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(54) **Automatic ring-shaped closing device for an airtight container**

(57) A tensioning ring (1) is disclosed, that is adapted to radially compress a cover of an airtightly sealed container for products; such ring (1) has a varying circumference due to a relative sliding of two end edges (1a,

1b), and is equipped with a device (2) equipped with lever (4) and crank (8); the device (2) is adapted to be closed through a closure movement that occurs due to a system of forces applied next to at least two points of the ring (1).

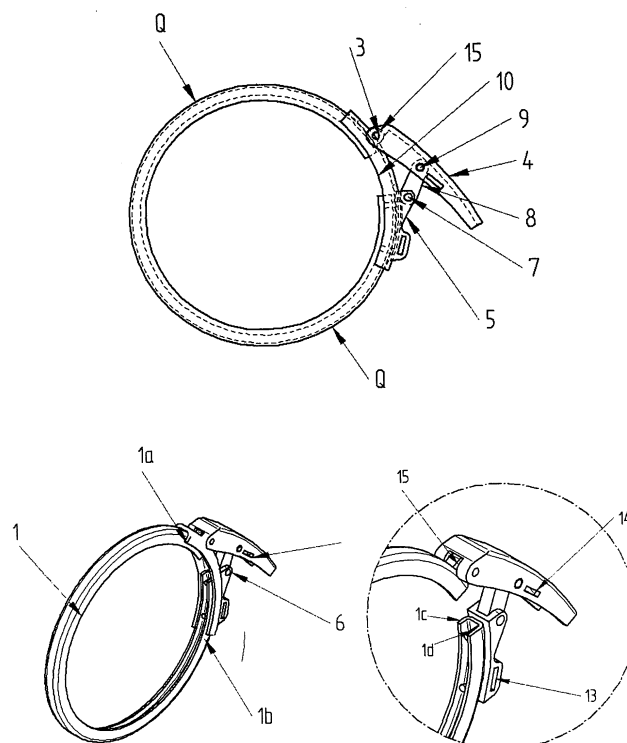


Fig. 2

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Description

[0001] The present invention deals with an automatic ringshaped closing device for an airtight container adapted for storing foodstuff, glues and paints, and, more generally, products falling within the "general line" category.

[0002] The automatic closing device applied to drums, cans, cylindrical or conical buckets made of thin plate, for stocking "general line" products, substantially deals with a cover equipped with basket based on silicone, or polyurethane, or PVC that is joined to the container body in order to avoid contaminating the stocked product with respect to external agents.

[0003] Joining the cover to the container body generally occurs with pressure, by exploiting the resiliency of body and cover edges, both suitable shaped according to a geometric outline that favours the automatic centring and closing steps with following squashing of the interposed gasket.

[0004] A band-shaped element clamps the shaped cover edge; a clamping device joins the two ends of the band-shaped element with the help of a manually actuable lever, by increasing the pressure along the contact edges between cover and container body as guarantee that the air-tightness remains during the transport and stocking steps, this latter step being subjected to situations in which high amounts of containers are stacked, and therefore high permanent and accidental loads occur.

[0005] The clamping device object of the present specification is of the type operating through the mechanical action transmitted by a lever for applying a radial pressure to the container cover.

[0006] The prior art, as shown in Fig. 1, deals with - for example in the clamping device of CH-A-674 193 - two ends of a band 1 that can be overlapped due to the manual rotation of a lever 6 integral with an end of band 1, a traction element 8 integral with the second end of the band 1 transmitting the circumferential ring traction. An arrangement is known - according to EP-A-0 226 552 - in which the ends 2' of a ring 1 tensioned by means of an element 14' and strictly blocked through a lever 4' are not overlapped. According to US-A-5 129 537, a manual lever is equipped with a sliding seat for a ring end 62.

[0007] The problem that occurs when using the known lever-type closing devices is the difficulty of automating the radial tensioning step of the container cover through a motored device replacing the manual intervention.

[0008] Object of the present invention is automating the radial tensioning step of the cover by operating on the closing lever of a mechanical device integral with the ring through a motored tool of the hydraulic or electric type.

[0009] This object is reached by a radial tensioning ring of a cover or an airtight container, the circumference of said ring being free from interruptions and with a variable size due to the overlapping of two end ring edges, a motored mechanical device directly operating on a lever-type device integral with the ring or indirectly on the same lever-type device through two diametrically opposite points located on the ring.

ver-type device integral with the ring or indirectly on the same lever-type device through two diametrically opposite points located on the ring.

