

FLEXIBLE CONTAINER

TECHNICAL FIELD

[0001]

The present invention relates to a flexible container being capable of preventing ignition discharge due to static electricity.

BACKGROUND ART

[0002]

There are a wide variety of contents in the flexible container, including petrochemical feedstocks, inorganics, minerals, fertilizers, feedstuffs, and foods. Depending on the properties and shapes of contents, the flexible container is required to be formulated so as not to be changed during transportation and storage as a packaging material.

[0003]

However, in particular when the contents are particulates, static electricity tends to occur due to the friction during charging and discharging. In this case, since ignition discharge may be occurred by increasing the electrostatic potential of the flexible container due to high volume of the flexible container, preventing ignition discharge is required. Therefore, a flexible container being capable of preventing ignition discharge by previously incorporating a conductive material in a bag body and by grounding the conductive material to escape static electricity is known. Note that such a flexible container is called as a "type C", and the specification of the product is defined in IEC 61340-4-4 (JIS C 61340-4-4).

[0004]

On the other hand, in the terms of preventing contamination and of increasing the gas-barrier properties and moisture proof properties, a flexible container having dual structure having an outer bag and an inner bag surrounded by the outer bag is known. When the above-described "type C" flexible container is modified to be the dual structure and the inner bag includes a conductive layer, the conductive materials of the outer bag and the inner bag are required to be electrically connected and then grounded. If the electrical connection between the outer bag and the inner bag is incomplete, static electricity accumulates in the incomplete area. Therefore, the connection is required to be complete.

[0005]

Patent Document 1 discloses a flexible container, comprising: an outer bag

obtained by forming a fabric including uniaxial oriented thermoplastic filaments and arranged conductive filaments into a bag-shaped body; and an inner layer body including a conductive synthetic resin which is attached on the inner surface of the outer bag; wherein a freely-closed opening is formed on the lower part and hanging belts including arranged conductive filaments are connected consecutively on the upper part; and wherein the conductive filaments in the outer bag and the conductive filaments in the hanging belts are electrically connected.

[0006]

Patent Document 2 discloses a method of discharging polymerizable hygroscopic powders from a flexible container bag, the flexible container bag comprising: an exterior part having an upper part having a charging port, a bottom part having an outlet, and a lateral part including at least four sewn hanging belts; and an inner bag part formed by a sealing material inside the exterior part; and the flexible container bag containing polymerizable hygroscopic powders having CRH of 60% or less and a moisture content of 2,000 ppm or less; characterized in that the method comprises: using a hanging tool including a hanging hook at each tip of four or more shafts radially extending from the center of the hanging tool; suspending each hanging belts of the flexible container bag with the hanging hook; hanging the flexible container bag so as to support at four or more fulcrums by the hanging belt at equal load in a vertical direction; and discharging polymerizable hygroscopic powders from the outlet in the bottom part of the flexible container bag.

[0007]

Patent Document 3 discloses a flexible container for charging particulates having a minimum ignition energy of 3 mJ or less; characterized in that the flexible container comprises: an outer bag formed by a woven fabric including conductive filaments in a stripe or a grid form as alternative yarns or adding yarns, the outer bag including a moiety for charging particulates having a base area of 0.15 to 7 m², a height of 0.25 to 3 m and, a ground resistance of less than $1 \times 10^8 \Omega$, and the outer bag being grounded; and an inner bag formed by a film including a synthetic resin and carbon black, the inner bag including a moiety for charging particulates having a base area of 0.15 to 7 m², a height of 0.25 to 3 m, and a ground resistance of $1 \times 10^9 \Omega$ to $1 \times 10^{12} \Omega$.

PRIOR ART DOCUMENTS

PATENT DOCUMENTS

[0008]

Patent Document 1: JP 2003-252397 A

Patent Document 2: JP 2005-67625 A

Patent Document 3: JP 2014-162514 A

SUMMARY OF THE INVENTION

PROBLEM TO BE SOLVED BY THE INVENTION

[0009]

IEC 61340-4-4 revised on January 2018 describes a specification that an inner bag is formed by a multilayer film in which a conductive layer is sandwiched with insulation layers (non-conductive layers). However, if the thickness of the conductive layer in the multilayer film is thin (for example, 10 μm or less), it is difficult to electrically connect with the conductive layer on the lateral edge of the multilayer film. On the other hand, if the multilayer film includes a thick conductive layer (for example, more than 10 μm), it may be possible to electrically connect with the conductive layer on the lateral edge, but it is difficult to use the multilayer film as the inner bag of the flexible container because of decreasing its flexibility.

