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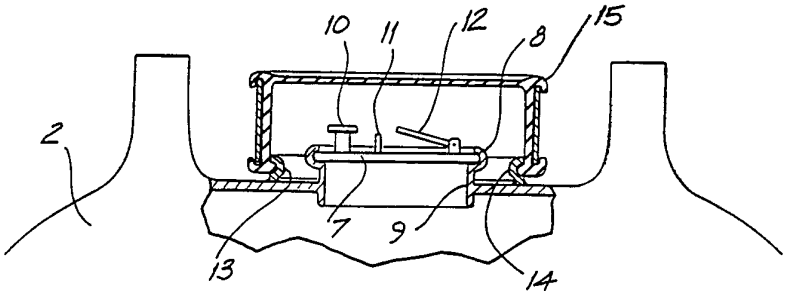

(57) Abstract

A hatch in road or rail tanker (2) includes a hatch cover (7) mounted in a flange (8) of a compartment manhole (9). In order to prevent leaks from the hatch cover (7), a band (13) is welded to the top of the tank (2) around compartment manhole (9). The band (13) includes an outwardly concave flange (14) providing a groove for receiving a hatch sealing device (15). The hatch sealing device (15) includes a generally cylindrical rubber cylinder having an open end and a closed end closed by a seal membrane, also of rubber. Around the inside of the rim forming open end there is provided an internally extending lip shaped to fit into concave flange (14). Around the outside of the cylinder is provided a split ring of metal, the ends of which are drawn together in order to radially compress the cylinder and thus seal it around the flange (14).

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HATCH SEAL

BACKGROUND OF THE INVENTION

This invention relates to sealing devices, and particularly to a device for sealing a hatch of the type provided in tankers, submarines, etc.

As is well known, such hatches are prone to leaking. For example, in road and rail tankers, the or each hatch provided at the top of the tanker comprises a compartment hatch cover which fits over the compartment manhole. The hatch cover is provided with a number of features including a pressure vacuum vent, a dip tube, and an inspection hatch. Although it will be apparent that leaks could occur at each of the features in the hatch cover, as well as the edge of the hatch cover itself, when there is an accident such as the tanker rolling over, such leaks even occur when the tanker is normally parked on an incline.

BRIEF SUMMARY OF THE INVENTION

It is therefore an object of the present invention to provide a sealing device for a hatch which can be positioned around a leaking hatch to prevent, or at least reduce leakage.

Accordingly, in one aspect, the invention provides a sealing device for a hatch, the sealing device comprising a generally cylindrical member having an open end for fitting around the hatch, said member having its other end closed in a fluid-tight manner, and means for maintaining the cylindrical member in radial compression against a flange provided around the hatch to seal said cylindrical member to said flange.

The flange could be a flange on a wall supporting the hatch cover, or could be a separate flange attached, for example by welding, around the hatch.

In a preferred embodiment, the means for maintaining the cylindrical member in compression comprises a split band arranged around

the cylindrical member and having means for pulling the two ends of the split band together so as to tighten the band around the cylindrical member. Preferably, the means for pulling the two ends together comprises a tongue attached to one of the ends and a lever rotatably mounted to the other of the ends and biased against the tongue, whereby, when the lever is rotated, the tongue is biased thus moving the one of the ends towards the other of the ends.

Preferably, the tongue slides within a guide in the other of the ends and is provided with a flange, through which extends a longitudinal member, biased against the flange and coupled to the lever at a point adjacent the rotational axis of the lever. The longitudinal member is preferably provided with means for adjusting the bias of the member.

In one embodiment, the open end of the member is provided with a lip around the rim thereof, the lip being adapted for fitting to a groove in the flange around the hatch.

In another embodiment, the open end of the member can be fitted over a flange having a ridge therearound for compressing over the ridge.

According to a second aspect, the invention provides a substantially cylindrical band for permanently attaching around a hatch in a surface of, for example, a road or rail tanker or a submarine, the cylindrical band having a flange to which the hatch sealing device as described above can be sealed.

The flange can be provided with a ridge or a groove to which the member described above can be sealed.

According to a third aspect, the invention provides a road or rail tanker having one or more cylindrical bands of the type described above permanently attached thereto.

In a fourth aspect, the invention provides a flange comprising a substantially annular member for fitting around a hatch in a surface of, for example, a road or rail tanker or a submarine, the annular member having sealing means around the internal diameter thereof for sealing to an upstanding wall of the hatch and being compressible by a hatch sealing device as described above.

