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(54) Fire protection system

(57) A fire protection system (1) comprises a container (2) which is filled with a fire extinguishant (3) and which contains a detonator (4). The system (1) also comprises an activating energy guiding member (5) which is mounted at least to the external side of the container (2) both in an inactive and an active condition of the system (1).

The system (1) comprises connecting means (6) for connecting the activating energy guiding member (5) to the detonator (4) so as to activate the system (1). The fire protection system (1) is save to handle in the inactive condition, such as during transport or storage, while it is simple to activate.

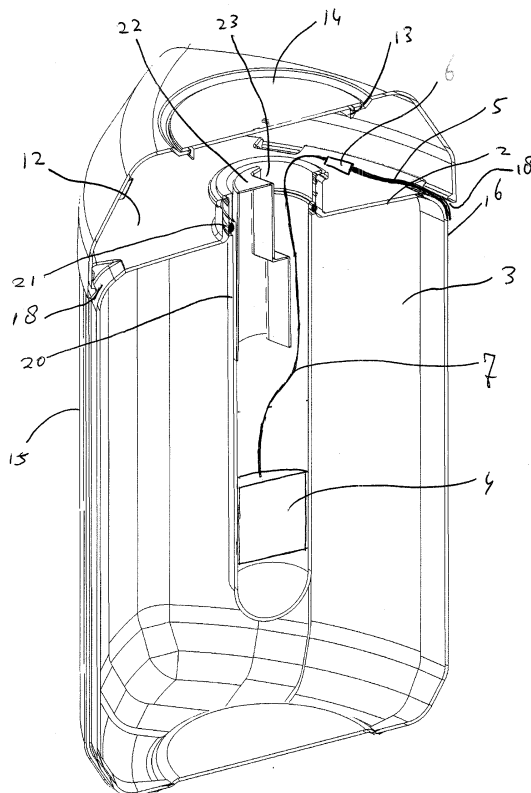


Fig. 6

Description

[0001] The present invention relates to a fire protection system for extinguishing a fire when the system is placed therein.

[0002] Such a fire protection system is known from EP 0 483 901 B1. The known system comprises a container filled with a fire extinguishant and containing a detonator, which is connected to a fuse. When the known system is placed in a fire the detonator detonates via the fuse and ruptures the container, thus releasing the extinguishant into the fire. This has been proven to be a very effective system for extinguishing a fire. A disadvantage of the known system is that it may explode when it is accidentally in contact with a fire before it is placed for use, for example, during storage or transport. This may cause dangerous situations.

[0003] The present invention aims to provide a safer fire protection system.

[0004] For this purpose the system comprises a container filled with a fire extinguishant and containing a detonator, and an activating energy guiding member mounted at least to the external side of the container both in an inactive and an active condition of the system, wherein the system comprises connecting means for connecting the activating energy guiding member to the detonator so as to activate the system.

[0005] The advantage of these features is that the detonator is not connected to the activating energy guiding member in the inactive condition, i.e. before activation of the system. Hence, the system cannot easily explode before actively activating it by the connecting means. In the active condition the system is ready for use and the detonator will be ignited if it comes in contact with a fire. Furthermore, the system according to the invention provides the opportunity to make the system as an integrated product, which can be activated by connecting means without the necessity of assembling different parts, such as connecting the activating energy guiding member to the container.

[0006] The extinguishant may be a liquid, but other substances such as powder or foam are also conceivable. In the inactive condition the system will not explode when it accidentally comes into contact with a fire.

[0007] In a particular embodiment of the fire protection system the activating energy guiding member comprises at least an external fuse. This is a reliable type of guiding member of activating energy since a fire can easily ignite a fuse, whereas a flamelet propagates relatively fast in the direction of the detonator. Nevertheless, alternative activating energy guiding members are conceivable. The external fuse will be exposed to the environment such that it will be ignited when the system is in contact with a fire. Of course, the activating energy guiding member may comprise more than one external fuse so as to accelerate the ignition when the system is in contact with a fire.

[0008] The detonator may be connected to at least an

internal fuse, wherein the connecting means are adapted such that the internal fuse and the external fuse are directly connectable to each other. The advantage of this embodiment is that the connecting means may be relatively simple since they only have to connect fuses to each other in order to connect the external fuse to the detonator. Furthermore, a direct connection between the fuses has a positive effect on flamelet propagation along the fuses which might be worse in the case when the fuses are indirectly connected to each other, for example.

[0009] A specific embodiment of the connecting means may comprise mutual fittable connector parts which are each fixed to ends of the internal and external fuses. This makes the activation of the system a simple operation since the user only has to connect the connector parts to each other. For safety reasons it may be preferred to design the connector parts such that the user cannot or only in a very difficult way disconnect the connector parts.

[0010] The connecting means may be adapted such that the internal fuse and the external fuse are pressed in contact with each other. This improves the performance of the flamelet propagation from the external to the internal fuse.

[0011] In an advantageous embodiment the internal and external fuses are fast fuses and the connecting means form an air-tight connection between the internal fuse and the external fuse. It appears that this further improves the flamelet propagation speed.

[0012] The connecting means may be present in a chamber which is accessible from outside the system via an opening. For activating the system the user can access the chamber with his fingers via the opening and connect the activating energy guiding member and the detonator to each other. The advantage of the chamber is that it provides the opportunity to separate the connecting means from the environment.

[0013] The chamber is sealable by a non-releasable cover fitting in the opening. The advantage of this embodiment is that the system can be sealed in the active condition, thereby avoiding undesired de-activation of the system.

