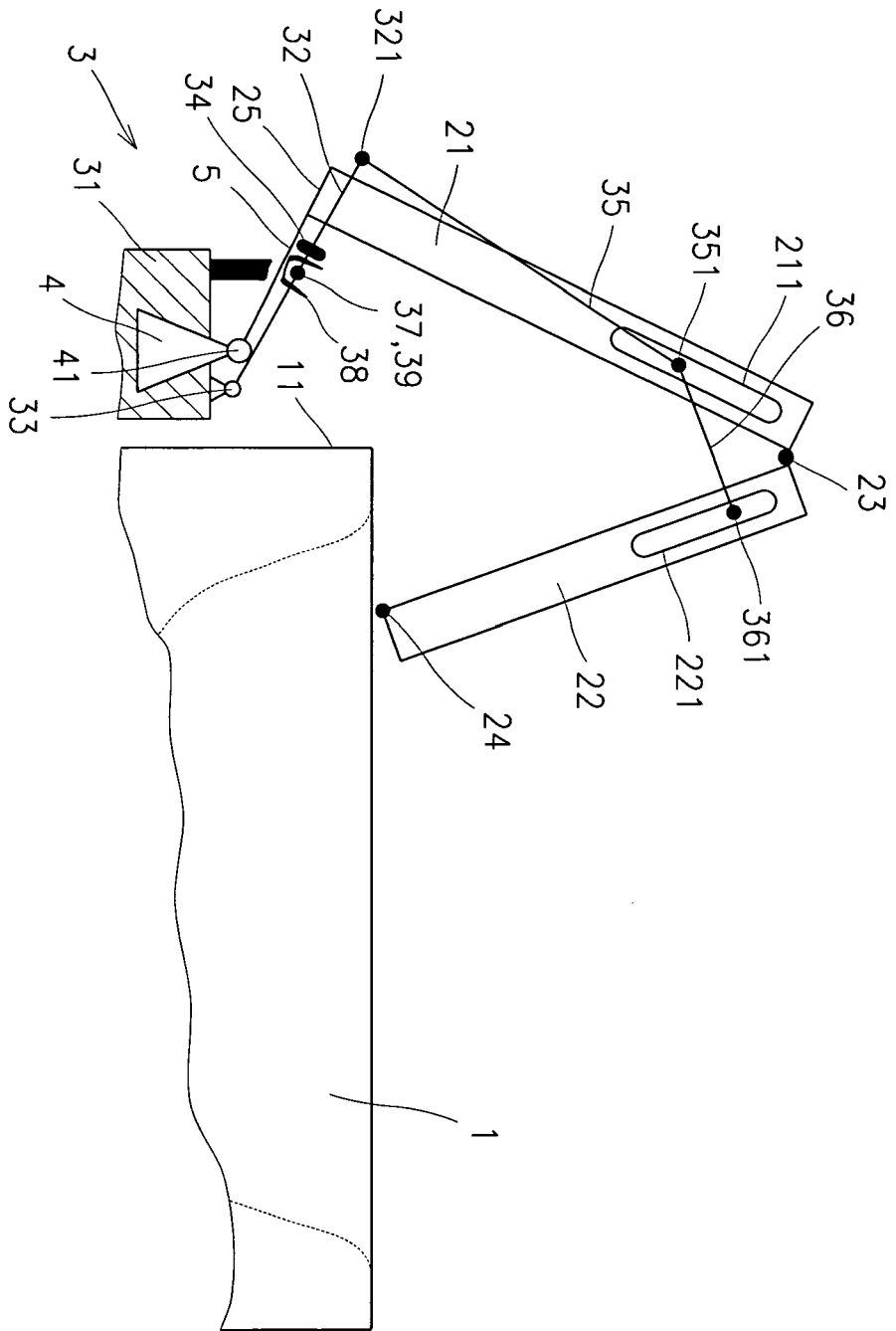


Fig. 2b



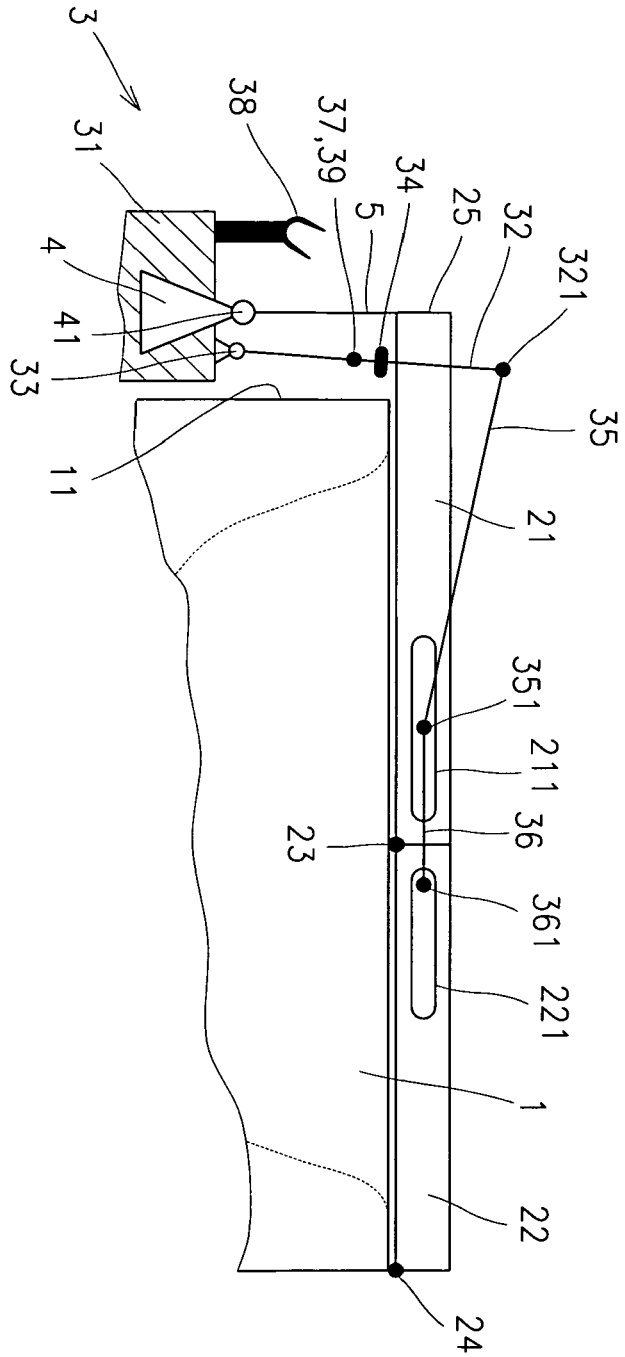


Fig. 3

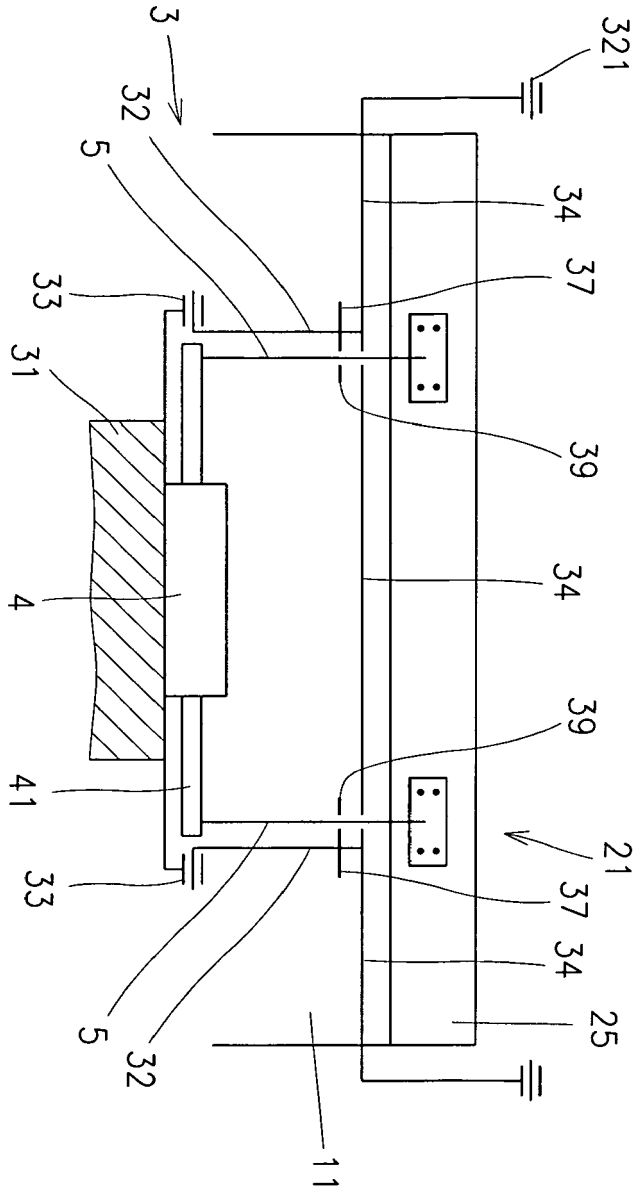


Fig. 4



EUROPEAN SEARCH REPORT

Application Number  
EP 10 18 9556

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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1	Place of search <b>Munich</b>	Date of completion of the search <b>13 February 2012</b>	Examiner <b>Decker, Robert</b>
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	

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**ANNEX TO THE EUROPEAN SEARCH REPORT  
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