Preferably, the annular member is formed in at least two segments to facilitate fitting the annular member around the hatch. Preferably, sealing means are provided between the contact faces of the segments, as well as around the internal diameter of the annular member. The annular member can be of metal, plastics or rubber material.

In a fifth aspect, the invention provides a hatch sealing apparatus comprising a hatch sealing device as described above, in combination with the flange formed by the annular member as described above.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of hatch sealing devices and apparatus according to the invention will now be more fully described, by way of example, with reference to the drawings, of which:

Figure 1 is a schematic view of the rear portion of a conventional road tanker;

Figure 2 is a schematic cross-sectional view of a hatch in the tanker of Figure 1 with a hatch sealing device according to one embodiment of the invention in position;

Figure 3 is a cross-sectional view of the hatch sealing device shown in Figure 2;

Figure 4 is a side view of the hatch sealing device shown in Figure 3 showing the compression means;

Figure 5 is a partial end view of the hatch sealing device shown in

Figure 3 with the compression means in position;

Figure 6 is a schematic cross-sectional view similar to that of Figure 2 with a hatch sealing device according to a second embodiment of the invention in position;

Figure 7 is a plan view of a flange forming part of a third embodiment of a hatch sealing device according to the invention;

Figure 8 is a cross-sectional view of the flange of Figure 7 along line VIII-VIII;

Figure 9 is a cross-sectional view through a part of the flange of Figure 7 looking from above; and

Figure 10 is a schematic cross-sectional view similar to that of Figure 2 with a hatch sealing device according to a third embodiment of the invention including the flange of Figures 7, 8 and 9 in position.

DETAILED DESCRIPTION OF THE DRAWINGS

Thus, as shown in Figure 1, a conventional road tanker 1 including a tank 2 mounted on a chassis 3 supported by wheels 4 is provided with a plurality of compartment hatches 5 along the top of the tank 2 to provide access to the plurality of tank compartments 6 forming the tank 2.

As shown in more detail in Figure 2, the compartment hatch 5 includes a hatch cover 7 mounted in a flange 8 of a compartment manhole 9. The hatch cover 7 is provided with a pressure vacuum vent 10, a dip tube 11 and a loading/inspection hatch 12, which is hingedly mounted to the cover 7. As mentioned above, leakage of fluid from the tank 2 can occur at flange 8 if the cover 7 is not properly sealed thereto, from pressure vacuum vent 10 and dip tube 11, if they are not properly sealed and from loading/inspection hatch 12 if it is not properly sealed to cover 7. Such leaks are especially likely in the event of an accident where the tanker is rolled over. However, it has been known for leaks to

occur even when the tanker is upright but parked on an incline.

Thus, in one embodiment of the invention, a band 13 is welded to the top of the tank 2 around compartment manhole 9. The band 13 includes an outwardly concave flange 14 providing a groove for receiving a hatch seal 15.

As more clearly shown in Figure 3, the hatch sealing device 15 comprises a generally cylindrical member 16 formed of rubber. The member 16 has an open end 17 and a closed end 18 closed by a seal membrane 19, also of rubber. Around the inside of the rim forming open end 17 there is provided an internally extending lip 20 shaped to fit into concave flange 14 of band 13. On the outside of both open end 17 and closed end 18, there are provided clip portions 21 and 22, respectively, between which is retained a split ring 23 of metal. The internal sides of cylindrical member 16 and lip 20 are preferably fluted, as shown, in order to reduce the amount of pressure required to radially compress the cylindrical member 16.

The compression is carried out by drawing together the two ends 24 and 25 of split ring 23. As best shown in Figures 4 and 5, the ends 24 and 25 of split ring 23 are drawn together by a lever and tongue arrangement. A tongue 26 is welded to end 25 of split ring 23 and slidably passes through a guide 27 in end 24 of split ring 23. The end of the tongue 26 opposite to that welded to end 25 of split ring 23 is provided with a flange 28. A sealing plate 29 is welded to the inner side of split ring 23 at its end 25 and extends below end 24 of split ring 23 which slidably passes over sealing plate 29.