[0010]

Accordingly, an object of the present invention is to provide a flexible container being capable of escaping static electricity by connecting an outer bag having an incorporated conductive material with an inner bag having a non-conductive layer/a conductive layer/a non-conductive layer.

MEANS OF SOLVING THE PROBLEM

[0011]

The present invention is a flexible container, comprising:

an outer bag formed by a sheet for outer bag having a conductive material incorporated in a non-conductive plastic substrate, the outer bag being capable of escaping static electricity by the conductive material;

an inner bag formed by a sheet for inner bag having a non-conductive layer/a conductive layer/a non-conductive layer, the inner bag being surrounded by the outer bag; and

a connector electrically connecting the conductive material in the sheet for outer bag with the conductive layer in the sheet for inner bag;

wherein the sheet for inner bag has an exposing part being capable of exposing a surface of the conductive layer; and

wherein the connector is electrically connected with the surface of the conductive layer exposed by the exposing part.

EFFECT OF THE INVENTION

[0012]

According to the present invention, a flexible container being capable of escaping static electricity by connecting an outer bag having an incorporated conductive material with an inner bag having a non-conductive layer/a conductive layer/a non-conductive layer can be provided.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is a perspective view illustrating a configuration example of an inner bag of a flexible container according to the present invention.

FIG. 2 is a perspective view illustrating a shape example of a sheet for inner bag constituting the inner bag of the flexible container according to the present invention.

FIG. 3 is a cross sectional view illustrating an example of connecting between a conductive layer of the sheet for inner bag and a connector, constituting the inner bag of the flexible container according to the present invention.

FIG. 4 is a perspective view illustrating a configuration example of an outer bag of the flexible container according to the present invention.

MODE FOR CARRYING OUT THE INVENTION

[0014]

A flexible container according to the present invention is a flexible container for preventing static electricity disaster, called as "type C". The flexible container has an outer bag being capable of escaping static electricity and an inner bag surrounded by the outer bag. The outer bag is formed by a sheet for outer bag having a conductive material incorporated in a non-conductive plastic substrate. The inner bag is formed by a sheet for inner bag having a non-conductive layer/a conductive layer/a non-conductive layer. The sheet for inner bag has an exposing part being capable of exposing a surface of the conductive layer. Then, the conductive material of the sheet for outer bag and the surface of the conductive layer exposed by the exposing part of the sheet for inner bag are electrically connected by a connector. By using such a configuration of the flexible container, the conductive material of the outer bag and the conductive layer of the inner bag are securely connected. Therefore, by grounding the conductive material of the outer bag, static electricity occurred on the surfaces of the outer bag and the inner bag can be escaped, and ignition discharge due to static electricity can be prevented.

[0015]

<Outer bag>

FIG. 4 illustrates a configuration example of an outer bag of a flexible container according to the present invention. An outer bag 1 as shown in FIG. 4 is formed by a sheet for outer bag 10, and the outer bag 1 has a container body having generally tetragon cross-section and having an upper open end and a lower open end, a body top surface covering the upper open end of the container body, and a body bottom surface covering the lower open end of the container body.

[0016]

The container body is a tubular body composed of a flexible material. The tubular body constituting the container body may be seamless. The tubular body may also be one formed into the tubular shape by rolling one sheet material and by jointing both ends of the sheet material. The tubular body may also be one formed into the tubular shape by arranging two or more sheet materials in the tubular shape so that lateral sides of the adjacent sheet materials are contact with each other and then by sealing lateral sides with each other. The container body may be a generally cylindrical shape having circle or ellipse cross-section in the horizontal direction, or may be a generally polygonal tubular body having polygon or rounded polygon cross-section in the horizontal direction. Examples of the polygon include a triangle having three corners, a tetragon having four corners, a pentagon having five corners, and a hexagon having six corners. The polygon is preferably a tetragon, and is more preferably a rectangle or a square.

