

DESCRIPTION

SPOUT AND LIQUID CONTAINER WITH SPOUT

Technical Field

5 [0001] The present invention relates to a spout for discharging contents filled in a liquid container and to a liquid container with the spout.

Background Art

[0002] Tube feeding is known as a treatment for those who cannot take meals by
10 mouth. Tube feeding is a treatment where nutrition is sent directly to the body through a tube. For example, a nutrient bag filled with a nutrient is used in tube feeding, and the nutrient supplied from the nutrient bag flows through a tube and is sent to the body. In this way, a supply system for sending the contents of a bag to the body through a tube also is utilized in transfusion for administering drug solutions.

15 [0003] FIG. 25 is a schematic diagram showing one example of a nutrient supply system using a conventional nutrient bag and one example of a drug solution supply system using a conventional drug solution bag. A bag main body 101 of a nutrient bag 100 is filled with a nutrient. To the nutrient bag 100, a tube 105 provided with a connecting portion 104 at its end is connected.

20 [0004] In the state of FIG. 25, a spout 102 is sealed with a liquid stopper cap 103. The spout 102 and the end of the tube 105 can be connected to each other by removing the liquid stopper cap 103.

[0005] On the other hand, a bag main body 111 of a drug solution bag 110 is filled with a drug solution. The drug solution is taken from a drug solution bottle (not
25 shown) through a tube (not shown) connected to a tube connector 112.

[0006] When administering the drug solution to the body, a needle 114 is inserted into a needle port 113. Consequently, the drug solution can be sent to the body through a tube connected to the needle 114.

[0007] Here, the connecting portion 104 is designed such that it is to be fitted to the
30 spout 102 of the nutrient bag 100. For this reason, the connecting portion 104 cannot be fitted to the needle port 113 of the drug solution bag 110, so that the connecting portion 104 will not be connected to the drug solution bag 110 by mistake under

normal conditions.

[0008] On the other hand, the liquid stopper cap 103 is made of a soft material so that it easily can be attached to and removed from the spout 102. Therefore, the needle 114 can be inserted into the liquid stopper cap 103. In this case, the needle
5 114 penetrates the liquid stopper cap 103 and reaches inside the spout 102. When such accidental insertion occurs, the nutrient will be administered through the transfusion line for supplying the drug solution, which raises the possibility of medical accidents.

[0009] In order to prevent such accidental insertion, for example, Patent document 1
10 proposes a connecting needle penetration prevention structure provided on a portion corresponding to the spout 102. This connecting needle penetration prevention structure is a spiral member, an intermediate plate member, a mesh member or the like provided inside a tubular portion, and penetration of a connecting needle is prevented by means of these members.

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Prior art document

Patent document

[0010] Patent document 1: JP 2007-39121 A

20 Disclosure of Invention

Problem to be Solved by the Invention

[0011] However, the penetration prevention structure using a spiral member proposed in Patent document 1 is not a structure that stops penetration at the leading end of the tubular portion but is a structure where the entry of a connecting needle
25 into the tubular portion to some extent is a prerequisite. Further, the penetration prevention structure using an intermediate plate member or a mesh member is likely to deform or be cracked when a connecting needle is pressed into it.

[0012] With the foregoing in mind, it is an object of the present invention to provide a
30 spout that can prevent accidental insertion of connecting needles with more certainty, and a liquid container with the spout.

Means for Solving Problem

[0013] In order to achieve the above object, the spout of the present invention is a spout that can be attached to a liquid container and through which contents filled in the liquid container are discharged. The spout includes: a tubular portion in which a through hole is formed and from a leading end of which the contents are discharged;
 5 and a rib that extends from an inner circumferential surface of the tubular portion towards a central axis side of the through hole. A hole surrounded by an edge of the extended rib is formed in a part where the rib is formed.

[0014] The liquid container with a spout of the present invention includes the spout of the present invention.

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Effects of the Invention

[0015] According to the present invention, accidental insertion of connecting needles can be prevented with more certainty.

15 Brief description of the drawings

[0016] [FIG. 1] A schematic view of a nutrient bag 1 according to one embodiment of the present invention.

[FIG. 2] An exploded perspective view of principal portions of the nutrient bag 1 shown in FIG. 1.

20 [FIG. 3] A cross-sectional view of a spout according to one embodiment of the present invention.

[FIG. 4] (a): a diagram showing a state where a spout 4 is attached to a port portion 3. (b): a diagram showing a state where a liquid stopper cap 5 is attached to the spout 4 in (a).

