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(54) **Closing apparatus for closing an opening**

(57) A closing device 1 for the liquid-tight closing of an opening 37 in a floor 39 has a cover 3 and sealants 5. A sealing body 7, two closing elements 9 and 11 and movement elements 13 form the sealants 5. The closing elements 9 and 11 can be moved toward each other by a movement element 15 of the movement elements 13 to press the sealing body 7 together. Thus the sealing body 7 extends in a radial direction, so that the opening

37 is closed.

Between a collar 45 at the end of the movement element 15 and the cover 3 and between the cover 3 and the floor 39 there are elastic rings 51 and 53. So the cover 3 is moveable with respect to the sealants. The sealing body 7 is not burdened if forces are exerted on the cover 3. In addition, the cover 3, when the movement element 15 is tightened, is pulled downward so that it comes to lie tightly against the floor 39.

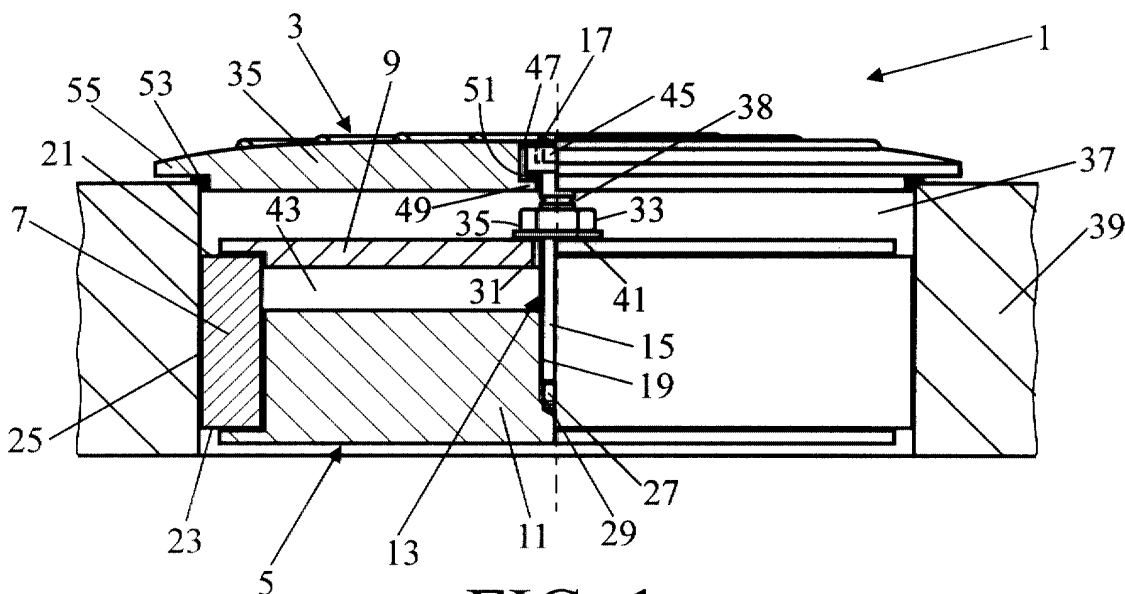


FIG. 1

Description

BACKGROUND OF THE INVENTION:

Field of the invention

[0001] The invention relates to a closing device for closing an opening, in particular the gastight and/or liquid-tight sealing of an opening in a floor or wall, comprising a cover, for covering the opening, as well as sealants, for sealing off the opening, which sealants are moveable with respect to the cover and which sealants comprise a deformable sealing body, with a first side turned toward the cover and a second side turned away from the cover, which sealants also comprise a first closing element, which is present on the first side of the sealing body, as well as a second closing element, which is present on the second side of the sealing body, and which sealants comprise movement elements, for moving the closing elements toward or away from each other, for pressing together the sealing body, so that the sealing body moves in a crosswise direction with respect to the compression direction. Such a closing device is used, among other things, for closing test holes in floors of the outside of a petrol station for cars. At petrol stations much fuel is spilled while tanks are being filled. This fuel must not come into the ground. This is why the floor must be liquid-tight. These floors are periodically tested for liquid-tightness, at which time via openings in the floor air comes under the floor and where a check is made if this air cannot escape through holes in the floor. After testing these holes must be closed off again so that no spilled fuel can come into the ground via these holes.