[0017]

As a material for the tubular body constituting the container body (the sheet for outer bag 10), a material having a conductive material incorporated in a non-conductive plastic substrate can be used. Example of a material used for a cross-shaped flexible container include, for example, yarn fabrics obtained by using a non-conductive flat yarn 11 as a warp and weft which is made of a polyolefin resin such as a polyethylene or a polypropylene, and by weaving a conductive filament 12 in a part of the non-conductive flat yarn 11 in an evenly spaced stripe shape. Examples of the conductive filament 12 include metallic fibers, metal plating fibers, organic conductive fibers, and fibers obtained by mixing or adhering a conductive substance such as carbon black. The woven conductive filaments 12 are preferably arranged so that they are contact with each other, and are preferably grounded from a terminal for grounding (not shown) connecting to the conductive filaments 12 to the earth or the like.

[0018]

The upper open end of the container body is covered by the body top surface.

That is, the outer circumference of the body top surface is formed to be nearly the same as that of the upper open end of the container body, and the outer circumferences of the body top surface and the upper open end of the container body are connected. The connecting form can be suitably designed with consideration of manufacturability and strength of the flexible container. For example, the container body and the body top surface can be separately formed, and then connected with each other via sewing, adhering, fusing, or the like. Additionally, as described later, when the body top surface is a tubular body having a cross-section shape nearly the same as the container body, the container body and the body top surface can be integrally formed. Specific examples of the material forming the body top surface include materials exemplified as the materials forming the container body, but the material is preferably the same as the material forming the container body.

[0019]

In the body top surface, an inlet 1a which communicates the inside and the outside of the container body is formed. That is, from the inlet 1a, a material to be stored in the container body can be introduced and a material which had been stored in the container body can be removed. Examples of a method for removing the material which had stored in the container body include methods of aspirating the material from above, and methods of inverting the flexible container. The shape and the size of the inlet 1a can be suitably designed with consideration of the designed loading amount of the flexible container 1 and the like. For example, the body top surface may be a form being capable of covering the upper open end of the container body by forming the body top surface into a tubular body having a cross-section shape nearly the same as the container body and then by folding the body top surface. Although the structure of the body top surface is not particularly limited, the body top surface preferably becomes a planer shape when the inlet 1a is closed in terms of effective utilization of the space.

[0020]

The lower open end of the container body is covered by the body bottom surface. That is, the outer circumference of the body bottom surface is formed to be nearly the same as that of the lower open end of the container body, and the outer circumferences of the body bottom surface and the upper open end of the container body are connected. The connecting form can be suitably designed with consideration of manufacturability and strength of the flexible container. For example, the container body and the body bottom surface can be separately formed, and then connected with each other via sewing, adhering, fusing, or the like. Additionally, as described later, when the body bottom surface is a tubular body having a cross-section shape nearly the

same as the container body, the container body and the body bottom surface can be integrally formed. Specific examples of the material forming the body bottom surface include materials exemplified as the materials forming the container body, but the material is preferably the same as the material forming the container body.

[0021]

Depending on the application of the flexible container, in the body bottom surface, an outlet 1b which communicates the inside and the outside of the container body can also be formed. In this case, a material which had been stored in the container body can be removed from the outlet 1b. The shape and size of the outlet 1b can be suitably designed with consideration of the designed loading amount of the flexible container and the like. For example, the body bottom surface may be a form being capable of covering the lower open end of the container body by forming the body bottom surface into a tubular body having a cross-section shape nearly the same as the container body and then by folding the body bottom surface. Although the structure of the body bottom surface is not particularly limited, the body bottom surface preferably becomes a planer shape when the outlet 1b is closed in terms of effective utilization of the space.

[0022]

<Inner bag>

FIG. 1 illustrates a configuration example of an inner bag of a flexible container according to the present invention. FIG. 2 illustrates a shape of a sheet for inner bag constituting the inner bag of FIG. 1. The inner bag 2 as shown in FIG. 1 is formed by combining four sheets for inner bag 20.

[0023]

The sheet for inner bag 20 has a structure having a conductive layer sandwiched by non-conductive layers, that is, it has at least a non-conductive layer/a conductive layer/a non-conductive layer. Each layer may be one layer or two or more layers, and it may also be a functional layer having a property such as adhesiveness, sealing property or gas-barrier property. Examples of the material forming the non-conductive layer include polyolefin resins such as polyethylenes and polypropylenes, ethylene-vinyl acetate copolymers (EVA), polyvinyl chlorides (PVC), and polyethylene terephthalates. Examples of the material forming the conductive layer include metals such as aluminum and resins obtained by mixing a conductive material such as metal or carbon black. The surface resistivity of the conductive layer is preferably $1.0 \times 10^8 \Omega$ or less. Examples of the laminating method include coating, laminating, and co-extruding.