25 [FIG. 5] A cross-sectional view taken in a vertical direction of FIG. 4(b).

[FIG. 6] A diagram showing an exemplary state where a nutrient administering tube is connected to a tubular portion 9 of the spout 4.

[FIG. 7] A perspective view of a spout according to one embodiment of the present invention.

30 [FIG. 8] A cross-sectional view taken in the central axis direction of the spout 4 shown in FIG. 7.

[FIG. 9] A perspective view showing a state where a connecting needle 120 is

entering the tubular portion 9.

[FIG. 10] A cross-sectional view taken in the central axis direction of the tubular portion 9 in FIG. 9.

[FIG. 11] A perspective view showing a state where the tip of the connecting
5 needle 120 is in contact with a rib 20.

[FIG. 12] A cross-sectional view taken on the line A-A in FIG. 11.

[FIG. 13] A cross-sectional view showing another embodiment of the rib 20.

[FIG. 14] A cross-sectional view showing yet another embodiment of the rib
20.

10 [FIG. 15] A schematic view of a nutrient bottle 30 according to one embodiment of the present invention.

[FIG. 16] An exploded perspective view of principal portions of the nutrient bottle 30 shown in FIG. 15.

[FIG. 17] A magnified view of a tubular portion 41 according to one
15 embodiment of the present invention.

[FIG. 18] A perspective view showing a state immediately before attaching a spout 33 to the bottle main body 31 in one embodiment of the present invention.

[FIG. 19] A perspective view showing a state immediately before attaching a connector 45 and a tube 46 to the spout 33 in one embodiment of the present
20 invention.

[FIG. 20] A perspective view showing a state where the connection of the connector 45 and the tube 46 to the spout 33 is completed in one embodiment of the present invention.

[FIG. 21] A perspective view showing a state where the connecting needle 120
25 is entering a tubular portion 41 in one embodiment of the present invention.

[FIG. 22] A cross-sectional view taken in the central axis direction of the tubular portion 41 in FIG. 21.

[FIG. 23] A perspective view showing a state where the tip of the connecting needle 120 is in contact with a rib 43 in one embodiment of the present invention.

30 [FIG. 24] A cross-sectional view taken on the line C-C in FIG. 23.

[FIG. 25] A schematic view showing one example of a nutrient supply system using a conventional nutrient bag and one example of a drug solution supply system

using a conventional drug solution bag.

Description of the Invention

[0017] According to the present invention, the structure for preventing accidental
5 insertion is achieved by extending the rib from the inner circumferential surface of the
tubular portion and forming a hole surrounded by the edge of the extended rib. With
this configuration, the strength of the rib can be secured easily, which is advantageous
in preventing breakage and deformation of the rib. Thus, it is also possible to
prevent accidental insertion of connecting needles with more certainty.

10 [0018] In the spout of the present invention, an inclined surface that inclines in the
leading end side of the tubular portion towards the central axis of the through hole
preferably is formed on the rib on the leading end side of the tubular portion. With
this configuration, the tip of a connecting needle that has come into contact with the
rib is guided by the inclined surface and is likely to slip in the direction away from the
15 hole. Thus, when the tip of the connecting needle first comes into contact with the
rib, it is hard for the connecting needle to enter the hole. If the tip of the connecting
needle does not enter the hole, the entry distance of the connecting needle is small,
which is more advantageous in preventing accidental insertion.

[0019] Further, an inclined surface that inclines in the leading end side of the
20 tubular portion towards the central axis of the through hole preferably is formed on
the rib on the base end side of the tubular portion. With this configuration, as a
result of forming the inclined surface, a liquid in the bag flows along the inclined
surface when it flows towards the leading end of the tubular portion. Thus, it is
possible to improve the flowability.

25 [0020] Further, inclined surfaces that incline in the leading end side of the tubular
portion towards the central axis of the through hole preferably are formed on the rib
on the leading end side and the base end side of the tubular portion, respectively.
With this configuration, it is possible not only to make it hard for the tip of the
connecting needle that has come into contact with the rib to enter the hole but also to
30 improve the flowability of the liquid in the bag at the tubular portion.

[0021] Further, it is preferable that the spout further includes a base that is attached
to the liquid container, the tubular portion protrudes from the base, and the

protruding dimension of the tubular portion from the base is 1 mm or more and 10 mm or less. With this configuration, when the spout is attached to the liquid container, it is not only advantageous in transporting the liquid container and in preventing breakage of the tubular portion but also advantageous in securing the

5 airtightness between the tubular portion and a tube attached to the tubular portion.