[0010] The invention will be described in detail with reference to the following enclosed figures:

- Figure 1: shows the main prior art arrangements;
- Figure 2: shows the front view of the ring without interruptions and the lever-type device, in addition to an axonometric view and the enlarged view of the part with hinge;
- Figure 3: shows the closing steps of the lever-type device pointing out the pre-arranged points where the tensioning force is applied;
- Figure 4: shows three motored tools equipped with lever arms and sliding edges.

[0011] The description of the invention further refers to the main steps for air-tightly closing a cover:

- positioning and centering: step in which the tensioning ring is inserted in the ring abutting against the external cover edge;
- closing and tensioning: step in which the tensioning device lever integral with the ring is rotated till it reaches a stable position.

[0012] The automatic tensioning of the cover coupled with a container - generally a conveyor belt of an automatic plant for air-tightly closing "general line" products supports such container - occurs by means of a ring whose circumference is variable due to the approach and the possible overlapping of the two end edges.

[0013] Such ring, that is circular and free from interruptions, joins the cover to be radially tensioned due to the approach along the cover revolution axis. In order to make the movement along such axis easier, the C-shaped section of this ring has a centering side 1c that is shorter than the guiding side 1d.

[0014] A ring 1 substantially is a metallic band whose cross section is shaped as a C, dealing with a container having a diameter included between 150 and 350 mm, comprising a lever-shaped hooking device 2.

[0015] This lever-type device 2 is composed of a hinge 15 equipped with a pin 3 which supports the end of a lever 4 that is freely rotating. A shaped base 5 comprises a hinge 6 equipped with a pin 7 which constraints the end of a crank 8 that is freely rotating and has a length H.

[0016] The lever 4 supports a pin 9 placed at a distance L from pin 3, being $L > H + D$, wherein D is the diameter of pins 3, 7 and 9.

[0017] A base 10 supports the shaped base 5 and has a sliding guide 12 having a linear extension R along which the hinge 15 is freely sliding.

[0018] The base 10 is integral with the end edge 1b of ring 1; the hinge 15 is integral with the end edge 1a of ring 1. The grooved guide 12 constraints the hinge 15, which, by sliding along the extension R, reduces the dis-

tance between the two ring edges.

[0019] The lever 4 comprises a groove 14 which is aligned with respect to a groove 13 of the shaped base 5; a safety element crosses grooves 13 and 14 blocking the container opening as guarantee for keeping its airtightness and making the "general line" product unaltered.

[0020] The automatic cover tensioning is obtained by an automatic machine equipped with a motored, hydraulic or electromagnetic tool of the tongs or sliding clamp type.

[0021] A motored tool adapted to close the lever 4 is of the type equipped with two arms 209 and 21 which, by pivoting on a fulcrum or sliding on a rigid guide, impart a tightening force F acting on two pre-established points of the lever-type device.

[0022] Such two application points of force F are respectively placed next to the lever 4 back and the shaped base 5 back. In particular, the lever 4 back has an outline whose front slant is such as to push the tightening tool arm, making the force F application point go away from the pin 3 of the hinge 15, thereby guaranteeing the necessary rotation torque for the lever 4. The lever 4 can rotate till its stable position, while the crank 8 is placed inside the recess of the lever 4.

