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(54) **IBC FOR COMBUSTIBLE PRODUCTS**

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(57) **ABSTRACT**

IBC in which the container is made of plastic and at least the outer surface is made electrically conducting. This IBC stands on a base and is surrounded by a jacket. Base and jacket consist of electrically conducting material and the jacket is constructed as a grid.

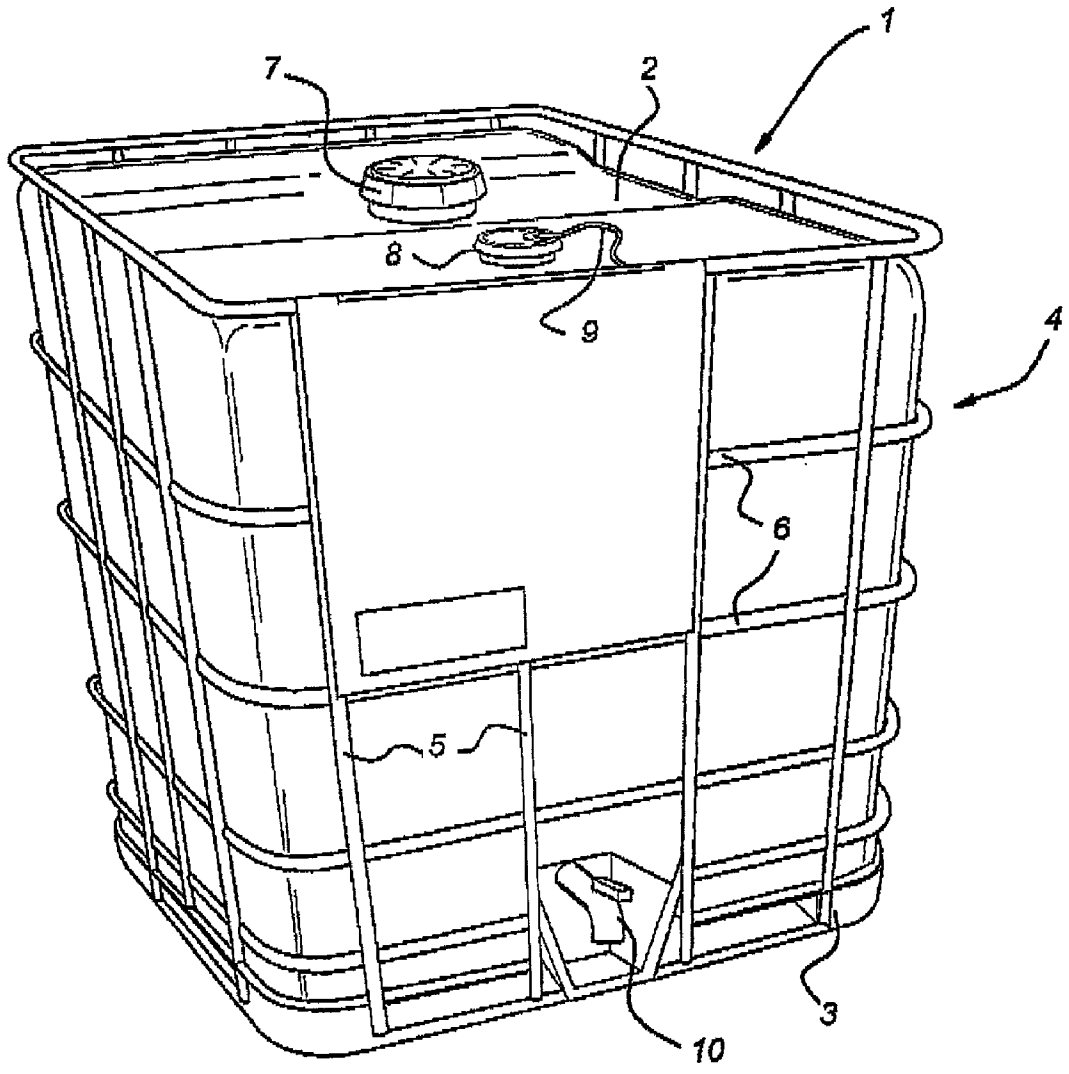


Fig 1

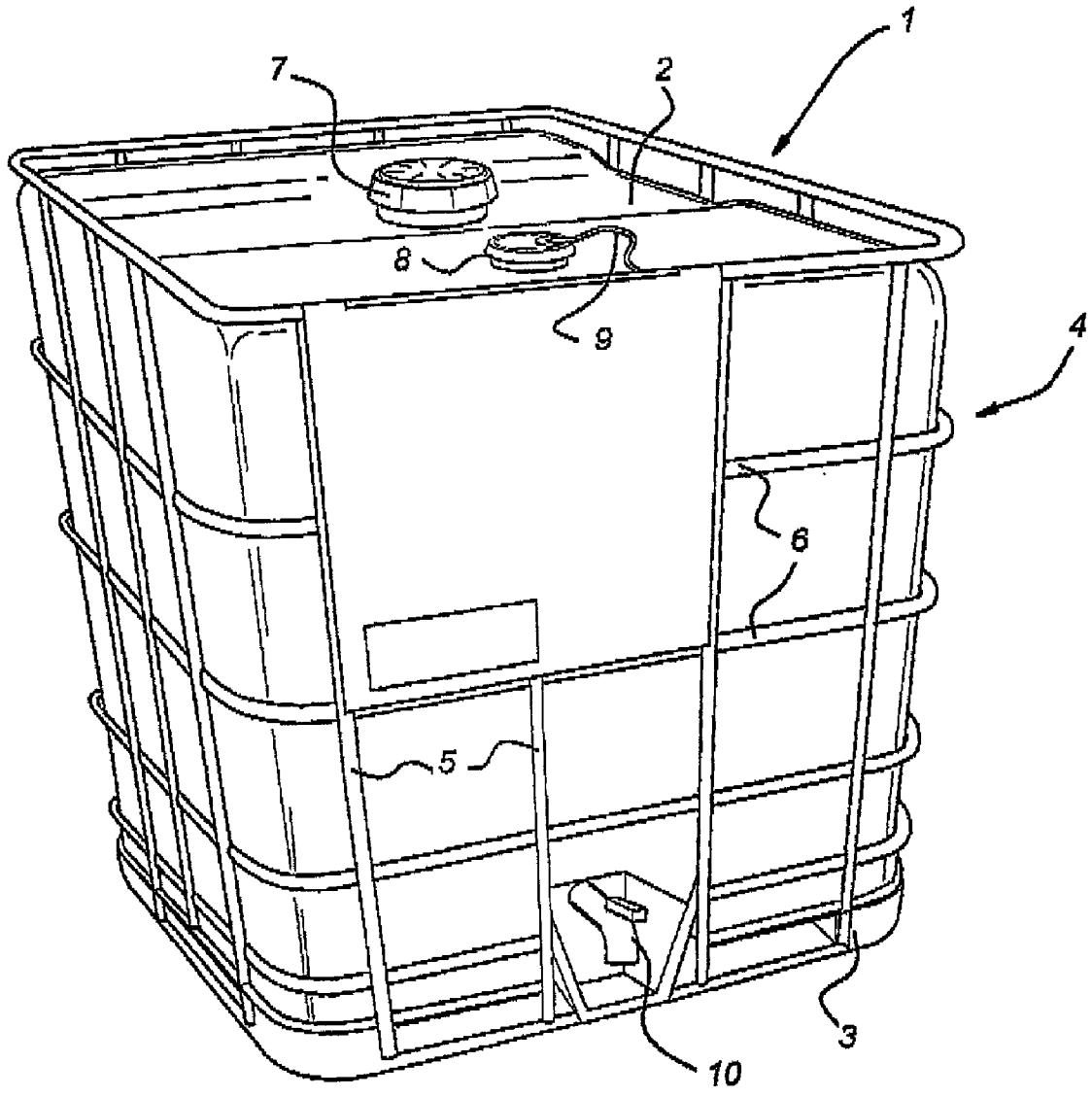


Fig 2

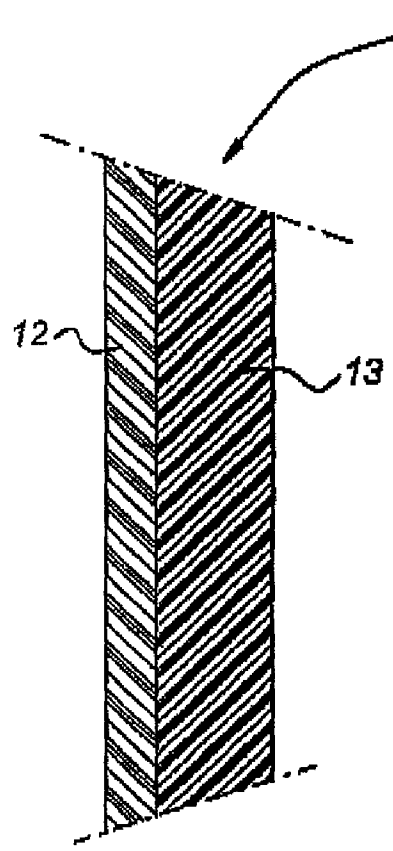


Fig 3

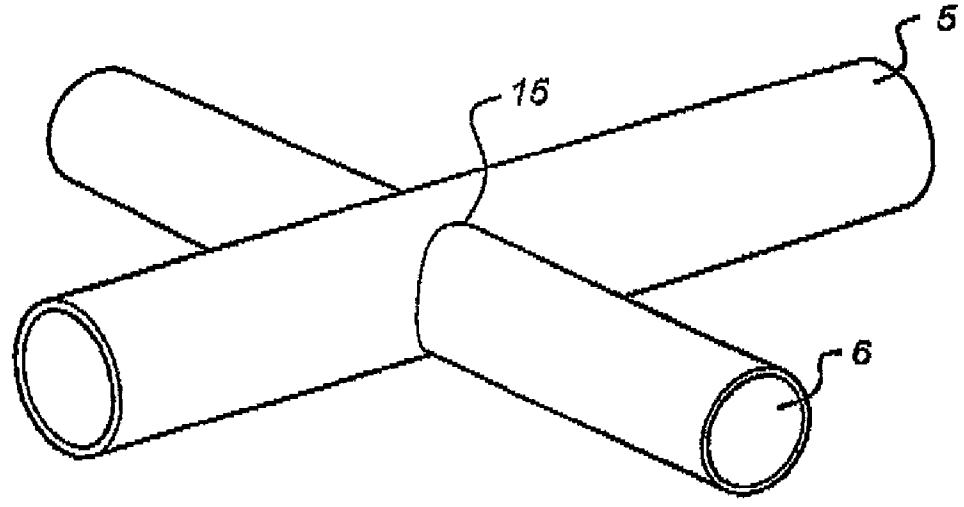
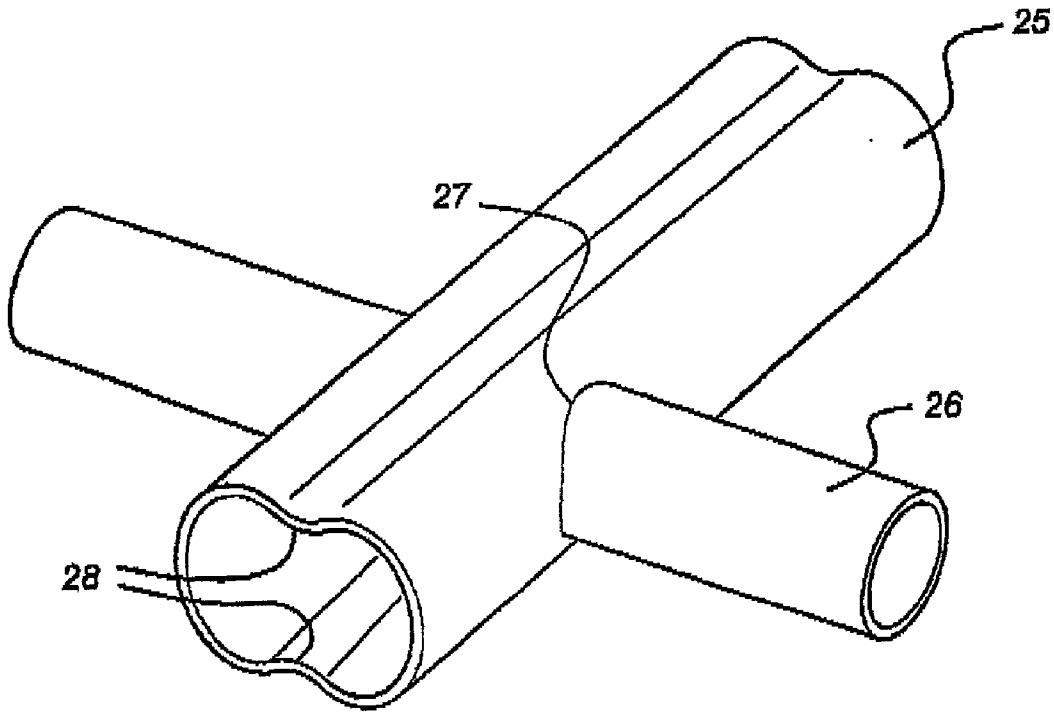