[0022] Further, it is preferable that the spout further includes an air-permeable filter.

With this configuration, the liquid can be discharged easily from the liquid container.

[0023] Further, the liquid container is preferably a pouch-like bag or a bottle.

[0024] It is preferable that the liquid container with a spout of the present invention
10 includes a liquid stopper cap for sealing the spout, and when the liquid stopper cap is attached to the spout, the minimum distance between the leading end of the liquid stopper cap and the rib is 5 mm or less. Further, the minimum distance is more preferably 1 mm or less.

[0025] This configuration allows the liquid stopper cap to come into contact with the
15 rib before the tip of the connecting needle penetrates the liquid stopper cap. Thus, even if the connecting needle remains inserted, it is possible to prevent the contents of the bag from being discharged.

[0026] Hereinafter, one embodiment of the present invention will be described with reference to the drawings.

20 [0027] (Embodiment 1)

FIG. 1 is a schematic view of a nutrient bag 1 according to one embodiment of the present invention. A bag main body 2 as a liquid container is a part in which a nutrient is filled. A spout 4 is attached to a port portion 3 integral with the bag main body 2. The spout 4 can be sealed by fitting a liquid stopper cap 5 thereto.

25 [0028] The bag main body 2 is soft resin sheets formed into the form of a pouch. The bag main body 2 can be formed by, for example, laying a resin sheet on top of another resin sheet and heat welding the edge for bonding. An opening 10 through which the nutrient bag 1 is hung is formed at one end of the bag main body 2.

[0029] Examples of resin sheet materials include polyethylene (PE), polypropylene
30 (PP), polyethylene terephthalate (PET), polyvinyl chloride (PVC), polybutadiene, nylon, and ethylene-vinyl acetate copolymer (EVA). Resin sheets may be laminated in two or more layers and the respective layers may be made of the same material or

different materials from each other.

[0030] FIG. 2 is an exploded perspective view of principal portions of the nutrient bag 1. The port portion 3 is a cylindrical member with an opening 6 being formed inside. The port portion 3 is integral with the bag main body 2, and the space

5 forming the opening 6 and the space inside the bag main body 2 are connected to each other. The port portion 3 and the bag main body 2 can be bonded to each other by, for example, heat welding one end of the port portion 3 with the end being sandwiched between the two resin sheets. A male screw 7 to be is screwed into the spout 4 is formed on the outer edge of the port portion 3.

10 [0031] Examples of materials for the port portion 3 include polyethylene (PE), polypropylene (PP), polyacetal (POM), polyethylene terephthalate (PET), and polycarbonate (PC).

[0032] The spout 4 includes a cylinder portion 8 and a tubular portion 9 having a smaller diameter than the cylinder portion 8. The inside of the tubular portion 9 is a through hole 12. On the outer circumferential surface of the tubular portion 9, a tapered surface 11 that increases in diameter from the leading end of the tubular portion 9 towards the cylinder portion 8 is formed.

[0033] FIG. 3 is a cross-sectional view of the spout 4. The spout 4 is a hollow member and the space inside the cylinder portion 8 and the through hole 12 inside the tubular portion 9 are connected to each other. As shown in FIG. 3, a female screw 14 is formed inside the cylinder portion 8. The spout 4 can be attached to the port portion 3 by screwing the male screw 7 (FIG. 2) of the port portion 3 into the female screw 14. Examples of materials for the spout 4 include those mentioned as exemplary materials for the port member 3.

25 [0034] In FIG. 2, a liquid stopper cap 5 is a cylindrical member, which is open on the spout 4 side but is sealed on the opposite side. The liquid stopper cap 5 is for sealing the spout 4 to prevent the contents of the bag main body 2 from being discharged. The liquid stopper cap 5 is made of a material more flexible than that of the spout 4, so that it can be attached to and detached from the tubular portion 9.

30 [0035] Examples of materials for the liquid stopper cap 5 include polypropylene (PP), polyethylene (PE), polybutadiene, polyvinyl chloride (PVC), ABS resin and elastomer.

[0036] FIG. 4(a) shows a state where the spout 4 is attached to the port portion 3.