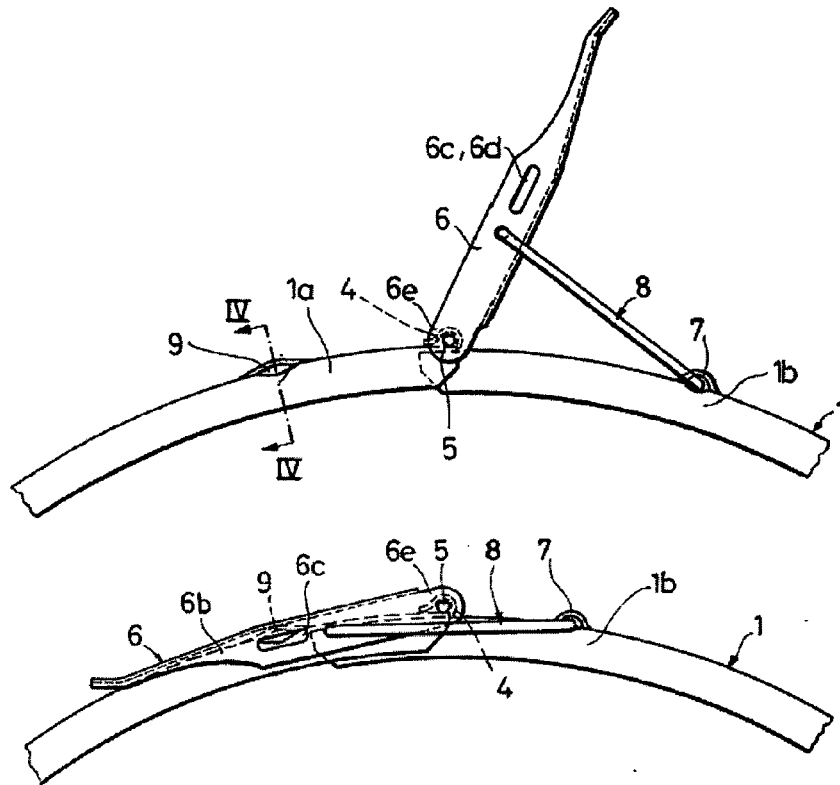
[0023] A further motored tool adapted to close the lever 4 is of the type equipped with a fixed edge 22 and a moving edge 23, this latter one being linearly sliding by means of a block 25 actuated by a pneumatic cylinder 24. The motored tool is able to impart a tightening force Q acting on two diametrically opposite points of the tensioning ring 1. Due to the effect of force Q, the two end edges 1a and 1b approach, making hinge 15, integral with the end edge 1a of the tensioning band 1, slide along the guide 12 for a length R and dragging the lever 4, which reaches the stable closing position of the lever-type device 2.

Claims

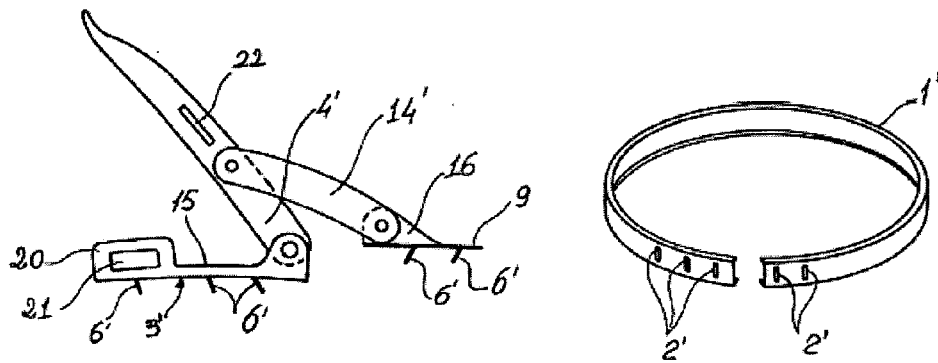
1. Tensioning ring (1), adapted to radially compress a cover of an airtightly sealed container for products, said ring (1) having a varying circumference due to a relative sliding of two end edges (1a, 1b), said ring (1) being equipped with a device (2) equipped with lever (4) and crank (8), **characterised in that** said device (2) is adapted to be closed through a closure movement that occurs due to a system of forces applied next to at least two points of said ring (1).
2. Tensioning ring (1) according to claim 1, **characterised in that** said device (2) is adapted to be closed through a direct action on said two end edges (1a, 1b) of said ring (1).
3. Tensioning ring (1) according to claim 1, **characterised in that** said device (2) is adapted to be closed

through an action next to two diametrically opposite points of said ring (1).