[0024]

One example of the sheet for inner bag 20 is a sheet formed by overlaying two laminated sheets 21 each having a metal evaporated layer as a conductive layer 21b on one surface of a non-conductive layer 21a so that each conducting layer 21b faces each other, as shown in FIG. 3. As the laminated sheet 21, a laminated sheet 21 obtained by forming an aluminum evaporated layer as the conductive layer 21b on one surface of a polyethylene terephthalate sheet as the non-conductive layer 21a can be used. In addition, for adhering the adjacent sheets for inner bag 20 via heat-sealing, the sheet for inner bag 20 preferably has a sealing layer 22 as an innermost layer which is an inner surface of the inner bag 2.

[0025]

The sheet for inner bag 20 forming the inner bag 2 may be a seamless tubular body, or may be a planer shaped sheet. For the planer shaped sheet, for example, the inner bag 2 can be formed by arranging at least two sheets for inner bag 20 in a tubular shape so that lateral sides of the adjacent sheets for inner bag 20 are contact with each other and then by sealing sides with each other if needed. The number of the sheets for inner bag 20 forming the inner bag 2 is one for the seamless body. When planer shaped sheets are combined to constitute the inner bag 2, the number may be one, but is preferably two or more. In particular, since the common flexible container has an outer bag 1 having generally tetragon cross-section as shown in FIG. 1, four sheets for inner bag 20 are more preferably combined to form the inner bag 2.

[0026]

The middle portion 20b of the inner bag 2 as shown in FIG. 1 forms a tubular body formed by arranging four sheets for inner bag 20 in a tubular shape so that lateral sides of the adjacent sheets for inner bag 20 are contact with each other and then by sealing at each sealing part 23 along each lateral sides. The upper portion 20a of the inner bag 2 which is located above the middle portion 20b forms an inlet part formed by sealing at each sealing part 23 along the side angled (the side inwardly angled) against the vertical direction from the lateral side to the upper side of the adjacent sheets for inner bag 20. An inlet 2a is formed in the middle of the upper side of the inlet part. The lower portion 20c of the inner bag 2 which is located below the middle portion 20b forms an outlet part formed by sealing at each sealing part 23 along the side angled (the side inwardly angled) against the vertical direction from the lateral side to the lower side of the adjacent sheets for inner bag 20. An outlet 2b is formed in the middle of the lower side of the outlet part. For example, the sheet for inner bag 20 has an octagon by the sealed sealing part 23, the upper side, and the lower side, as shown in FIG. 1.

[0027]

The perimeter of the inner bag 2 in the middle portion 20b is preferably from 3 to 10% larger than that of the outer bag 1 which is a part surrounding the middle portion 20b of the inner bag 2 when the inner bag 2 is introduced in the outer bag 1 and the contents are charged. Using such a configuration, when the contents are charged and transported, friction occurred between the outer bag 1 and the inner bag 2 due to the vibration and the motion of the inner bag 2 is limited in the outer bag 1, and thereby the connector tends not to separate from the inner bag 2 or the outer bag 1. From this point of view, the coefficient of static friction between the rear surface of the outer bag and the front surface of the inner bag is preferably 0.04 or more and 0.8 or less as measured according to JIS K 7125, and is more preferably 0.1 or more and 0.38 or less. The height of the inner bag is required to be at least the same as that of the outer bag so as to fold the inner bag inside the outer bag and not to overflow the contents, while considering the wrinkle of the inner bag itself. Further, if the inner bag is too long, the conductivity of the inner bag may be affected, and sealing the inlet becomes complicated. Therefore, the height of the inner bag is required to be higher (preferably 50 mm or more higher, and more preferably 300 mm or more higher) than that of the outer bag.