FIG. 4(b) shows a state where the liquid stopper cap 5 is attached to the spout 4 in FIG. 4(a). FIG. 5 is a cross-sectional view taken in the vertical direction of FIG. 4(b). As shown in FIG. 5, the liquid stopper cap 5 is plugged in so as to entirely encompass the tubular portion 9 of the spout 4.

5 [0037] In the vicinity of the end of the tapered surface 11 on the cylinder portion 8 side, the tapered surface 11 has a larger outer diameter than the inner diameter of the liquid stopper cap 5. As a result, when the liquid stopper cap 5 is attached to the spout 4, the liquid stopper cap 5 partially comes into close contact with the tapered surface 11 due to the liquid stopper cap 5 being elastically deformed. Consequently,
10 the attachment of the liquid stopper cap 5 can be ensured.

[0038] Next, exemplary dimensions of each portion will be described with reference to FIG. 5. In the following description, the leading end side of the tubular portion 9 is, between the two end sides of the tubular portion 9, the side (lower side of FIG. 5) from which the contents of the bag main body 2 (FIGS. 1 and 2) are discharged. The base
15 end side of the tubular portion 9 is the opposite side to the leading end side and is the side into which the contents of the bag main body 2 (FIG. 1 and 2) flows, in other words, it is the bag main body 2 (FIGS. 1 and 2) side.

[0039] As for the dimensions of each portion in FIG. 5, it can be assumed that a dimension A (the thickness of the rib 20) is 3.0 mm and a dimension B (the thickness
20 of the center part of the liquid stopper cap 5) is 3.8 mm. Further, it is assumed that the inner diameter of the through hole 12 on the leading end side of the tubular portion 9 from the rib 20 is a dimension C, and the inner diameter of the through hole 12 on the base end side of the tubular portion 9 is a dimension E.

[0040] In this case, it can be assumed that the dimension C is 4.74 mm on the
25 leading side of the tubular portion 9 and 4.85 mm on the base end side of the tubular portion 9, and the dimension E is 3.45 mm on the leading end side of the tubular portion 9 and 4.1 mm on the base end side of the tubular portion 9. Further, it can be assumed that a dimension D (the minimum distance between the leading end of the tubular portion 9 and the rib 20) is 3.5 mm.

30 [0041] The dimensions A to E each may be changed as needed within tolerance. The tolerance of each of the dimensions A, B and D is in the range of -20% to +20% of the mentioned value. The tolerance of each of the dimensions C and E is in the range

of -10% to +10% of the mentioned value.

[0042] As shown in FIGS. 4(b) and 5, the nutrient bag 1 is transported with the liquid stopper cap 5 being attached thereto. When administering the nutrient, the liquid stopper cap 5 is removed as in FIG. 4(a) and a nutrient administering tube is
5 connected to the tubular portion 9 of the spout 4.

[0043] FIG. 6 shows an exemplary state where a nutrient administering tube is connected to the tubular portion 9 of the spout 4. In FIG. 6, the spout 4 and the tube 15 are connected to each other through a connecting portion 16 provided at the end of the tube 15. To establish the connection, a hook (not shown) formed on the spout 4 is
10 fitted to a recess (not shown) formed in the connecting portion 16, for example. In the state of FIG. 6, the nutrient in the bag main body 2 is to be administered to the body through the tube 15.

[0044] Note that a variety of connection schemes can be used to connect the spout 4 and the tube 15 to each other, and the connection scheme of FIG. 6 is one example.

[0045] Hereinafter, the procedure of administering a nutrient using the nutrient bag 1 will be described more specifically. In the initial state prior to being filled with a nutrient, the nutrient bag 1 is in a state where the liquid stopper cap 5 is attached to the spout 4 as shown in FIG. 4(b). From this state, the spout 4 is removed from the port portion 3 with the liquid stopper cap 5 remaining attached to the spout 4. The
15 spout 4 can be removed by rotating the spout 4 to loosen the screw.

[0046] In the state where the spout 4 is removed from the port portion 3, the opening 6 of the port portion 3 is exposed as shown in FIG. 2. A nutrient is injected into the bag main body 2 through the opening 6 as an entrance.

[0047] After injecting the nutrient into the bag main body 2, the spout 4 is
25 reattached to the port 3 to put it back in the state of FIG. 4(b). The nutrient bag 1 is transported in this state. Since a tube is not attached to the spout 4 in this state, a long tube does not get in the way of the transportation, and the nutrient bag 1 can be transported easily.