Fig 4



IBC FOR COMBUSTIBLE PRODUCTS

[0001] The present invention relates to an IBC comprising a plastic container, a base that supports the container and is constructed to accommodate the forks of a fork lift truck and a protective jacket that is joined to the base and supports the container.

[0002] IBCs of this type have found general acceptance and are used, inter alia, for moving combustible products. Particularly when filling and emptying, but also under other conditions, there is a risk that, as a result of static electricity, sparks arc to the combustible contents, which can consist of liquids or flowable powders. Moreover, it is possible that such sparks give rise to explosion of solid material, gases or liquids present in the surroundings. In particular there is a high risk with non-conducting liquids such as fuels and apolar solvents. A distinction must be made between spark discharge and brush discharge. In the case of spark discharge a spark arcs from an insulated conductor. All of the static energy is discharged by a single spark arc. Brush discharge arises at electrostatically charged, non-conducting plastic surfaces and if these are approached by an earthed (conducting) electrode discharge takes place. Brush discharge must be avoided in particular in the case of the IBCs described above.

[0003] It is for this reason that there are IBCs that are provided with anti-electrostatic properties. In the state of the art the container (bottle) is produced from a metallic material and the jacket is likewise produced from a metallic material or the container also serves as supporting construction and no jacket is present. If a plastic container is used, it is necessary to fit a jacket. The base of the pallet is preferably likewise made of metallic material and in this way it is possible to prevent a charge building up on the container that can result in a spark discharge.

[0004] Recently, containers for IBCs consisting of plastic with an electrically conducting exterior have been proposed. A wide range of liquids, flowable powders can be packed at a lower cost price by this means. However; if plastic containers are used it is necessary to fit a jacket.

[0005] In the state of the art both jackets produced from sheet material and nettings are proposed for this purpose. It is assumed that the container of the IBC bears against the jacket or netting and, because the exterior of the container of the IBC conducts current and is in contact with the jacket netting respectively, which likewise consists of metallic material, it is possible to provide for discharge of any electrostatic charge that may build up.

[0006] The aim of the present invention is to provide an IBC which has anti-electrostatic properties and which is less expensive to produce, that is to say as far as possible can be produced in existing production facilities where IBCs that do not have anti-electrostatic properties are produced.

[0007] This aim is realised with an IBC comprising a container; a base that supports the container and is constructed to accommodate the forks of a fork lift truck and a protective jacket that is joined to the base and supports the container, wherein the container is made of a plastic material, at least the outer surface of which is made electrically conducting and wherein said jacket is made of a metallic material and the jacket is in electrical contact with said container, wherein said base provides an electrical contact between the container/jacket and the support (ground) on which said base is placed, and wherein the jacket comprises a grid of metal rod.

[0008] Such rod can be hollow (tube) or solid wire and can have geometry according to a requirement.