[0014] The system may have a housing which accommodates the container, wherein the outer side of the housing is provided with at least a recess in which an activating energy guiding member at least partly fits. In the case of a fuse, for example, it is advantageous if the fuse lies in a recess of the housing so as to prevent damage of the fuse when the housing collides against an object. The container may be integrated with the housing such that at least a portion of the external side of the container is also the outer side of the housing. Furthermore, the above-mentioned chamber may be integrated in the housing as well, of course separated from the container in order to prevent leakage of the extinguishant to the chamber.

[0015] The system may have a housing which accommodates the container, wherein the bottom side of the

housing is provided with at least a recess for receiving at least an activating energy guiding member. The recess in the bottom is advantageous, for example, when several fuses are mounted to outer side walls of the housing and join at the bottom. The joint fuses may then extend within this recess, hence avoiding damage of the fuses when the bottom of the system collides against another object.

[0016] The system may have a housing which accommodates the container, wherein the housing has a triangular cross-section. The advantage of this shape is that in volumes of 1 to 2 litre, for example, it offers the opportunity to make the system of such dimensions that it is easy to hold it by hand, hence increasing user friendliness.

[0017] An alternative fire protection system may comprise a releasing mechanism, which is adapted such that the activating energy guiding member is connectable to the detonator by removing a removable member which separates the activating energy guiding member from the detonator in the inactive condition. The advantage of this embodiment is that the user can remove a part for connecting the activating energy guiding member and the detonator to each other instead of connecting different parts to each other, which further simplifies the activation operation. The removable member may have numerous embodiments, such as.

[0018] The present invention is also related to a method of activating a fire protection system which comprises a container filled with a fire extinguishant and containing a detonator, and an internal fuse connected to the detonator, wherein at least an external fuse and the internal fuse are connected directly to each other. The advantage of this method is that it provides a simple operation to activate the system, such as explained hereinbefore.

[0019] The external fuse can be mounted to the external side of the container before connecting the external and internal fuses. In this case, for activating the system the only operation to carry out is connecting the internal and external fuse to each other.

[0020] It is noted that DE 1 229 849 discloses a fire protection system, wherein fuses are connected to a separate activating unit, which unit is connectable to the container for activating the fire protection system. Before activation the fuses are still not mounted to the container whereas the fuses are only indirectly connectable to the detonator.

[0021] The invention will hereafter be elucidated with reference to the drawings showing embodiments of the invention by way of example.

[0022] Fig. 1 is a perspective view of an embodiment of the fire protection system according to the invention.

[0023] Fig. 2 is a perspective bottom view of the embodiment of Fig. 1.

[0024] Fig. 3 is a perspective top view of the embodiment of Fig. 1 illustrating it in the condition when the cover is removed from the opening.

[0025] Fig. 4 is a perspective cut-away view of a portion

of the embodiment of Fig. 1.

[0026] Fig. 5 is a perspective view of an embodiment of a connector part for connecting the internal and external fuses, illustrating the connector part in a closed condition.

[0027] Fig. 6 is a perspective view of the connector part of Fig. 5, illustrating the open condition.

[0028] Fig. 7 is a perspective view of a part of an alternative embodiment of the fire protection system of Fig. 1.

[0029] Fig. 1-4 show an embodiment of a fire protection system 1 which comprises a container 2 which is filled with a fire extinguishant 3. The container 2 contains a detonator 4, which is preferably placed in the middle of the container 2. When the detonator 4 is ignited it will explode and the extinguishant 3 will be pressed outwardly such that the walls of the container 2 will burst open the extinguishant 3 will be spread into the environment. The detonator 4 is ignited by an activating energy guiding member, which comprises six external fuses 5 in this embodiment (note that only one external fuse 5 is shown in Fig. 4). Of course, the number of external fuses 5 may be more or less than six fuses. The external fuses 5 are mounted to the external side of the container 2 both in an inactive and an active condition of the system 1.

[0030] The external fuses 5 may be connected to a net (not shown), which is at least partly made of fuse material, so as to increase the probability of contact between the external fuses 5 and a fire. The space between the external fuses 5 may be small so as to prevent the fire from melting the container 2 such that it can break or rupture before the explosion occurs.

[0031] According to the invention the system 1 comprises connecting means 6 for connecting the activating energy guiding member to the detonator 4 so as to activate the system 1. In the embodiment shown in Fig. 1-4 this means that the external fuses 5 are connectable to the detonator 4 via an internal fuse 7 which is connected to the detonator 4. The connecting means 6 in this embodiment comprise two mutual fittable connector parts 8, such as shown in Fig. 5 and 6. Each of the connector parts 8 are fixed to ends of the internal 7 and external 5 fuses. This configuration provides the opportunity to connect the internal fuse 7 and the external fuses 5 directly to each other. It appears to be favourable when the internal fuse 7 and the external fuses 5 are pressed in contact with each other, because the flamelet propagation along the fuses 5, 7 is improved.

[0032] The connector part 8 such as shown in open condition in Fig. 6 can receive the internal fuse 7 or external fuses 5 in a chamber 9 which is provided with a protrusion 10a in the chamber 9. When the external fuses 5 or internal fuse 7 are put into the chamber 9 a connector cover 11 comprising protrusions 10b is closed such that the fuses 5 or 7 are fixed tightly in the chamber 9 of the connector part 8. The connector part 8 has a counter part fixed to the end of the external 5 or internal fuse 7 and fitting to the other connector part 8 such that for activating

the system 1 the user only has to put both connector parts 8 into each other. In this embodiment the six external fuses 5 may be joint outside the connector part 8 or in the connector part 8 itself. It should be noted that numerous alternative embodiments of the connector parts 8 are conceivable.