Prior art

[0002] Such a closing device is known from the American patent no. US 2.773.554. In this known closing device the cover is separate from the sealants. When an opening is closed off first the sealants are placed in the opening and moved such that they seal off the opening. Then the cover is separately placed over the opening. The cover and the sealants are therefore two separate parts of the closing device.

[0003] When used at a petrol station cars regularly drive over the cover. This exerts great pressure on the cover. To prevent the cover from sliding away, the cover should be separately fastened. To place the closing device sturdily, therefore, first the sealants should be placed and fastened and then the cover should be placed and fastened.

Summary of the invention

[0004] An objective of the invention is to provide a closing device of the type described in the preamble that can be placed easily and sturdily in an opening in a floor.

To this end the closing device according to the invention is characterised in that the cover is coupled with the sealants and the movement elements are accessible, after the sealants are placed in an opening and the cover over the opening. When the sealants are fastened in the opening, therefore, through the coupling of the cover with the sealants the cover is also fastened in place. Here under fastening one should understand that the cover is not loose but is connected in such a way to the sealants that the cover can make small movements with respect to the sealants.

[0005] It is noted that from the Dutch patent no. 1005931 a closing device is known in which the cover forms a single whole with the sealants. So the cover is not moveable with respect to the sealants. This is a disadvantage. In placement of this known closing device in an opening in a floor of, for example, a petrol station, cars regularly drive over the cover. So relatively strong forces are exerted on the cover, which are led via the sealing body on the limiting wall of the opening in the floor. Here it can occur that the closing device slowly works its way out of the opening and/or that the sealing body is damaged, such that no more liquid-tight seal exists.

[0006] In the closing device according to the invention the cover is preferably separately coupled with the sealants.

[0007] An embodiment of the closing device according to the invention is characterised in that the cover is coupled with the movement elements and has a continuous opening, with the movement elements being provided with operating elements, which are at least partially present in the opening in the cover.

[0008] A favourable other embodiment of the closing device according to the invention is characterised in that the movement elements comprise a movement element provided with a first screw thread, which is coupled with the two closing elements, at which at least one of the closing elements is provided with a second screw thread, which cooperates with the first screw thread, and in which the first end of the movement element is provided with the operating elements.

[0009] In order to be able to place the cover tightly against the floor, a further embodiment of the closing device according to the invention is characterised in that the first closing element has a continuous opening and the second closing element has a blind opening of which the inside has the second screw thread, and that the movement element sticks through the continuous opening in the first closing element and with the second end, which is provided with the first screw thread, is present in the blind opening, which movement element is provided between the first end and the first closing element with a first collar, which is behind an edge of the continuous opening and when the movement element is turned moves the first closing element in the direction of the second closing element, and which movement element has on its first end a second collar, which is part

of the operating elements, is sunken into the continuous opening in the cover, and catches behind a protruding edge in the opening, and when the movement element is turned pushes the cover in the direction of the sealing body. By turning the operating elements on the one hand both closing elements are moved toward each other such that the sealing body expands and comes to be securely in the opening and on the other hand the cover is pulled in the direction of the closing elements such that the cover comes to lie securely against the floor. The operating elements are thus sunken in the cover so that when someone drives over the cover no force is exerted on the bolt.

[0010] Still another embodiment is characterised in that the movement element between the two collars has a weakening. Preferably, the movement element just under the cover has a weakening, for example a small notch. The advantage of this is that upon extremely strong force on the cover where the movement element breaks, the movement element at the site of the weakening will break, that is to say above the first closing element. So the closing of the sealing body is not affected and the seal will remain intact at all times. In order to better facilitate the moving of the cover with respect to the movement element and to close off the space between the cover and the sealing body liquid-tight so that no liquid can come in contact with the sealing body and so the sealing body cannot be affected, another embodiment is characterised in that between the second collar of the movement element and the protruding edge in the opening of the cover and/or under the circumferential edge of the cover there is an elastic ring.

[0011] To further improve the seal a further embodiment is characterised in that between the two closing elements at least one further sealing body is present. It has been noted that two or more separate sealing bodies instead of one large sealing body provides a better seal.