An elongate bar 30 passes through an aperture in flange 28 and is provided with a compression spring 31 coiled around the member 30 between flange 28 and an end stop 32 threaded on one end of member 30 so as to be

able to adjust the bias of compression spring 31. The other end of elongate member 30 is pivotably coupled to a lever arm 33 at pivot 34. The lever arm 33 is itself pivotally mounted at 35 to mount 36 attached to split ring 23. The pivots 34 and 35 are spaced from each other so that, when lever 33 is pivoted about pivot 35, elongate member 30 is pulled against the bias of compression spring 31, which biases flange 28 such that ends 24 and 25 of split ring 23 are pulled together. This compresses, and maintains in compression, the cylindrical member 16 so as to tighten lip 20 within concave flange 14, and thus seal the cylindrical member 16 around the hatch.

Turning now to Figure 6, there is shown a second embodiment, similar to the first embodiment, in which all identical elements have the same reference numerals. As can be seen, in this embodiment, the lip 20 around the open end of the member 16 is not present. In this embodiment it is not required since the band 13 is taller than that of the first embodiment, and is provided with a convex flange 37 forming a ridge at an upper portion thereof. The hatch seal 15 is thus positioned over the flange 37 and compressed over the flange 37 to seal around it.

In an alternative to this embodiment, the hatch seal 15 could be compressed directly onto the flange 8 of manhole compartment 9 if the leakage occurs from the top of the hatch cover rather than from the lower portions of manhole compartment 9.

Shown in Figure 10 is a still further embodiment of the invention, again with the same elements having the same reference numerals as in the earlier embodiments. In this embodiment the member 16 again does not have the lip 20 around its open end, and the hatch seal is generally identical to the hatch seal of the second embodiment. However, in this embodiment, the band 13 is not present. Instead, there is provided a

flange 38 formed of an annular member 39 split into three segments and having a sealing element 40 extending around the inner side thereof. The flange 38 is more clearly shown in Figures 7, 8 and 9. The annular member 39 can be made of any suitable material, such as metal, plastics or rubber material and has a groove 41 around the inner side thereof into which the sealing element 40 is fitted. Of course, if the annular member is itself made of a material which will provide adequate sealing, a separate sealing element would not be required. As shown in Figure 9, which is a part cross-sectional view looking from above the view of Figure 7, the three segments forming the annular member 39 are joined together at their contact faces by means of a tongue 42 and recess 43 arrangement. The sealing element 40 is arranged to seal the contact faces when they are connected.

To use the hatch seal, the annular member 39 is disconnected into three segments and positioned around the outside of the wall of manhole compartment 9 and then connected together such that the sealing element 40 is positioned between the contact faces of the annular member 39 and around the inner side thereof adjacent the wall of manhole compartment 9. The hatch seal 15 is then positioned over the flange 38 formed by annular member 39 and sealing element 40 and radially compressed in the manner described above. Radial compression causes the segments of the annular member to be tightly connected with the sealing element 40 sealing the contact faces and forming a tight seal between the inner side of the annular member 39 and the wall of the manhole compartment 9.

It will be appreciated, that although only particular embodiments of the hatch seal and the way of compressing the cylindrical member have been described, various modifications and improvements can be made without departing from the scope of the present invention.

For example, it will be appreciated that if the ring 13 is used, it should be made of a material compatible with that of the tank to which it is attached, for example by welding.

The split ring 23 should be made of material resistant to the fluid in the tank, for example of stainless steel.

Furthermore, the cylindrical member, and the annular member forming the flange, if used, can be formed of any material which is substantially impervious and/or resistant to fluid within the tank.

CLAIMS

1. A sealing device for a hatch, the sealing device comprising a generally cylindrical member having an open end for fitting around the hatch, said member having its other end closed in a fluid-tight manner, and means for radially compressing the cylindrical member and maintaining the cylindrical member in radial compression against a flange provided around the hatch to seal said cylindrical member to said flange.

2. A sealing device according to claim 1, wherein said means for radially compressing the cylindrical member and maintaining the cylindrical member in compression comprises a split band arranged around the cylindrical member and having means for pulling the two ends of the split band together so as to tighten the band around the cylindrical member.

3. A sealing device according to claim 2, wherein said means for pulling the two ends together comprises a tongue attached to one of the ends and a lever rotatably mounted to the other of the ends and biased against the tongue, whereby, when the lever is rotated, the tongue is biased thus moving the one of the ends towards the other of the ends.

4. A sealing device according to claim 3, wherein said tongue slides within a guide in the other of the ends and is provided with a flange, through which extends a longitudinal member biased against the flange and coupled to the lever at a point adjacent the rotational axis of the lever.

5. A sealing device according to claim 4, wherein said longitudinal member is provided with means for adjusting the bias of the member.