[0033] The internal and external fuses 5, 7 may be fast fuses, which have the advantage that the delay time between fire detection by the system 1 and explosion of the detonator 4 is minimized. In that case it appears favourable that the connector parts 8 when connected to each other, form an air-tight connection between the internal fuse 7 and the external fuses 5.

[0034] The extinguishant 3 may be a liquid such as water. It may also be a powder, foam or other substance. Preferably, the extinguishant 3 comprises AFFF (Aqueous Film Forming Foam) or ARFFF (Alcohol-Resistant Aqueous Film Forming Foam), which are known extinguishing agents. The above-mentioned substances are normally mixed with water. It is also possible to add substances for conserving water in the container 2, for example, in order to avoid getting frozen under certain conditions.

[0035] In the embodiment such as shown in Fig. 1-4 the connector parts 8 are present in a chamber 12. The chamber 12 is accessible from outside the system 1 via an opening 13. The user may activate the system 1 by taking out the connector parts 8 out of the chamber 12, connecting them to each other, putting the connected internal and external fuses 5, 7 back into the chamber 12 and closing the chamber by a cover 14.

[0036] The opening 13 and cover 14 may be adapted such that the cover 14 fits non-releasably into the opening 13 so as to obtain a sealed chamber 12 which makes it difficult to easily de-activate the system 1. It is conceivable to have the cover 14 upside down lying on the opening 13 in the inactivated condition, for example, by using an adhesive tape (not shown). When the cover 14 is put on the opening 13 in the activated condition the cover 14 may, for example, show the word *active* on the upper side of the cover 14. This is a clear indication for people that the system 1 is ready for use.

[0037] Fig. 1-4 show that the embodiment of the system 1 has a housing 15 which accommodates the container 2 as well as the chamber 12. Fig. 4 shows that the chamber 12 is separated from the container 2 so as to avoid leakage of extinguishant 3 to the chamber 12. In this embodiment the container 2 is integrated within the housing 15. The outer side of the housing 15 is provided with recesses 16 in longitudinal direction of the housing 15. The recesses 16 receive the external fuses 5. The external fuses 5 are fixed to the outer side of the housing 15 and extend from a bottom side 17 of the housing 15 via holes 18 to the chamber 12. The external fuses 5 may be fixed to the housing 15 by using adhesive labels around the housing 15.

[0038] The bottom side 17 also has a recess 19, such as shown in Fig. 2. The recess 19 has a rather large

frontal surface with respect to the frontal surface of the bottom side 17. This is advantageous to receive the ends of six external fuses 5 in this embodiment. If the external fuses 5 are joined within the recess 19 of the bottom side 17 the joint ends of the external fuses 5 may be fixed to the housing 15 by an adhesive label.

[0039] The housing 15 of the embodiment such as shown in Fig. 1-4 has a triangular cross-section. The outer walls of the housing 15 between each two longitudinal edges thereof are slightly curved. This shape gives the system 1 a characteristic appearance, which improves the recognition of the system 1.

[0040] Furthermore, the chamber 12 may be integrated in the housing 15 together with the container 2, but is also possible that the chamber 12 is created by a cover on the container 2 creating the chamber 12 between the cover and the container 2. Such an embodiment is illustrated in Fig. 7, which shows the external side of the container 2 from which the cover has been removed.

[0041] Fig. 4 shows that in this embodiment the detonator 4 is accommodated in a tubular element 20 which is fixed in a wall of the container 2 and which ends in the chamber 12. The tubular element 20 of this embodiment is located along a central axis of the container 2. The tubular element 20 is provided with an O-ring 21 in order to obtain a sealed closure between the container 2 and the chamber 12. Particularly, in the case of a liquid extinguishant 3 this avoids leakage from the container 2 to the chamber 12. The end of the tubular element 20 which ends within the container 2 is closed and the detonator 4 is placed at the closed end within the tubular element 20 to fix the detonator 4. The detonator 4 may, for example, be a cylindrical carton-like member which fits in the tubular element 20. In the embodiment shown a cylindrical plug 22 is tightly fit in the cylindrical element 20. In this case the plug 22 has a longitudinal groove 23 to guide the internal fuse 7 from the detonator 4 to the chamber 12.

[0042] It is also possible to integrate a connector part 8 in the plug 22 such that the user only has to put a connector part 8 fixed to the external fuses 5 into the integrated connector part of the plug 22 for activating the system 1.

[0043] The wall of the container 2 may be provided with one or more weaker locations that rupture first after explosion of the detonator 4. Also the tubular element 20 may be designed such as to stimulate an explosive force in certain directions, for example by providing the tubular element 20 with predetermined weaker locations. It is also favourable to avoid sharp edges of the components used in the system as well as to use light materials in order to avoid any damage of components to the environment after explosion.

[0044] Alternatively, the connecting means 6 may comprise a releasing mechanism (not shown), which is, for example, located between the detonator 4 and the external fuses 5. The releasing mechanism may be operated by removing a removable member which separates the external fuses 5 from the detonator 4 in the

inactivate condition. The removable member may be operated from outside the system 1 such that the system 1 is a fully closed product.