[0028]

Additionally, the upper portion 20a and the lower portion 20c of the sheet for inner bag 20 each have a region outside of the sealing part 23 sealing the adjacent sheets for inner bag 20. That is, the sheet for inner bag 20 has a non-sealed region 24 outside of the sealing part 23 sealing the adjacent sheets for inner bag 20. In the sheet for inner bag 20 as shown in FIGS. 1 and 2, the middle portion 20b, the lower part of the upper portion 20a, and the upper part of the lower portion 20c form a rectangle, while the upper part of the upper portion 20a forms a trapezoid in which the upper side (the side forming the inlet 2a) is a short side, and the lower part of the lower portion 20c forms a trapezoid in which the lower side (the side forming the outlet 2b) is a short side. In this case, the sealing part 23 sealing the adjacent sheets for inner bag 20 is formed along the sides extended from both lateral sides of the trapezoid forming the upper part of the upper portion 20a, along both lateral sides of the middle portion 20b, and along the sides extended from both lateral sides of the trapezoid forming the lower part of the lower portion 20c.

Note that above from the upper side of the upper part of the upper portion 20a in the octangle-shaped sheet for inner bag 20 in FIG.1, a tetragon part having the upper side as one side may be formed. Similarly, below from the lower side of the lower part

of the lower portion 20c, a tetragon part having the lower side as one side may be formed. Using such a configuration, since the shapes of the inlet and the outlet of a bag coincides with the shapes of the inlet and the outlet of the inner bag, and then the inclusion tends to flow during charge and discharge, to result in improving the work efficiency.

[0029]

The sheet for inner bag 20 has an exposing part being capable of exposing the surface of the conductive layer 21b. Using such a configuration, a connector 3 as described below can be electrically connected with the surface of the conductive layer 21b exposed by the exposing part. Note that the surface of the conductive layer 21b means one surface of the conductive layer 21b (that is, a front surface or a rear surface), and the surface does not include the lateral edge. The method of exposing the surface of the conductive layer 21b may be a method of disposing the non-conductive layer 21a on a region other than a part of the region in one surface of the conductive layer 21b, but the surface of the conductive layer 21b can be exposed by creating a non-adhered area between one surface of the conductive layer 21b and the adjacent layer to the conductive layer 21b and then separating (peeling) the non-adhered area if needed.

[0030]

Although the position of the exposing part is not particularly limited as long as the connector 3 as described below can be electrically connected with the exposed surface of the conductive layer 21b, as shown in FIG. 3, the exposing part is preferably formed in the non-sealed region 24 outside of the sealing part 23. By forming the exposing part in the non-sealed region 24 outside of the inner bag 2, the connector 3 as described below can be electrically connected with the surface of the conductive layer 21b exposed by the exposing part conveniently. In this case, in the exposing part, a non-adhered area is preferably created between the conductive layers 21b of the two laminated sheets 21, and the surface of the conductive layer 21b can be exposed by peeling one of the two laminated sheets 21, as shown in FIG. 3.

[0031]

<Connector>

A flexible container according to the present invention has a connector electrically connecting the conductive material in the sheet for outer bag with the conductive layer in the sheet for inner bag. Since the outer bag can be electrically connected with the inner bag by the connector, static electricity occurred on the surfaces of the outer bag and the inner bag can be escaped.

[0032]

As the connector 3, for example, as shown in FIG. 3, a conductive sheet 31 which is electrically connecting with the surface of the conductive layer 21b exposed by the exposing part of the sheet for inner bag 20 can be used. The connector 3 may further have a cover sheet 32 covering at least a part of the conductive sheet 31. More specifically, as shown in FIG. 3, in a condition that the conductive sheet 20 on one of the sheets for inner bag 20 is peeled to expose the surface of the conductive layer 21b, the conductive sheet 31 can be disposed so as to contact with the surface of the conductive layer 21b and the cover sheet 32 can be disposed so as to cover the conductive sheet 31, and then wholly sealed via heat-sealing. Note that the cover sheet 32 may cover a part of the conductive sheet 31, and the uncovered region of the conductive sheet 31 can be connected with the conductive material (conductive filament 12) of the sheet for outer bag 10. As the conductive sheet 31, for example, a carbon black sheet can be used. Although the connecting method is not limited, for example, it can be connected by adhering with an adhesive. The cover sheet 32 may be non-conductive, or a part of the cover sheet 32 may be conductive.

[0033]

When the connector 3 is fixed to the exposing part of the sheet for inner bag 20, the connector 3 may be adhered to the exposing part of the sheet for inner bag 20 by adding a tackifier or an adhesive between them. In this case, the surface specific resistance of the tackifier or the adhesive is preferably less than $1.0 \times 10^7 \Omega$. The aspect of applying the tackifier or the adhesive is not particularly limited. As for the applied region, it may be applied to all of the overlapped area of the connector 3 and the exposing part of the sheet for inner bag 20, or may be applied to a part thereof. It may be applied in dots, in lines or in planes, or may be applied so as to trace a specific pattern by any combination thereof.