6. A sealing device according to any one of claims 2 to 5, wherein said split band is of steel.

7. A sealing device according to any preceding claim, wherein said cylindrical member is formed of material which is substantially impervious and/or resistant to fluid within the hatch.

8. A sealing device according to any preceding claim, wherein the open end of the member is provided with a lip around the rim thereof, the lip being adapted for fitting to a groove in the flange around the hatch.

9. A substantially cylindrical band for permanently attaching around a hatch in a surface of, for example, a road or rail tanker or a submarine, the cylindrical band having a flange to which the hatch sealing device of any preceding claim can be sealed.

10. A substantially cylindrical band according to claim 9, wherein said flange is provided with a ridge to which the hatch sealing device according to any one of claims 1 to 8 can be sealed.

11. A substantially cylindrical band according to claim 9, wherein said flange is provided with a groove to which the hatch sealing device according to claim 8 can be sealed.

12. A road tanker having one or more cylindrical bands according to any one of claims 9, 10 or 11 attached thereto.

13. A rail tanker having one or more cylindrical bands according to any one of claims 9, 10 or 11 attached thereto.

14. A submarine having one or more cylindrical bands according to any one of claims 9, 10 or 11 attached thereto.

15. A flange comprising a substantially annular member for fitting around a hatch in a surface of, for example, a road or rail tanker or a submarine, the annular member having sealing means around the internal

diameter thereof for sealing to an upstanding wall of the hatch and being compressible by a hatch sealing device according to any one of claims 1 to 8.

16. A flange according to claim 15, wherein said annular member is formed in at least two segments to facilitate fitting the annular member around the hatch.

17. A flange according to either claim 15 or claim 16, wherein said sealing means are provided between the contact faces of the segments.

18. A flange according to any one of claims 15, 16 or 17, wherein the annular member is of metal, plastics or rubber material.

19. A hatch sealing apparatus comprising a hatch sealing device according to any one of claims 1 to 8, in combination with a flange according to any one of claims 14 to 17.

20. A hatch sealing apparatus comprising a hatch sealing device according to any one of claims 1 to 8, in combination with a substantially cylindrical band according to claim 10.

21. A hatch sealing apparatus comprising a hatch sealing device according to claim 8, in combination with a substantially cylindrical band according to claim 11.