[0045] The housing 15, cover 14, tubular element 20, plug 22 and connector parts 8 may be made of a plastic such as HDPE or polypropylene.

[0046] From the foregoing, it will be clear that the invention provides a fire protection system, which is save to handle in inactive condition, such as during transport or storage, while it provides the opportunity to simply activate the system.

[0047] The invention is not limited to the embodiment shown in the drawings and described hereinbefore, which may be varied in different manners within the scope of the claims and their technical equivalents. For example the container may be of any suitable material like anti static plastic. The container may have any suitable shape like a ball or tube and may have any desired cross section shape, for example, circular, rectangular or hexagonal. The container may also have any suitable wall thickness that may depend on the intended application (small fires or large fires). Furthermore, the activating energy guiding member may be of another type than a fuse, for example, based on the principle of guiding activating energy to the detonator by electricity. Besides, a fire and/or smoke and/or heat detection system may be coupled to the activating energy guiding member so as to ignite the detonator on the basis of a fire and/or smoke and/or heat signal without direct contact of fire to the fire protection system. Although the activation of the system is described hereinbefore, it will be clear to the skilled person that the system can be easily adapted for de-activation, as well, if desired.

Claims

1. Fire protection system (1) comprising a container (2) filled with a fire extinguishant (3) and containing a detonator (4), and an activating energy guiding member (5) mounted at least to the external side of the container (2) both in an inactive and an active condition of the system (1), wherein the system (1) comprises connecting means (6) for connecting the activating energy guiding member (5) to the detonator (4) so as to activate the system (1).
2. Fire protection system (1) according to claim 1, wherein the activating energy guiding member comprises at least an external fuse (5).
3. Fire protection system (1) according to claim 2, wherein the detonator (4) is connected to at least an internal fuse (7), wherein the connecting means (6) are adapted such that the internal fuse (7) and the external fuse (5) are directly connectable to each other.
4. Fire protection system (1) according to claim 3, wherein the connecting means (6) comprise mutual fittable connector parts (8) which are each fixed to ends of the internal and external fuses (5, 7).
5. Fire protection system (1) according to claim 3 or 4, wherein the connecting means (6) are adapted such that the internal fuse (7) and the external fuse (5) are pressed in contact with each other.
6. Fire protection system (1) according to one of the claims 3 - 5, wherein the internal and external fuses (5, 7) are fast fuses and the connecting means (6) form an air-tight connection between the internal fuse (7) and the external fuse (5).
7. Fire protection system (1) according to one of the preceding claims, wherein the connecting means (6) are present in a chamber (12) which is accessible from outside the system (1) via an opening (13).
8. Fire protection system (1) according to claim 7, wherein the chamber (12) is sealable by a non-releasable cover (14) fitting in the opening (13).
9. Fire protection system (1) according to one of the preceding claims, wherein the system (1) has a housing (15) which accommodates the container (2), the outer side of the housing (15) being provided with at least a recess (16) in which an activating energy guiding member (5) at least partly fits.
10. Fire protection system (1) according to one of the preceding claims, wherein the system (1) has a housing (15) which accommodates the container (2), the bottom side (17) of the housing (15) being provided with at least a recess (19) for receiving at least an activating energy guiding member (5).
11. Fire protection system (1) according to one of the preceding claims, wherein the system (1) has a housing (15) which accommodates the container (2), the housing (15) having a triangular cross-section.
12. Fire protection system (1) according to claim 1, wherein the connecting means comprise a releasing mechanism, which is adapted such that the activating energy guiding member is connectable to the detonator (4) by removing a removable member which separates the activating energy guiding member from the detonator (4) in the inactive condition.
13. Method of activating a fire protection system (1) which comprises a container (2) filled with a fire extinguishant (3) and containing a detonator (4), and an internal fuse (7) connected to the detonator (4), wherein at least an external fuse (5) and the internal fuse (7) are connected directly to each other.

14. Method according to claim 13, wherein the external fuse (5) is mounted to the external side of the container (2) before connecting the external and internal fuses (5, 7).