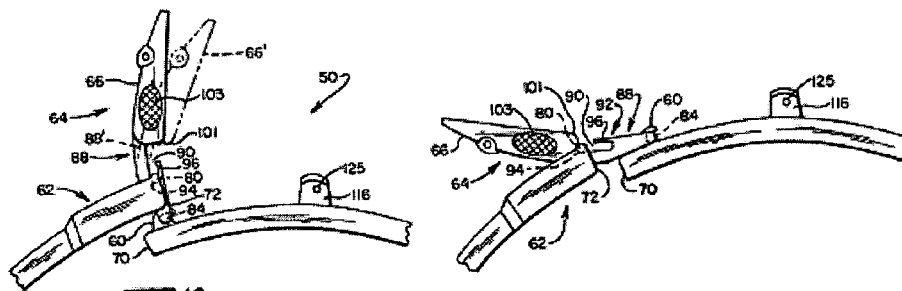
4. Tensioning ring (1) according to claim 1, **characterised in that** said lever (4) and said crank (8) are constrained with respect to a grooved guide (12), said grooved guide (12) being integral with an end edge (1b).
5. Tensioning ring (1) according to claim 4, **characterised in that** said grooved guide (12) is integral with a plaque or base (10) integral with the end edge (1b) and able to be overlapped to at least one end edge (1a).
6. Tensioning ring (1) according to any one of the previous claims, **characterised in that** an active length (H) of the crank (8) is less than an active length (L), (L) being contained in the length included between end hinge (2) and intermediate hinge (9) of the lever (4).
7. Tensioning ring (1) according to any one of the previous claims, **characterised in that** said crank (8) is adapted to be compressed through a rotation of lever (4).
8. Tensioning ring (1) according to claim 2, **characterised in that** a motored tool adapted to close the lever (4) is equipped with two arms (20, 21), said arms (20, 21) being adapted, by pivoting on a fulcrum or sliding on a rigid guide, to impart a tightening force (F) operating on two pre-established points of the lever-type device.
9. Tensioning ring (1) according to claim 3, **characterised in that** a motored tool, equipped with a fixed edge (22) and a moving edge (23), by operating on two diametrically opposite points of the ring (1), is adapted to impart a closure movement of said device (2).