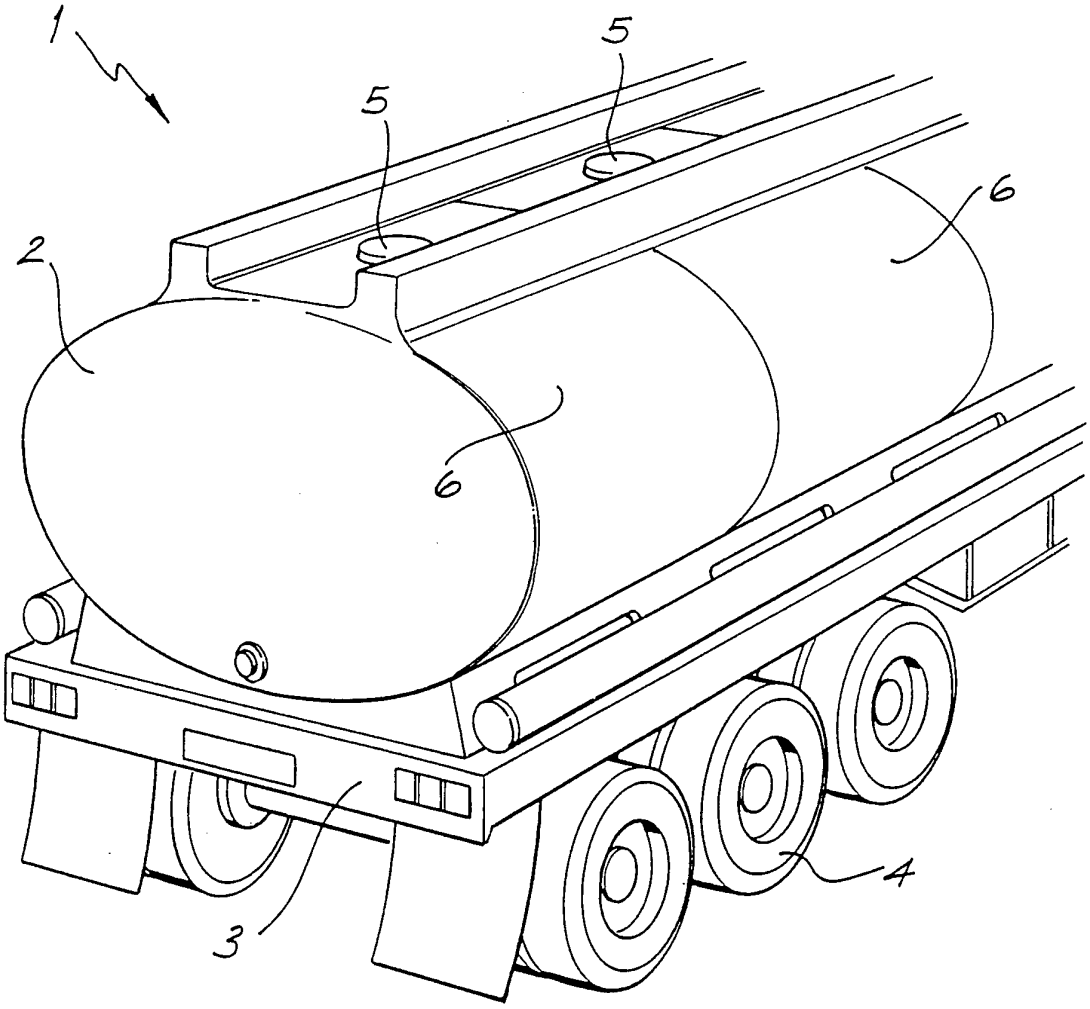

FIG. 1

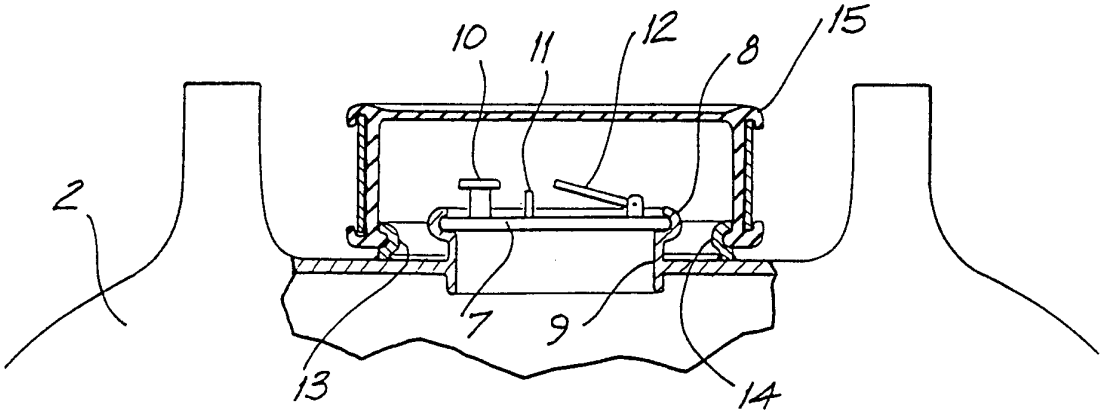

FIG. 2

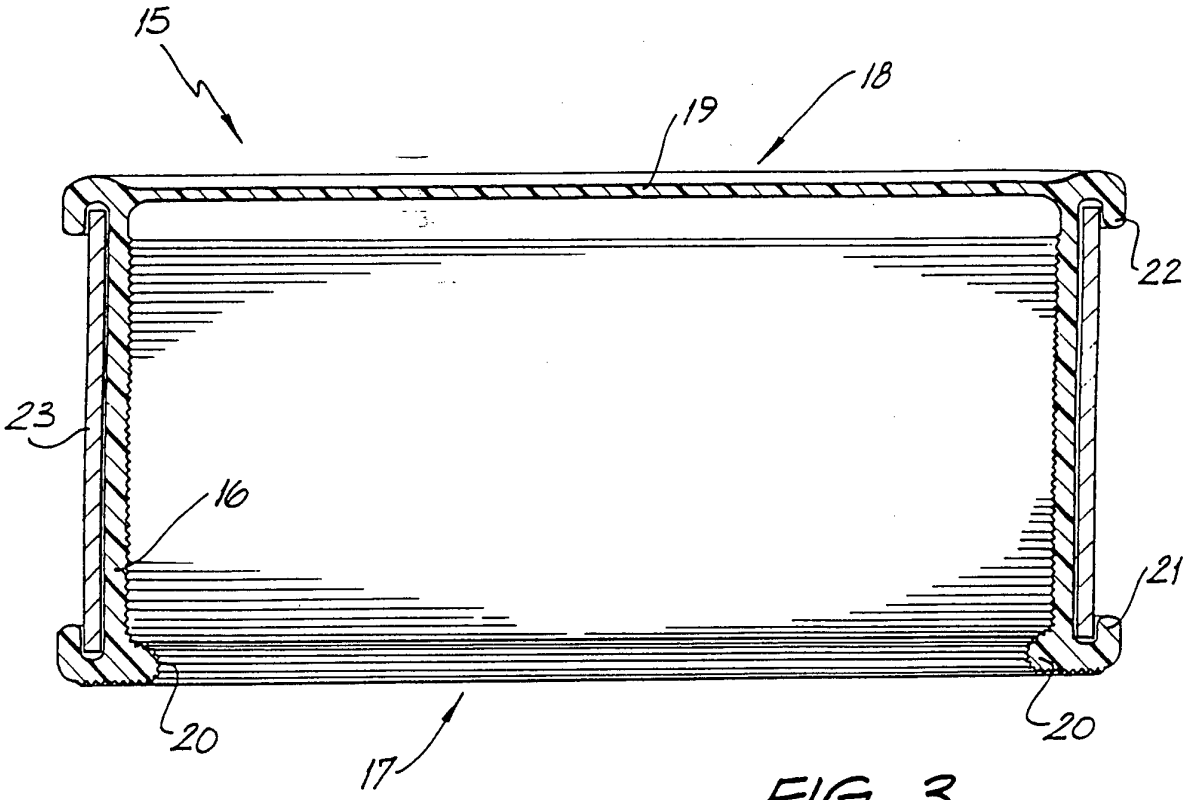