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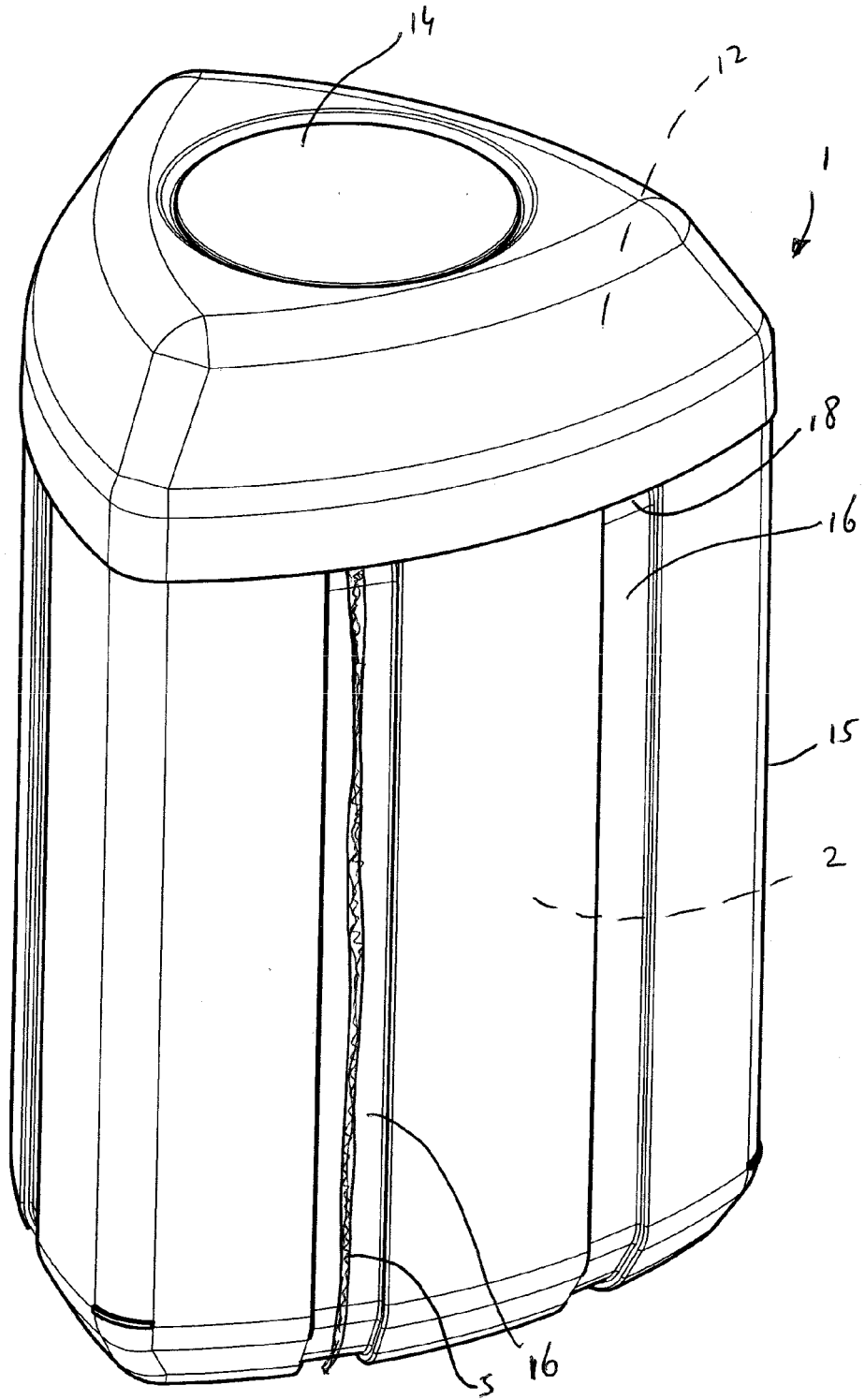