CH 674 193



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US 5 129 537

Fig. 1

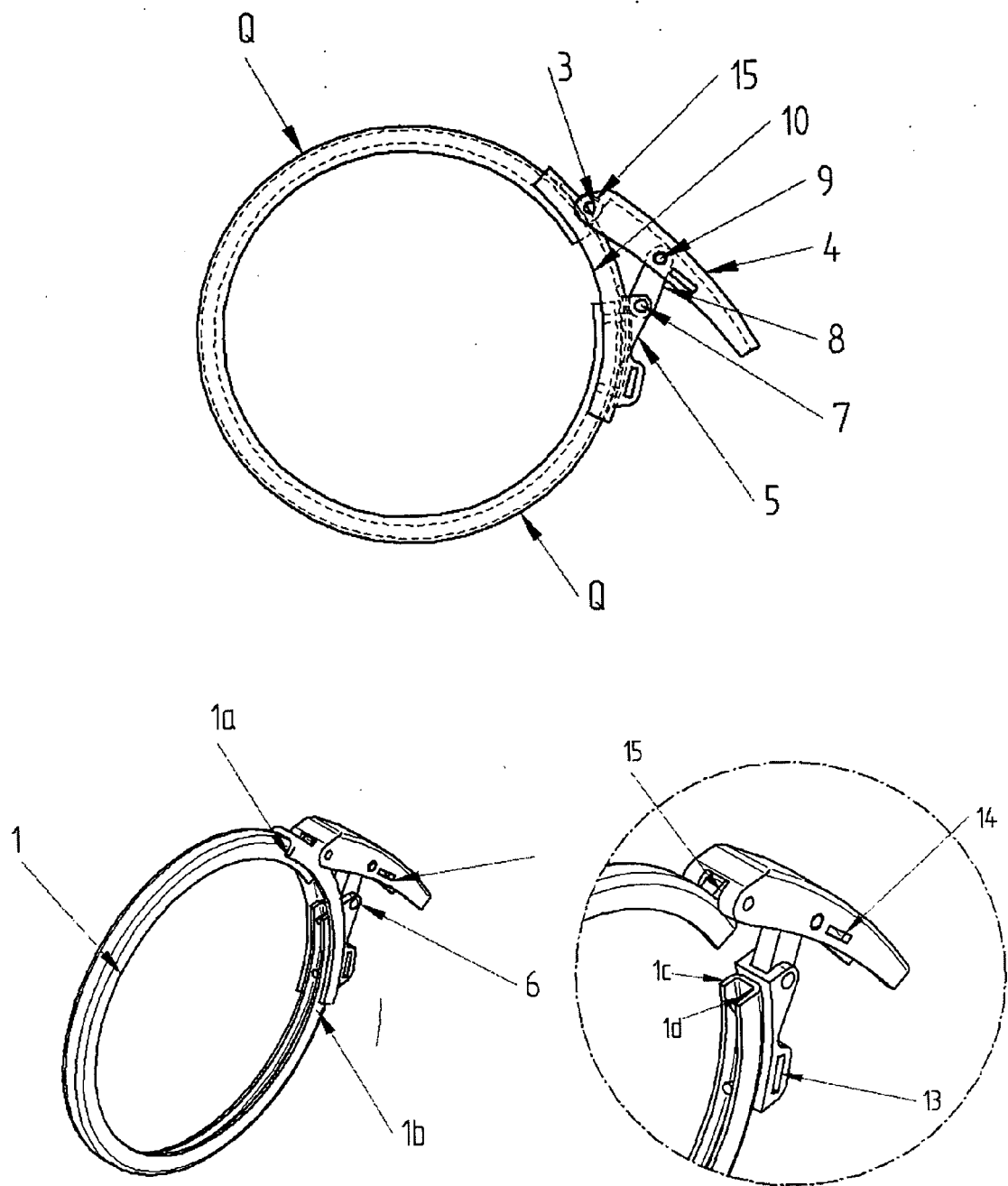


Fig. 2

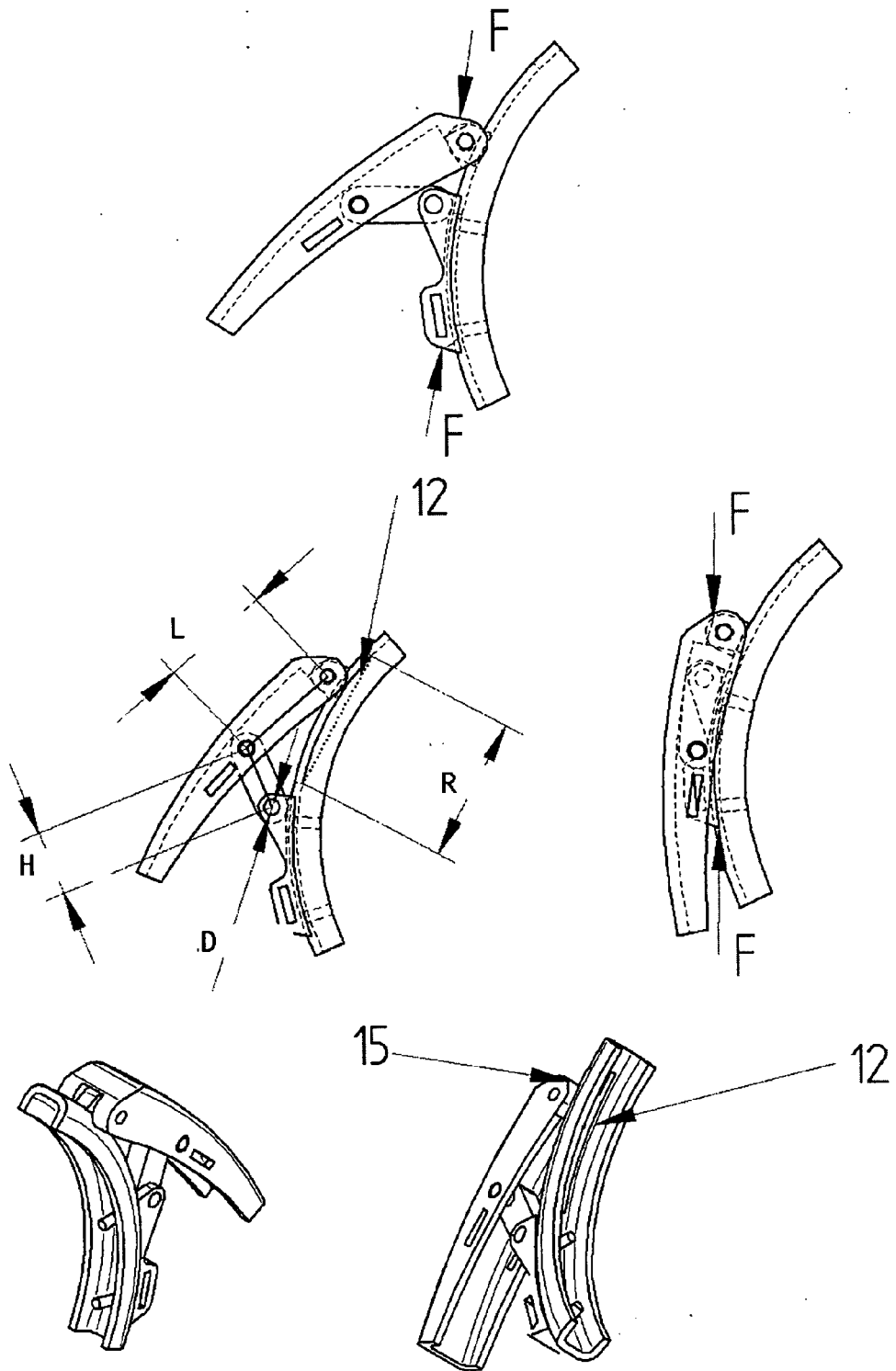


Fig. 3

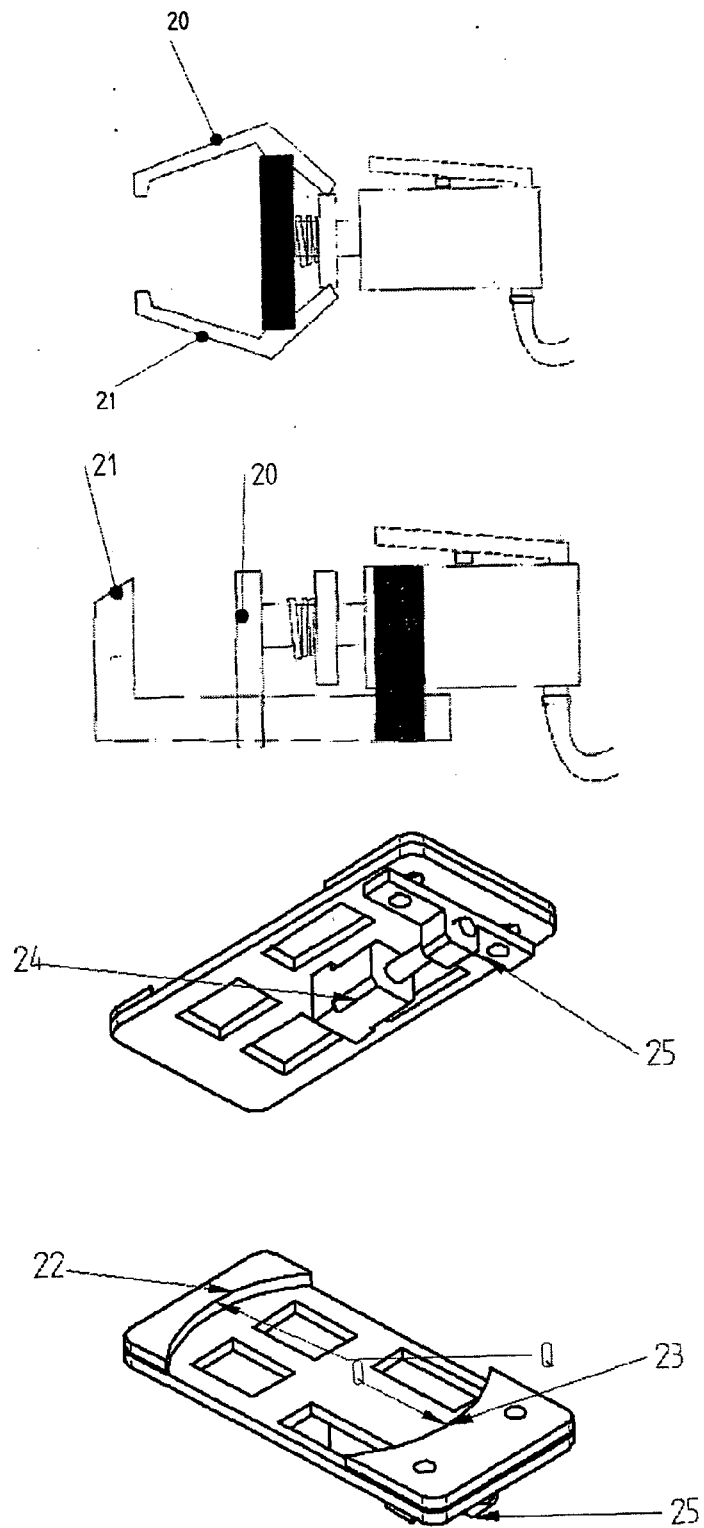


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 05 42 5045

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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 June 2005	Examiner Galli, M
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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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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