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FIG. 3

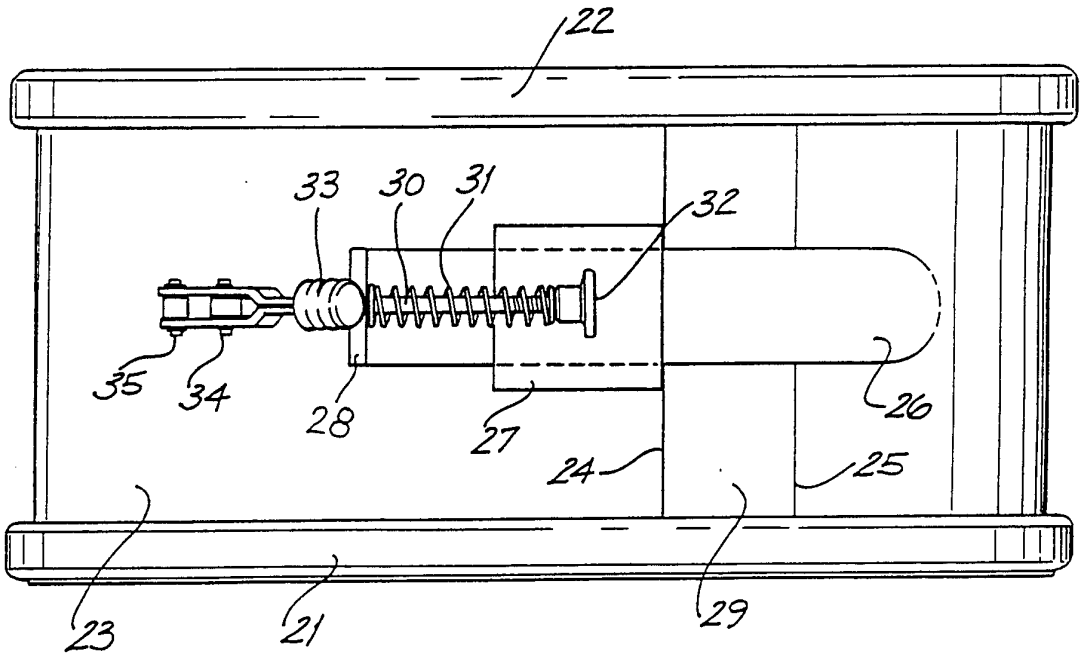
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FIG. 4