[0009] It has been found that when a plastic container which has an outer surface that has electrically conducting properties is used it is not necessary to use a jacket of sheet material but it is possible to suffice with a jacket in grid form customary in the state of the art. Such grids are produced on a large scale for IBCs without anti-electrostatic properties. These grids can consist of hollow or solid profile of various geometry, such as metallic rod or metallic tube, so that no special measures are needed for the production of the grid when used in an IBC having anti-electrostatic properties. It has been found that the container of the IBC has such good electrical contact with the grid that special measures are not needed.

[0010] Because of the presence of possible electrical charge in the contents of the container, the discharge closure or tap for the IBC needs to be electrically conductive, and is always in electrical contact with the container under all conditions. Grounding over the discharge tap to earth (cage) is not neccessary. However, if the discharge tap is not conductive, it can be necessary to provide an electrical conductor, such as using a wire, between a cover lid on the container at the top and grid. The cover lid is connected to an immersion device, such as a wire or tube that should be electrical conductive, and reach to the bottom of the container.

[0011] When the base is made of electrical conducting material the base will provide an electrical contact between the container/jacket ad the support (ground). When the base is made of a non-conductive material, it can be necessary to provide an electrical conductor, such as using a wire, between the jacket or container and the underside of the base. Such a lead is not necessary when the jacket/container is electrically conducted through an external lead, which in turn is electrically connected to earth.

[0012] The grid can be constructed in some way known in the state of the art. For instance, it is possible that metal tubes crossing one another are joined to one another by welding. However, it is preferred to produce this joint by making use of tubes of different diameter. The tubes having the largest diameter are provided with holes a regular distance apart, through which the tubes of small diameter are inserted. Details of such a construction can be found in European applications 97119263.8 and 97 119 264.0.

[0013] The container having an electrically conducting exterior can be formed in various ways. Plastic can be made electrically conducting by adding electrically conducting fillers thereto. It is possible to produce the container entirely from a single layer of plastic material. However, it is also possible to produce the container from various layers, the inner layer preferably being free from fillers and, because of the sealing/mechanical properties, preferably consisting of a pure plastic. A plastic in which electrically conducting fillers are present can be used as the outer layer. The outer layer can optionally consist of recycled or regrind plastic. Of course, it is possible to work with more than two layers. What is achieved by not using fillers in the inner layer is that such

electrically conducting fillers or other foreign matter are prevented from being released into the contents of the container.

[0014] It has been found that if the electrical resistance of the outer layer of the container is less than 10^7 ohm and more particular less than 10^6 Ohm it can be adequately guaranteed that an electrostatic charge is not able to build up on the container.

[0015] The invention will be explained in more detail below with reference to an illustrative embodiment shown in the drawing. In the drawing:

[0016] **FIG. 1** shows a perspective view of an IBC according to the invention;

[0017] **FIG. 2** shows the cross-section in detail through the wall of the container of the IBC;

[0018] **FIG. 3** shows a first embodiment of the "crossings" of two tubes; and

[0019] **FIG. 4** shows a second embodiment of a joint between two tubes.

[0020] In **FIG. 1** an IBC (intermediate bulk container) is indicated by **1**. This consists of a container or bottle **2** that is supported by a base **3** and surrounded by a jacket **4**. In the example shown the jacket **4** consists of vertical tubes **5** and horizontal tubes **6**. In this example these tubes extend (partially) to the base, which likewise is constructed from metallic tubes. The jacket and base are joined to one another by welding or screws such that they are electrically conducting. The container is provided with one or more openings **7**, **8** at the top and with a discharge tap **10** at the bottom. There is an earth lead **9** between cap **8** and jacket **4** (an earth lead between cap **7** and jacket is also possible). The discharge tap **10** is made of an electrically conducting material that is in (electrical) contact with the exterior of the container **2**. If the discharge tap is not electrically conductive, opening **8** becomes effective. An immersion device such as a tube will be entered in the container (bottle) through the opening (**7** or **8**). This immersion device should be electrical conductive, to remove static charges from the contents of the container.