[0012] The seal is improved even more if between the two sealing bodies there is a ring. It has been noted that during the expansion of the sealing bodies an air pressure accrual takes place in the space between the sealing bodies and the limiting wall of the opening. This air pressure blows possible dust particles between the sealing bodies and the limiting wall of the opening away and prevents liquid from coming into the space between the sealing bodies.

[0013] The seal is even further improved if between the first collar and the first closing element there is a sealing ring. So during the tightening of the movement element, when the closing elements move toward each other, in the space between the two closing elements an overpressure is created, such that soil and liquid cannot get behind the sealing bodies.

[0014] Particularly also the combination with the independently moveable cover with the improved seal forms a strong improvement with respect to the known cover. Here the improved seal can be obtained by application

of two or more sealing bodies instead of one or by the application of the elastic rings under the cover and between the head of the bolt and the cover or by the pressure accrual between the closing elements and the sealing bodies, or through the combination of two or more of these seals.

[0015] In order to be able to check if in this last embodiment the seal is in order, an embodiment of this is characterised in that there is a channel in the ring of which the ends end up on the inside and outside of the ring, and that the second closing element has a further channel of which an end ends up between the two sealing bodies and the other end ends up on the top of the second closing element, so that this end is connected to a tube or hose, which goes through a hole in the first closing element and to which a pressure gauge can be connected. With this test design of the closing device the sealing function can be checked. If a constant overpressure is measured in the space between the sealing bodies one knows that the seal is in order.

[0016] It is noted that the embodiment with two or more sealing bodies instead of one or with the elastic rings under the cover and between the second collar of the movement element and the cover or with the ring between the sealing bodies can also be used independently of whether the cover is coupled with the sealants. Thus the possibility is kept open that these embodiments can be claimed separately.

Brief description of the drawings

[0017] The invention will be elucidated more fully below on the basis of drawings in which embodiments of the closing device according to the invention are shown. In these drawings:

Figure 1 is a first embodiment of the closing device according to the invention with one sealing body;

Figure 2 is a second embodiment of the closing device according to the invention with two sealing bodies; and

Figure 3 is a third embodiment of the closing device according to the invention for checking the seal.

Detailed description of the drawings

[0018] In Figure 1 a first embodiment of the closing device according to the invention is shown. The closing device 1 is comprised of a cover 3 and sealants 5. The sealants 5 consist of an elastic, cylindrical sealing body 7, two closing elements 9 and 11 and movement elements 13, to bring the closing elements 9 and 11 toward each other.

[0019] The movement elements 13 are formed by a movement element 15, here as a bolt, which on its end has operating elements 17, formed here by the internal hexagonal in the head of the bolt. The movement element 15 is partially provided in its length with an exter-

nal, first screw thread 19.

[0020] The sealing body 7 has a first side 21, a second side 23 and a circumferential side 25, and is present between the two closing elements 9 and 11, with a first closing element 11 being in contact with the first side 21 and the second closing element 11 being in contact with the second side 23 of the sealing body 7.

[0021] The second closing element 11 is provided with a blind opening 27, which is provided with an internal second screw thread 29. The movement element 15 is turned with an end into the opening and sticks through a continuous opening 31 in the first closing element 9. The movement element 15 is provided with a first collar 33, formed in this embodiment by a nut, which is present behind the edge 35 of the opening 31.

[0022] The placement of the closing device 1 in an opening 37 in a floor 39 goes like this. When the movement element 15 is turned in the opening 27, the collar 33 moves the first closing element 9 to the second closing element 11, such that the sealing body 7 is pressed in an axial direction. Here the sealing body 7 expands in a crosswise direction to the compression direction, so that it comes to be fastened in the opening 37 in the floor 39.

[0023] Between the collar 33 and the first closing element 9 there is a sealing ring 41, for example of Teflon, which closes off the space 43 between the two closing elements 9 and 11 gastight. During the tightening of the movement element 15 in this space 43 there will be increased gas pressure because the two closing elements 9 and 11 move toward each other. So no liquid can get behind the sealing body 7.