Fig-1

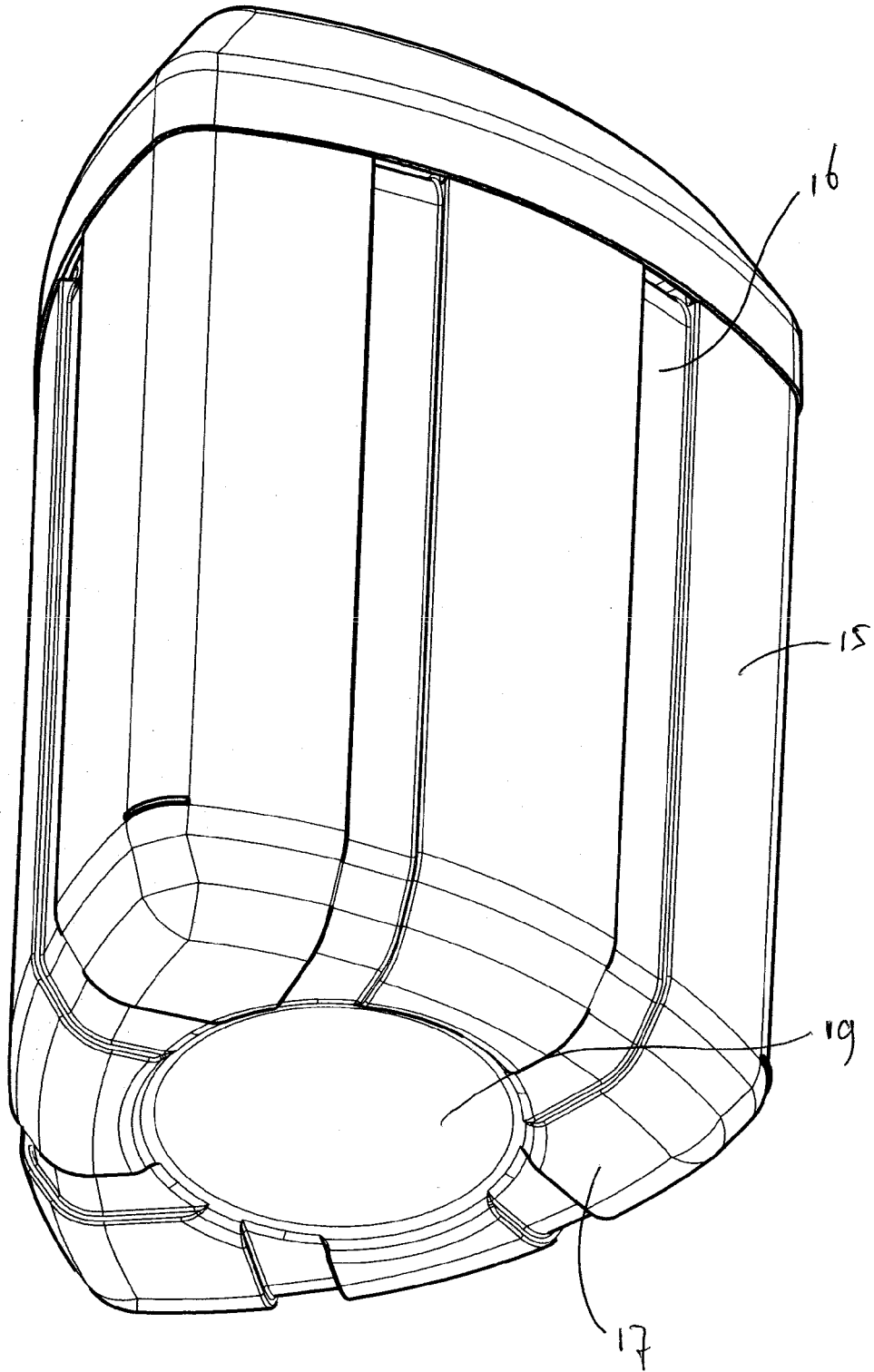


Fig. 2

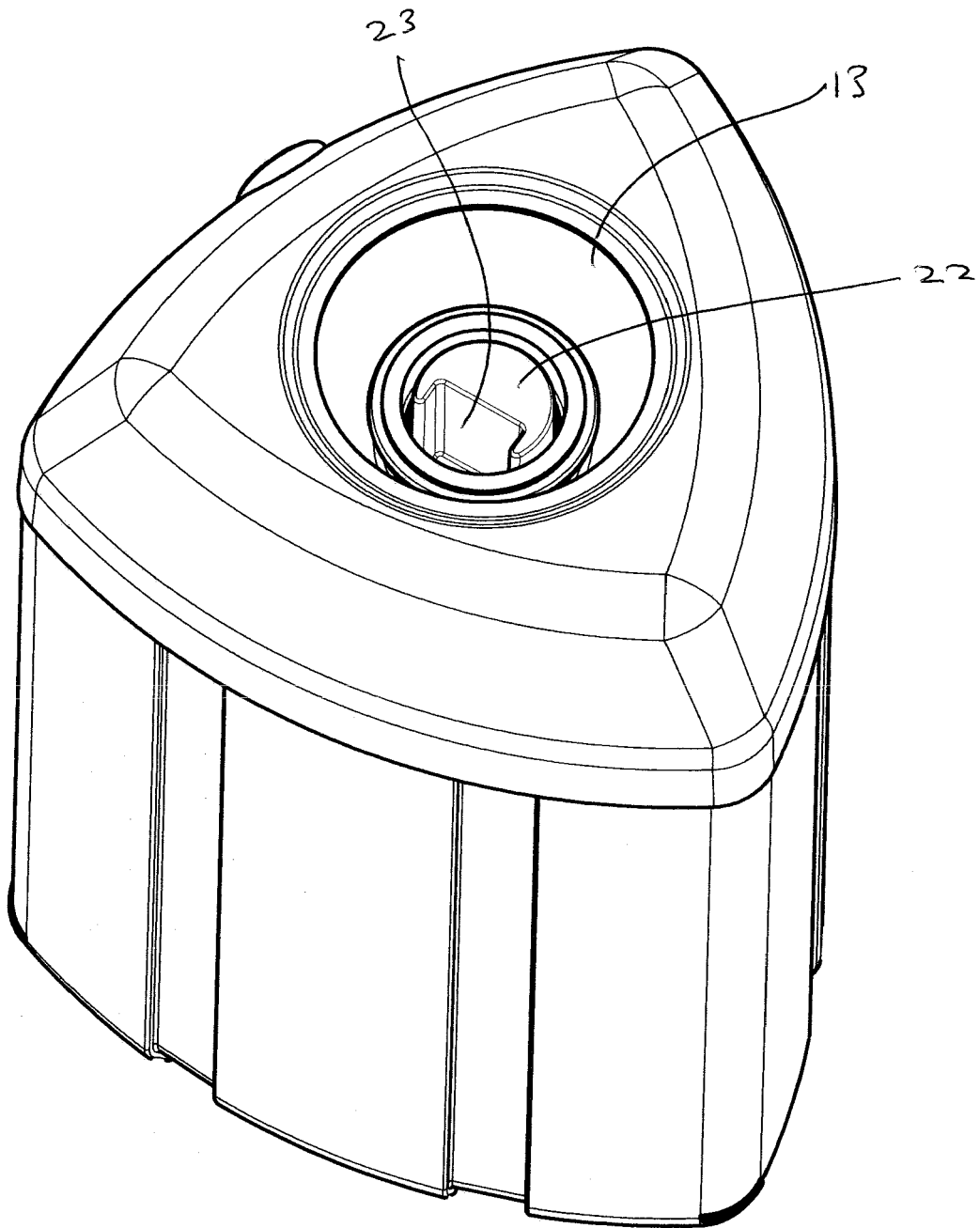


Fig. 3

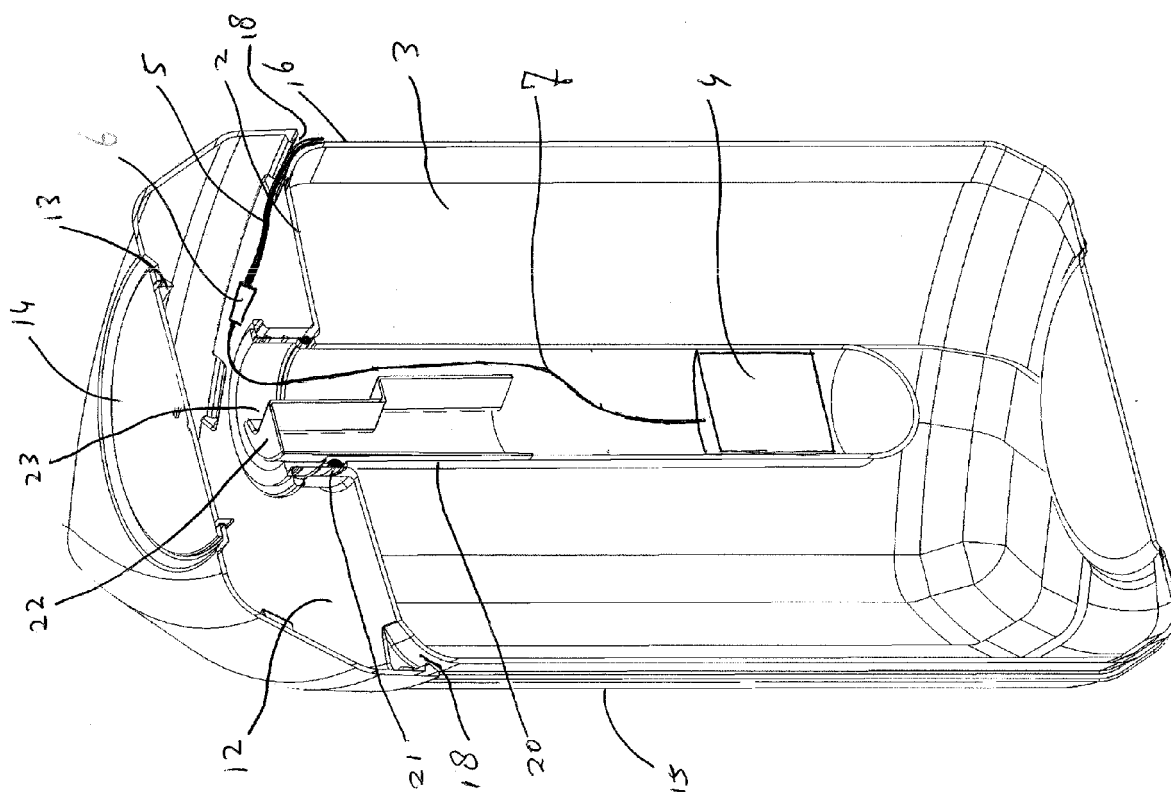


Fig. 4

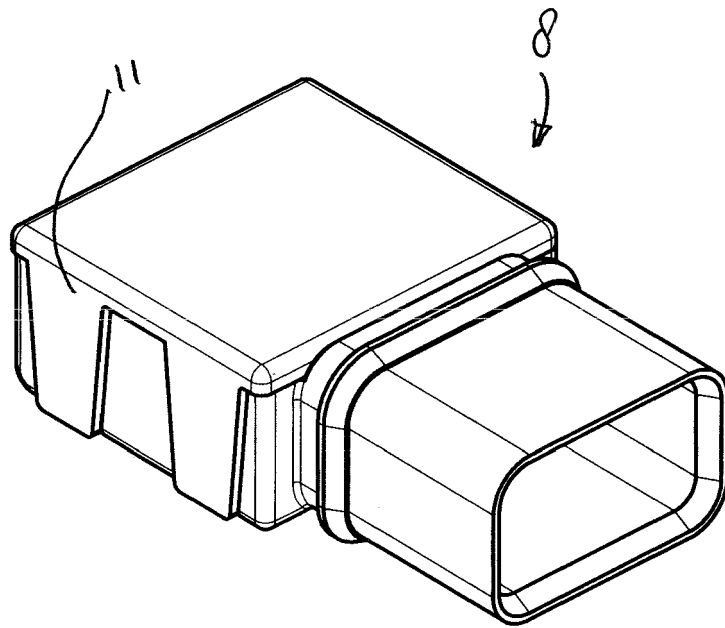


Fig. 5