[0048] Further, the spout 4 is screwed into the port portion 3 and the spout 4 is
30 sealed with the liquid stopper cap 5. As a result, leakage of the contents of the bag main body 2 is prevented. Therefore, the nutrient bag 1 also can be placed laterally when being transported.

[0049] As for the nutrient bag 1 after being transported, the nutrient administering tube 15 is connected to the tubular portion 9 of the spout 4 as shown in FIG. 6 with the liquid stopper cap 5 being removed as in FIG. 4(a). At this time, the spout 4 is brought to face upward to prevent leakage of the nutrient. After connecting the tube 15, the nutrient bag 1 is hung on a hook through the opening 10 (FIG. 1). The nutrient is to be administered in this state.

[0050] As described above, FIG. 25 shows one example of a nutrient supply system using the conventional nutrient bag 100. FIG. 25 shows a conventional example where both the nutrient bag 100 and the drug solution bag 110 are used in combination.

[0051] In this case, there is a possibility of inserting a needle 114 into the liquid stopper cap 103 of the nutrient bag 100, even through the needle 114 is supposed to be inserted into the drug solution bag 110. The nutrient bag 1 according to the present embodiment has the same appearance as the conventional nutrient bag 100 shown in FIG. 25.

[0052] Therefore, even if the nutrient bag 1 according to the present embodiment is used in place of the conventional nutrient bag 100 shown in FIG. 25, there is a possibility of inserting the needle 114 into the liquid stopper cap 5 of the nutrient bag 1 shown in FIG. 4(b), even though the needle 114 is supposed to be inserted into the drug solution bag 110.

[0053] The spout 4 of the nutrient bag 1 according to the present embodiment is structured to prevent such accidental insertion. In this regard, a description will be given below.

[0054] FIG. 7 is a perspective view of the spout 4. FIG. 8 is a cross-sectional view taken in the central axis direction of the spout 4 shown in FIG. 7.

[0055] The through hole 12 inside the tubular portion 9 of the spout 4 is provided with a rib 20 that narrows the inner diameter of the through hole 12. The rib 20 extends from the inner circumferential surface of the tubular portion 9 towards the central axis 13 side of the through hole 12. A hole 21 surrounded by the edge of the extended rib 20 is formed in the part where the rib 20 is formed. For example, the area of the hole 21 is preferably in the range of 2 to 14 mm², and more preferably 4 to 12 mm².

[0056] By means of the rib 20 formed inside the through hole 12, the spout 4 prevents accidental insertion of connecting needles. Since there is no room for inserting a connecting needle in the state after the connection of the tube 15 as in FIG. 6, no accidental insertion occurs. In the states of FIGS. 4(b) and 5, however, there is
 5 a possibility of inserting a connecting needle for a bag other than the nutrient bag 1 into the liquid stopper cap 5 as a soft material.

[0057] FIG. 9 is a perspective view showing a state where the connecting needle 120 is entering the tubular portion 9. FIG. 10 is a cross-sectional view taken in the central axis direction of the tubular portion 9 in FIG. 9. In FIGS. 9 and 10, the
 10 connecting needle 120 is for a bag other than the nutrient bag 1. The connecting needle 120 corresponds to the connecting needle 114 for the drug solution bag 110 in the example shown in FIG. 25.

[0058] As shown in FIG. 9, the tip of the connecting needle 120 is inserted in the hole 21 whose diameter is narrowed by the rib 20. Although the liquid stopper cap 5 is
 15 not illustrated in FIG. 9, the connecting needle 120 has penetrated the liquid stopper cap 5 as shown in FIG. 10 and is inserted in the hole 21.

[0059] A tip part 120b of the connecting needle 120 increases in diameter towards a main body part 120a. From one point between the tip part 120b and the main body part 120a, the diameter of the tip part 120b becomes larger than the diameter of the
 20 hole 21. Therefore, the tip part 120b of the connecting needle 120 enters the hole 21 but the entry of the tip part 120b is limited.

[0060] That is, the connecting needle 120 can only be inserted for a small distance, so that accidental insertion is likely to be noticed. In this case, the connecting needle 120 will be removed, so that accidental insertion is prevented.

25 [0061] Further, the hole 21 is surrounded by the edge of the rib 20 that extends from the inner circumferential surface of the tubular portion 9. That is, since there is no other hole between the edge of the rib 20 and the inner circumferential surface of the tubular portion 9, the rib 20 is a structure advantageous in preventing breakage and deformation.