[0024] The movement element 15 also has a second collar 45, which in this embodiment is formed by the head of the bolt. This second collar 45 is sunken in a continuous opening 47 in the cover 3 and catches behind a protruding edge 49 in the opening 47 of the cover 3. When the movement element 15 is turned, the second collar 45 pulls the cover 3 in the direction of the sealing body 7, such that the cover 3 is pressed tightly against the edge of the opening 37.

[0025] To prevent, upon overload of the cover 3, that the formed seal can leak, the movement element 15 is provided with a weakening 49 in the form of a notch. So when there is an overload the movement element 15 will always break in this place and not between the two closing elements 9 and 11, so that the seal will remain intact.

[0026] To facilitate the moving of the cover 3 with respect to the movement element 15 there is an elastic ring 51 between the second collar 45 and the protruding edge 49 of the cover 3, and there is a further elastic ring 53 between a circumferential edge 55 of the cover 3 and the floor 39.

[0027] In Figure 2 a second embodiment of the closing device 101 according to the invention is shown. This differs from the first embodiment in that instead of a sealing body there are now two sealing bodies 103 and 105 between the two closing elements 107 and 109. This

yields a better seal. Between the two sealing bodies 103 and 105 there is a ring 111. When the sealing bodies 103 and 105 expand, pressure builds up in a space 113 between the sealing bodies 103 and 105, and a limiting wall 115 of the opening 37 in the floor 39. This prevents liquid from coming into the space 113 between the sealing bodies 103 and 105.

[0028] In Figure 3 a third embodiment of the closing device 201 according to the invention is shown. With this closing device 201 it can be tested whether the seal is good. This closing device 201, too, has two sealing bodies 203 and 205, which are enclosed between two closing elements 207 and 209. Here, too, between the two sealing bodies 203 and 205 there is a ring 211. The testing of the seal takes place by measuring the air pressure in the space 213 between the two sealing bodies 203 and 205. To this end the ring 211 has a channel 215 of which the ends end up in the inside and outside 217, 219 of the ring 211. In the bottom closing element 209 there is another channel 221 the end of which ends up in the space 213 between the two sealing bodies 203 and 205 and of which the other end ends up at the top 223 of the bottom closing element 209. At the last end 225 a tube 227 is connected, which goes through a hole 229 in the top closing element 207. At the end 231 of the tube 227 there is a pressure gauge 233 for measuring the pressure in the space 213.

[0029] Although in the above the invention is explained on the basis of the drawings, it should be noted that the invention is in no way limited to the embodiments shown in the drawings. The invention also extends to all embodiments deviating from the embodiments shown in the drawings within the context defined by the claims. For example, the closing device can also be used for closing openings in floors and walls of swimming pools, but also for openings in barrels and for all other conceivable seals of openings.

Claims

1. Closing device for closing an opening, in particular the gastight and/or liquid-tight sealing of an opening in a floor or wall, comprising a cover, for covering the opening, as well as sealants, for sealing off the opening, which sealants are moveable with respect to the cover and which sealants comprise a deformable sealing body, with a first side turned toward the cover and a second side turned away from the cover, which sealants also comprise a first closing element, which is present on the first side of the sealing body, as well as a second closing element, which is present on the second side of the sealing body, and which sealants comprise movement elements, for moving the closing elements toward or away from each other, for pressing together the sealing body, so that the sealing body moves in a crosswise direction with respect to the compression direction,

characterised in that the cover is coupled with the sealants and the movement elements are accessible, after the sealants are placed in an opening and the cover over the opening.