[0034]

When the sheet for inner bag 20 preferably has a sealing layer 22 as the innermost layer which is the inner surface of the inner bag 2, one end of the connector 3 can be fixed to the inner bag 2 by using a material being capable of heat-sealing with the sealing layer 22 of the sheet for inner bag 20 as the outermost layer of the connector 3 disposed in the adjacent position, and then by sandwiching and heat-sealing one end of the connector 3 between the sealing layer 22 and the sealing layer 22 of the sheets for inner bag 20 to be applied when the inner bag 2 is formed via heat-sealing. By using such a configuration, the connector 3 can be securely fixed to the inner bag 2.

[0035]

The flexible container having such a configuration according to the present

invention can escape static electricity by connecting the outer bag having an incorporated conductive material with an inner bag having a non-conductive layer/a conductive layer/a non-conductive layer. The invention of a flexible container in which the surfaces of the conductive material of the outer bag and the conductive layer of the inner bag are previously connected with a connector was described above, but the outer bag, the inner bag, and the connector may be separately supplied and electrically connected later. In particular, since the above-described inner bag (the inner bag for flexible container) is useful for an inner bag for flexible container for preventing static electricity disaster, a flexible container for preventing static electricity disaster can be formed by electrically connecting the inner bag with an existing outer bag for flexible container for preventing static electricity disaster via a connector. Therefore, the above-described each element is also one embodiment of the present invention as a separated part.

[0036]

The present invention encompasses at least the following embodiments.

[1] A flexible container, comprising:

an outer bag formed by a sheet for outer bag having a conductive material incorporated in a non-conductive plastic substrate, the outer bag being capable of escaping static electricity by the conductive material;

an inner bag formed by a sheet for inner bag having a non-conductive layer/a conductive layer/a non-conductive layer, the inner bag being surrounded by the outer bag; and

a connector electrically connecting the conductive material in the sheet for outer bag with the conductive layer in the sheet for inner bag;

wherein the sheet for inner bag has an exposing part being capable of exposing a surface of the conductive layer; and

wherein the connector is electrically connected with the surface of the conductive layer exposed by the exposing part.

[2] The flexible container according to [1],

wherein the inner bag has a tubular body in a middle portion of the inner bag, the tubular body being formed by arranging at least two sheets for inner bag in a tubular shape so that lateral sides of the adjacent sheets for inner bag are contact with each other and then by sealing the sheets along its lateral sides;

wherein the inner bag has an inlet part in an upper portion located above the middle portion, the inlet part being formed by sealing the adjacent sheets for inner bag along its sides angled against the vertical direction from the lateral side to the upper side

of the sheets; and

wherein the upper part has the exposing part in a region outside of the sides sealing the adjacent sheets for inner bag.

[3] The flexible container according to [2],

wherein the inner bag has an outlet part in a lower portion located below the middle portion, the outlet part being formed by sealing the adjacent sheets for inner bag along its sides angled against the vertical direction from the lateral side to the lower side of the sheets; and

wherein the lower part has the exposing part in a region outside of the sides sealing the adjacent sheets for inner bag.

[4] The flexible container according to [1],

wherein the inner bag has a tubular body in a middle portion of the inner bag, the tubular body being formed by arranging at least two sheets for inner bag in a tubular shape so that lateral sides of the adjacent sheets for inner bag are contact with each other and then by sealing the sheets along its lateral sides;

wherein the inner bag has an outlet part in a lower portion located below the middle portion, the outlet part being formed by sealing the adjacent sheets for inner bag along its sides angled against the vertical direction from the lateral side to the lower side of the sheets; and

wherein the lower part has the exposing part in a region outside of the sides sealing the adjacent sheets for inner bag.

[5] The flexible container according to any one of [2] to [4],

wherein the inner bag is formed by using four sheets for inner bag.

[6] The flexible container according to any one of [1] to [5],

wherein the sheet for inner bag is capable of exposing the surface of the conductive layer by creating a non-adhered area between one surface of the conductive layer and the adjacent layer in the exposing part.