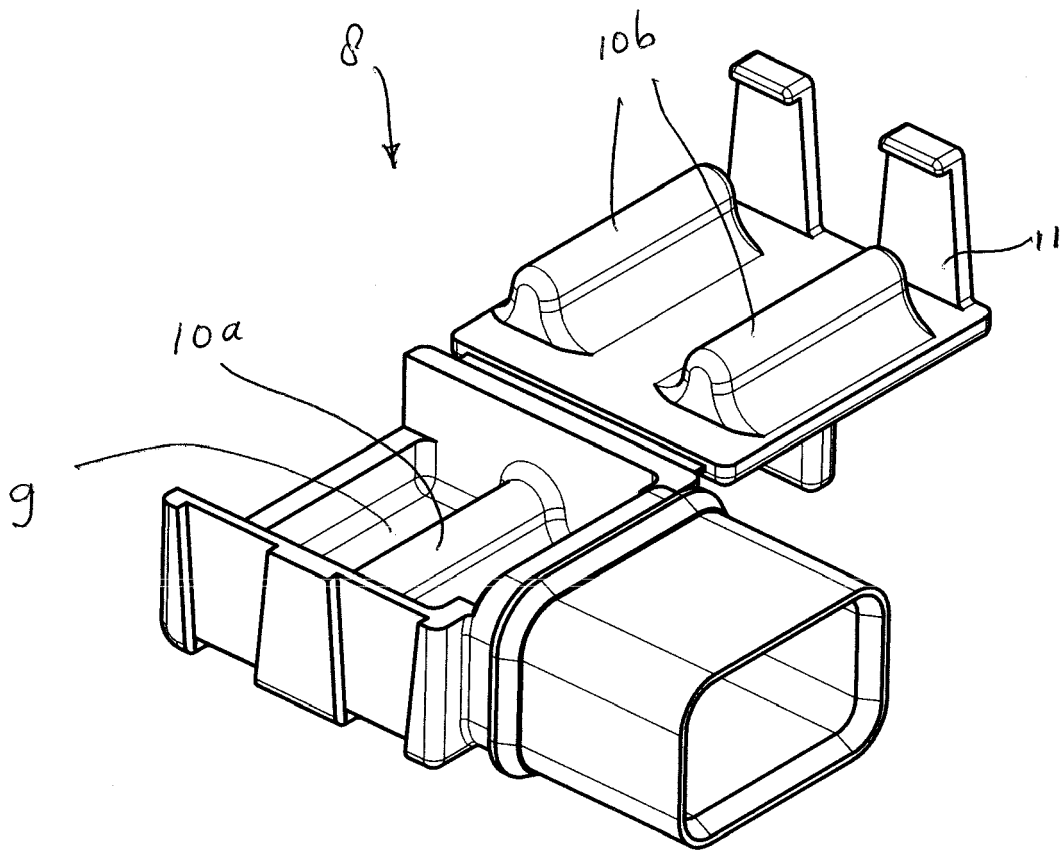


Fig. 6

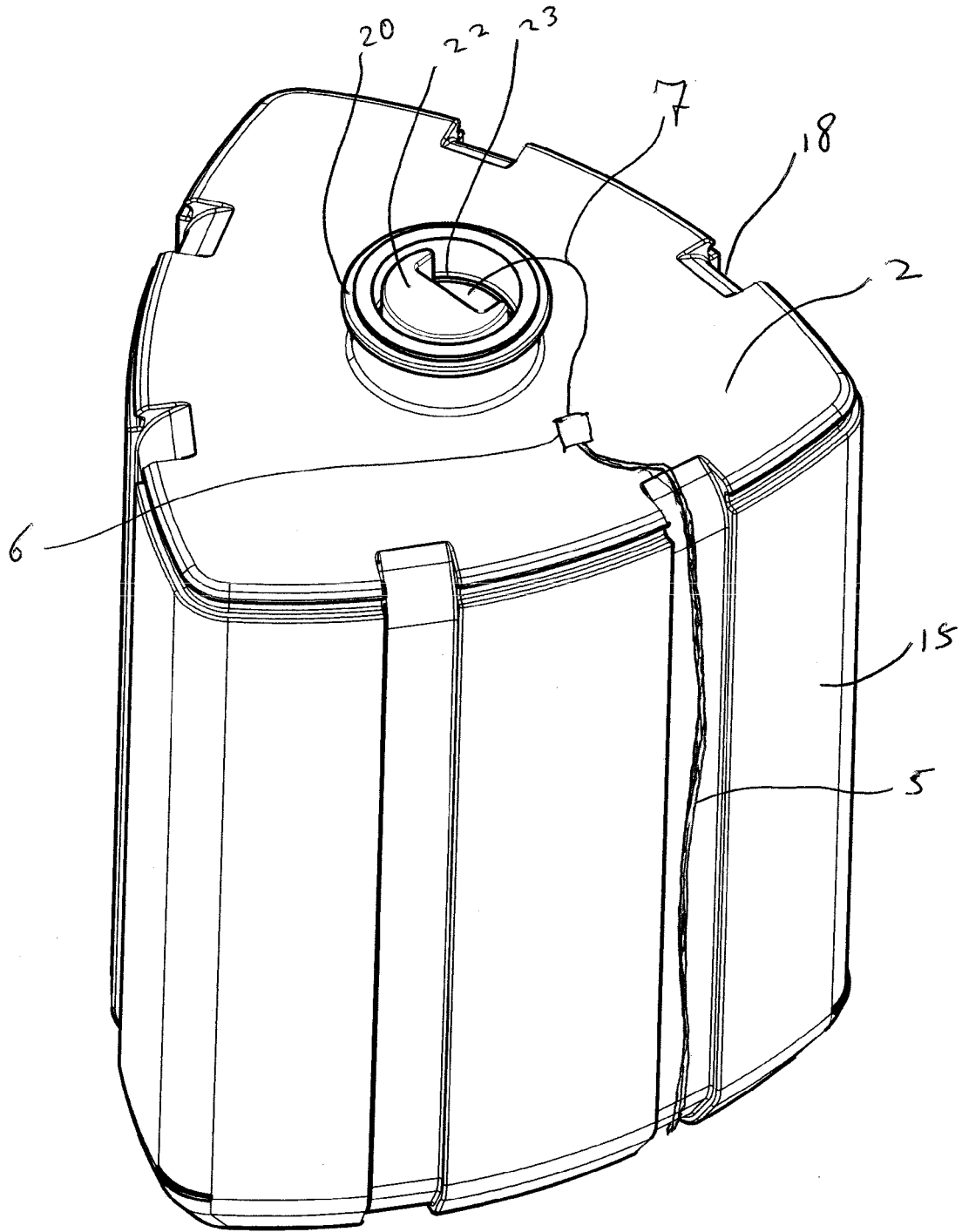


Fig. 7



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 10 0864

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 31 May 2007	Examiner Paul, Adeline
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 10 0864

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REFERENCES CITED IN THE DESCRIPTION

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