2. Closing device according to claim 1, characterised in that the cover is coupled with the movement elements and is provided with a continuous opening, where the movement elements are provided with operating elements, which at least partially are present in the opening in the cover. 10
3. Closing device according to claim 2, characterised in that the movement elements comprise a movement element provided with a first screw thread, which is coupled with the two closing elements, at which at least one of the closing elements is provided with a second screw thread, which cooperates with the first screw thread, and in which the first end of the movement element is provided with the operating elements 15 20
4. Closing device according to claim 3, characterised in that the first closing element has a continuous opening and the second closing element has a blind opening of which the inside has the second screw thread, and that the movement element sticks through the continuous opening in the first closing element and with the second end, which is provided with the first screw thread, is present in the blind opening, which movement element is provided between the first end and the first closing element with a first collar, which is behind an edge of the continuous opening and when the movement element is turned moves the first closing element in the direction of the second closing element, and which movement element has on its first end a second collar, which is part of the operating elements, is sunken into the continuous opening in the cover, and catches behind a protruding edge in the opening, and when the movement element is turned pushes the cover in the direction of the sealing body. 25 30 35 40
5. Closing device according to claim 4, characterised in that the movement element between the two collars has a weakening. 45
6. Closing device according to claim 4 or 5, characterised in that between the second collar of the movement element and the protruding edge in the opening of the cover and/or under the circumferential edge of the cover there is an elastic ring. 50
7. Closing device according to claim 4, 5 or 6, characterised in that between the first collar and the first closing element there is a sealing ring. 55
8. Closing device according to one of the preceding

claims, characterised in that between the two closing elements there is at least one more sealing body.

- 5 9. Closing device according to claim 8, characterised in that between the two sealing bodies there is a ring.
10. Closing device according to claim 9, characterised in that in the ring there is a channel of which the ends end up on the inside and outside of the ring, and the second closing element is provided with another channel of which an end ends up between the two sealing bodies and the other end ends up at the top of the second closing element, with this end being connected to a tube or hose, which goes through a hole in the first closing element and to which a pressure gauge can be connected.