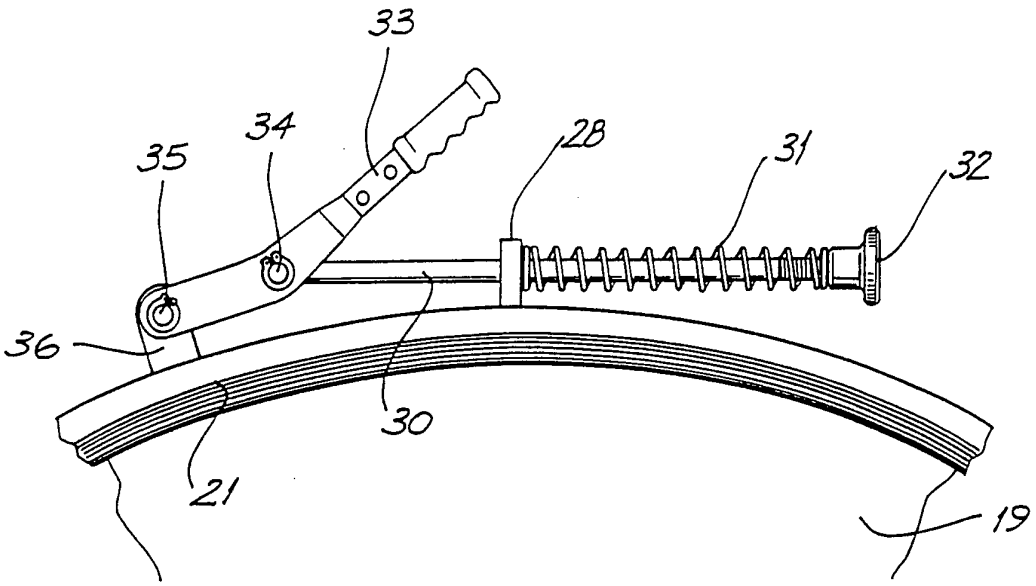

FIG. 5

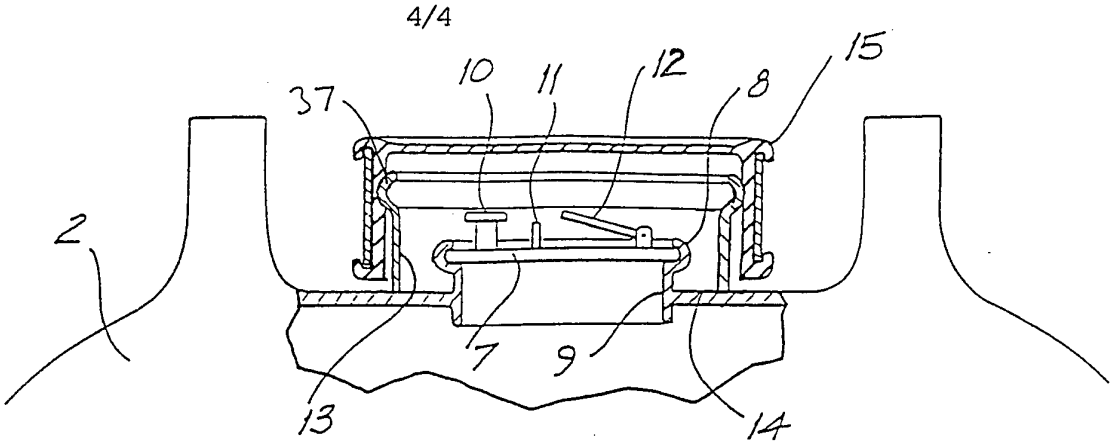

FIG. 6

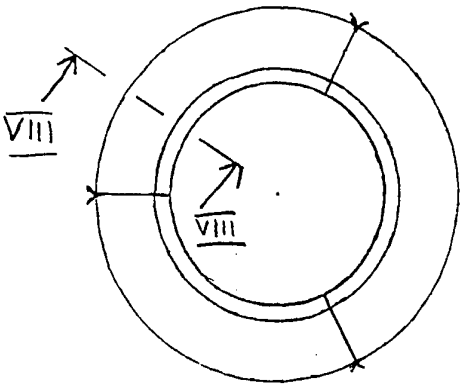

FIG. 7

FIG. 8

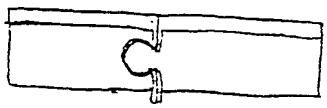

FIG. 9

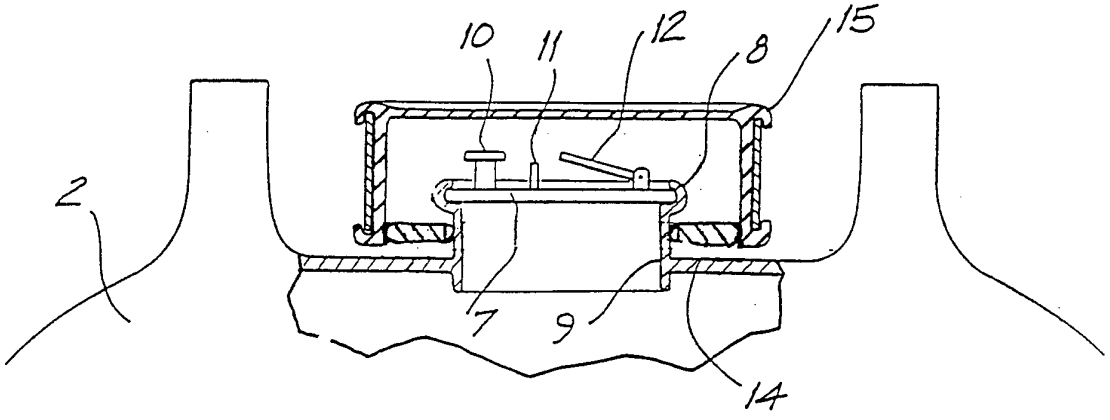

FIG. 10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU 93/00506

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl.[5] B65D 90/10 // B63B 19/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B65D 90/10, 90/24, 87/40, 45/32, 45/34

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

AU: IPC as above and F16J

Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.
	US,A,3561637 (McCONNELL) 9 February 1971 (09.02.71)	
X	Whole document	1,2,6,7,8
Y		3,4,5
	FR 532218 (SOCIETE HAGART) 30 January 1922 (30.01.22)	
X	Whole document	1,2,6,7
Y		3,4,5
	Derwent Abstract Accession NO. 86-142631/22, Class Q33, SU,A,1188055 (SOKOLOV) 30 October 1985 (30.10.85)	
X	Abstract	1,7,8

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
8 December 1993 (08.12.93)	17 DEC 1993 (17.12.93)

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	**Citation of document, with indication, where appropriate of the relevant passages**	**Relevant to Claim No.**
X	FR 569904 (WILLIAMS) 19 April 1924 (19.04.24) Figs. 1, 2, 3, 5, 7	1,9,10,11
X	AU,A,23558/84 (MARTIN ENGINEERING CO) 6 September 1984 (06.09.84) Figs. 2 to 5	9,10