[7] The flexible container according to [6],

wherein the sheet for inner bag is formed by forming two laminated sheets each having a metal evaporated layer on one surface of a non-conductive layer and by overlaying the two laminated sheets so that the metal evaporated layers of the two laminated sheets face each other; and

wherein the non-adhered area is created between the metal evaporated layers of the two laminated sheets in the exposing part.

DENOTATION OF REFERENCE NUMERALS

[0037]

- 1 outer bag
- 1a inlet
- 1b outlet
- 10 sheet for outer bag
- 11 flat yarn
- 12 conductive filament
- 2 inner bag
- 2a inlet
- 2b outlet
- 20 sheet for inner bag
- 20a upper portion
- 20b middle portion
- 20c lower portion
- 21 laminated sheet
- 21a non-conductive layer
- 21b conductive layer
- 22 sealing layer
- 23 sealing part
- 24 non-sealed region
- 3 connector
- 31 conductive sheet
- 32 cover sheet

WHAT IS CLAIMED IS:

1. A flexible container, comprising:

an outer bag formed by a sheet for outer bag having a conductive material incorporated in a non-conductive plastic substrate, the outer bag being capable of escaping static electricity by the conductive material;

an inner bag formed by a sheet for inner bag having a non-conductive layer/a conductive layer/a non-conductive layer, the inner bag being surrounded by the outer bag; and

a connector electrically connecting the conductive material in the sheet for outer bag with the conductive layer in the sheet for inner bag;

wherein the sheet for inner bag has an exposing part being capable of exposing a surface of the conductive layer; and

wherein the connector is electrically connected with the surface of the conductive layer exposed by the exposing part;

wherein the inner bag has a tubular body in a middle portion of the inner bag, the tubular body being formed by arranging at least two sheets for inner bag in a tubular shape so that lateral sides of the adjacent sheets for inner bag are contact with each other and then by sealing the sheets along its lateral sides;

wherein the inner bag has an inlet part in an upper portion located above the middle portion, the inlet part being formed by sealing the adjacent sheets for inner bag along its sides angled against the vertical direction from the lateral side to the upper side of the sheets; and

wherein the upper part has the exposing part in a region outside of the sides sealing the adjacent sheets for inner bag.

2. The flexible container according to claim 1,

wherein the inner bag has an outlet part in a lower portion located below the middle portion, the outlet part being formed by sealing the adjacent sheets for inner bag along its sides angled against the vertical direction from the lateral side to the lower side of the sheets; and

wherein the lower part has the exposing part in a region outside of the sides sealing the adjacent sheets for inner bag.

3. A flexible container, comprising:

an outer bag formed by a sheet for outer bag having a conductive material incorporated in a non-conductive plastic substrate, the outer bag being capable of escaping static electricity by the conductive material;

an inner bag formed by a sheet for inner bag having a non-conductive layer/a conductive layer/a non-conductive layer, the inner bag being surrounded by the outer bag; and

a connector electrically connecting the conductive material in the sheet for outer bag with the conductive layer in the sheet for inner bag;

wherein the sheet for inner bag has an exposing part being capable of exposing a surface of the conductive layer; and

wherein the connector is electrically connected with the surface of the conductive layer exposed by the exposing part;

wherein the inner bag has a tubular body in a middle portion of the inner bag, the tubular body being formed by arranging at least two sheets for inner bag in a tubular shape so that lateral sides of the adjacent sheets for inner bag are contact with each other and then by sealing the sheets along its lateral sides;

wherein the inner bag has an outlet part in a lower portion located below the middle portion, the outlet part being formed by sealing the adjacent sheets for inner bag along its sides angled against the vertical direction from the lateral side to the lower side of the sheets; and

wherein the lower part has the exposing part in a region outside of the sides sealing the adjacent sheets for inner bag.

4. The flexible container according to any one of claims 1 to 3,

wherein the inner bag is formed by using four sheets for inner bag.

5. The flexible container according to any one of claims 1 to 4,

wherein the sheet for inner bag is capable of exposing the surface of the conductive layer by creating a non-adhered area between one surface of the conductive layer and the adjacent layer in the exposing part.

6. The flexible container according to claim 5,

wherein the sheet for inner bag is formed by forming two laminated sheets each having a metal evaporated layer on one surface of a non-conductive layer and by overlaying the two laminated sheets so that the metal evaporated layers of the two

laminated sheets face each other; and

wherein the non-adhered area is created between the metal evaporated layers of the two laminated sheets in the exposing part.