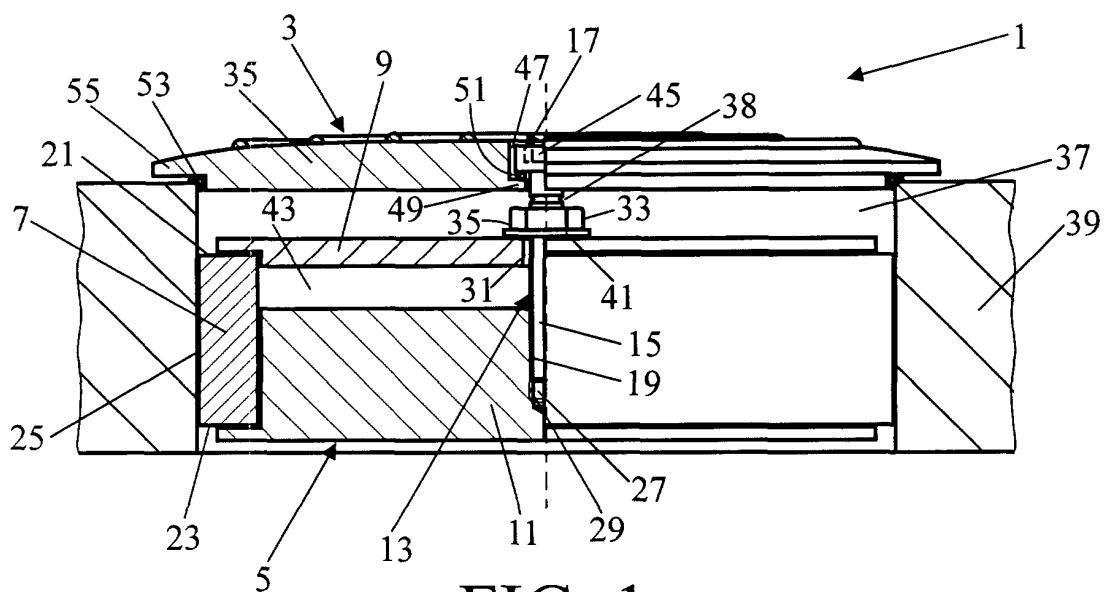


FIG. 1

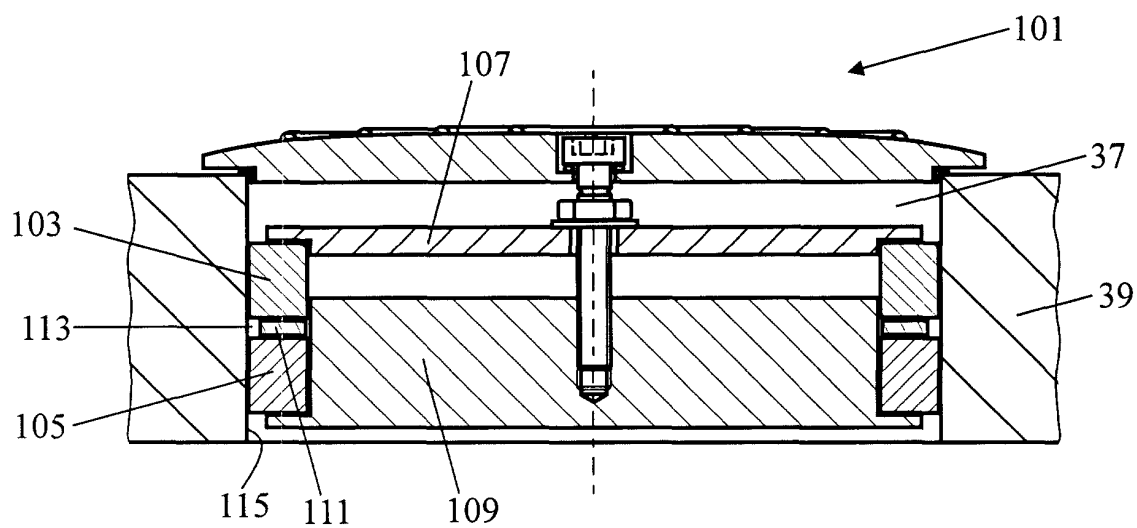


FIG. 2

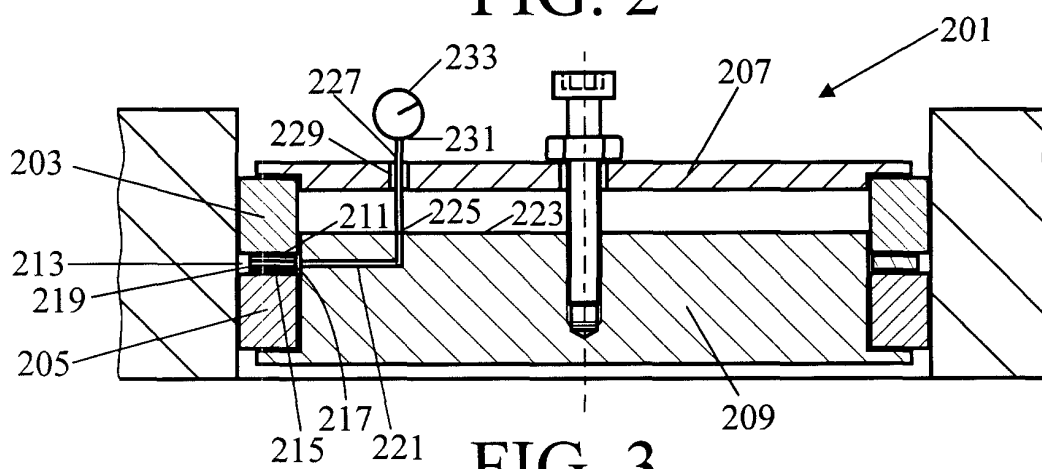


FIG. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 20 0389

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)
X	DE 89 05 287 U (HÖRNLEIN) 10 August 1989 (1989-08-10)	1-3	E02D29/14
A	* page 8, line 12 - page 11, line 7; figure 1 *	4	
D,A	----- NL 1 005 931 C (DE JONG) 23 November 1998 (1998-11-23) * figures 3-5 *	1	
A	----- US 5 230 437 A (KELLY) 27 July 1993 (1993-07-27) -----		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7) E02D B65D E03F
Place of search		Date of completion of the search	Examiner
THE HAGUE		23 May 2001	Kergueno, J
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			

EPO FORM 1503 03/82 (P4/C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 20 0389

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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23-05-2001

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 8905287 U	10-08-1989	NONE	
NL 1005931 C	23-11-1998	AU 7351098 A	24-11-1998
		DE 29807550 U	12-11-1998
		EP 0979330 A	16-02-2000
		NL 1005931 A	03-11-1998
		WO 9849401 A	05-11-1998
		NO 995277 A	20-12-1999
US 5230437 A	27-07-1993	NONE	