[0021] Part of the wall of container **2** is shown highly diagrammatically in section in **FIG. 2**. This wall consists of an outer layer **12** and an inner layer **13**. The inner layer **13** consists of a "pure" plastic. The outer layer **12** consists of a plastic to which electrically conducting fillers have been added so that an outer layer resistance of less than 10^7 ohm is obtained. The wall thickness of the layers **12** and **13** can be chosen in the conventional manner. In this illustrative embodiment the wall can have a total thickness of less than 3 mm. As a result of the use of pure plastic for wall layer **13** the good mechanical properties of the container are ensured and the release of constituents from the wall into the contents of the container is also prevented.

[0022] When the base is made of electrical conducting material the base will provide an electrical contact between the container **2** or jacket **4** and the support (ground). When the base is made of a non-conductive material, it can be necessary to provide an electrical conductor, such as using a wire, between the jacket or container and the underside of the base. Such a lead is not necessary when the jacket container is electrically conducted trough an external lead, which in turn is electrically connected to earth (not the support).

[0023] According to the present invention jacket **4** is constructed as a grid. This grid consists of tubes **5** and **6** crossing one another, The way in which such a "crossing" is constructed is shown in detail in **FIG. 3**. Tube **5** has a relatively large diameter and is provided at regular intervals with openings **15**. The latter are such that tubes **6** can extend through them. Optionally a weld can be present at the location of said joint.

[0024] Another embodiment of the joint between vertical and horizontal tubes is shown in **FIG. 4**. The vertical tubes are indicated by **25**, whilst the horizontal tubes are indicated by **26**. Here again there is an opening in the tubes having the largest diameter: tubes **25**. This opening is indicated by **27**. In addition tube **25** is provided with indentations **28**, located opposite one another to promote the contact between tubes **25** and **26** and increase the mechanical strength of the connection. A contact weld can optionally be provided at the location where the indentation **28** comes into contact with tube **26**.

[0025] It has been found that with such a grid adequate electrical contact is provided between the jacket and the container. Because the outer layer of the container itself consists of electrically conducting material, it has been found that it is not necessary to shield the entire surface around the walls of the container with a metallic material. The use of he grid as shown in the figures is found to be adequate.

[0026] Variants of the IBC will be immediately apparent to those skilled in the art on reading the above description. These variants are considered to fall within the scope of the appended claims.

1. IBC comprising a plastic container, a base that supports the container and is constructed to accommodate the forks of a fork lift tuck and a protective jacket that is joined to the base and supports the container, wherein the container is made of a plastic material, at least the outer surface of which is made electrically conducting and wherein said jacket is made of a metallic material and the jacket is in electrical contact with said container, wherein said base provides an electrical contact between the container/jacket and the support (ground) on which said base is placed, and wherein the jacket comprises a grid of metal rods.

2. IBC according to claim 1, wherein said metal rods comprise hollow rods.

3. IBC according to claim 1, wherein said metal rods comprise solid rods.

4. IBC according to claim 1, wherein the discharge tap is made of electrical conductive material, which provides an electrical contact between the contents in the container and the outer surface of the container.

5. IBC according to claim 1, wherein the discharge tap is made of non-electric conductive material, and an opening is provided in the container with an electrical conductive immersion device and connected by an earth wire to the jacket.

6. IBC according to claim 1, wherein said base consists of electrically conducting material.

7. IBC according to claim 1, wherein said base consists of electrically non-conducting material and there is a strip of

conducting material between said jacket and/or container and the underside (in the use position) of said base.

8. IBC according to claim 1, wherein the walls of the container are layered, containing a inner layer of electrically non-conducting material.

9. IBC according to claim 1, wherein the use position said metal rods cross one another and comprise horizontal and vertical rods.

10. IBC according to claim 1, wherein the rods are welded to one another at the points where said rods cross.

11. IBC according to claim 9, wherein the vertical rods are of a different size to the horizontal rods and, at the point where the rods cross, the rod of the largest size is provided with an opening for accommodating the rod of the smallest size.

12. IBC according to claim 11, wherein the rod of the largest size is provided with a central longitudinal indentation.

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