X	US,A,4732294 (BOHLER) 22 March 1988 (22.03.88) Figs. 1 and 3 item 12	9,10
Y	US,A,3239175 (SEIBEL) 8 March 1966 (08.03.66) Clamping ring (resilient band) item 12	3,4,5
X	AU,A,36468/78 (BOC SUBUCEAN SERVICES LTD) 29 November 1979 (29.11.79) Item 12, composite sealing flange	15,16,17
A	AU 33445/89 (LAPORTE INDUSTRIES LTD.) 21 September 1989 (21.09.89) Whole document	
A	US,A,5011038 (SCHULTZ) 30 April 1991 (30.04.91) Whole document	
A	EP,A,385860 (BERG) 5 September 1990 (05.09.90) Whole document	
A	DE,A,3042547 (KOLOSEUS GmbH) 11 June 1981 (11.06.81) Whole document	
A	FR,A,2640376 (SCHNEIDER) 15 June 1990 (15.06.90) Whole document	
A	Derwent Abstract Accession No. 92-306159/37, Class Q34, SU,A,1684178 (AZOVMASH) 15 October 1991 (15.10.91) Abstract	

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
US	3561637	FR	1579158	NL	6808792	US	3561637
AU	23558/84	AT	199/84	AT	391458	CA	1223538
		CH	663004	DE	3401990	ES	285928
		FR	2539720	GB	8401055	GB	2133762
		IT	8419269	IT	1173103	JP	59186821
		MX	156514	SE	8400228	SE	461721
		US	4573567	AU	23586/84	AU	565933
		ZA	8400426				
US	4732294						
AU	36468/78	BR	7803364	ES	469917	FR	2392296
		GB	1566641	IT	7823871	JP	54033939
		NL	7804561	NO	781830		
AU	33445/89	JP	2212456	EP	393156	WO	89/08594
		DE	3808553				
US	5011038						
EP	385860	CA	2010632	EP	385860	US	4958957
DE	3042547	AT	7661/79	AT	367710	CH	648988
FR	2640376						

END OF ANNEX