30 [0062] Here, resin needles normally have a hole 121 with a large length. When the insertion distance of the connecting needle 120 is small, the hole 121 protrudes outside the liquid stopper cap 5 as shown in FIG. 10. In this state, even if the

nutrient starts to flow into the hole 121, the nutrient leaks through the hole 121 on the outside of the liquid stopper cap 5. Also in this case, accidental insertion is noticed, so that the connecting needle 120 will be removed and accidental insertion is prevented.

5 [0063] Further, as shown in FIG. 10, the hole 121 protrudes outside the liquid stopper cap 5 more as the rib 20 is positioned closer to the leading end of the liquid stopper cap 5. For this reason, it is desirable that the minimum distance d between the leading end of the liquid stopper cap 5 and the rib 20 is set to be small in FIG. 5. In this case, if the leading end of the liquid stopper cap 5 is configured not to press the
10 rib 20, attachment of the liquid stopper cap 5 becomes easy.

[0064] Although the examples of FIGS. 9 and 10 show that the tip of the connecting needle 120 is in the hole 21, there may be a case where the tip of the connecting needle 120 does not enter the hole 21 but comes into contact with the rib 20. FIG. 11 is a perspective view showing a state where the tip of the connecting needle 120 is in
15 contact with the rib 20. FIG. 12 is a cross-sectional view taken in the line A-A in FIG. 11. Although the liquid stopper cap 5 is not illustrated in FIG. 11, the tip of the connecting needle 120 has penetrated the liquid stopper cap 5 as shown in FIG. 12 and is in contact with the rib 20. As shown in FIGS. 11 and 12, when the tip of the connecting needle 120 comes in contact with the rib 20, the entry distance of the
20 connecting needle 120 becomes smaller in comparison with the case where the tip of the connecting needle 120 enters the hole 21. Thus, it is advantageous in preventing accidental insertion.

[0065] In the examples of FIGS. 11 and 12, an inclined surface 22 is formed on the rib 20 on the leading end side of the tubular portion 9. This makes it hard for the tip
25 of the connecting needle 120 that has come into contact with the rib 20 to enter the hole 21. The inclined surface 22 is formed so as to surround the hole 21. The inclined surface 22 is inclined in the leading end side of the tubular portion 9 towards the central axis 13 of the through hole 12.

[0066] As a result of forming the inclined surface 22, the tip of the connecting needle
30 120 that has come into contact with the rib 20 as shown in FIGS. 11 and 12 is guided by the inclined surface 22 and is likely to slip in the direction away from the hole 21. For this reason, when the tip of the connecting needle 120 once comes into contact

with the rib 20, the connecting needle 120 is less likely to enter the hole 21.

[0067] Here, as described above, it is desirable that the minimum distance d between the leading end of the liquid stopper cap 5 and the rib 20 is set to be small. This is also effective in the case where the tip of the connecting needle 120 does not
5 enter the hole 21 but comes into contact with the rib 20 as in FIG. 12.

[0068] In the example of FIG. 12, the tip of the connecting needle 120 has penetrated the liquid stopper cap 5. However, until being penetrated, the liquid stopper cap 5 is pressed by the connecting needle 120 and deforms elastically. When the minimum distance d is small, the liquid stopper cap 5 comes into contact with the rib 20 before
10 the tip of the connecting needle 120 penetrates the liquid stopper cap 5.

[0069] In this case, the contents of the bag main body are not discharged even if the connecting needle 120 remains inserted. More specifically, the minimum distance d between the leading end of the liquid stopper cap 5 and the rib 20 is preferably 5 mm or less, and more preferably 1 mm or less.

[0070] FIG. 13 is a cross-sectional view showing another embodiment of the rib 20. An inclined surface 23 is formed on the rib 20 on the base end side of the tubular portion 9. The inclined surface 23 is formed so as to surround the hole 21. The inclined surface 23 is inclined in the leading end side of the tubular portion 9 towards the central axis 13 of the through hole 12.
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[0071] With this configuration, when the nutrient in the bag main body 2 (FIG. 1) flows towards the leading end of the tubular portion 9, the nutrient flows along the inclined surface 23 and enters the hole 21. That is, since the diameter of the through hole 12 is narrowed by the rib 20, the quantity of flow drops. However, as a result of forming the inclined surface 23, the flowability is improved.
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[0072] FIG. 14 is a cross-sectional view showing yet another embodiment of the rib 20. As described above, the configuration with the inclined surface 22 and that with the inclined surface 23 have been shown in FIGS. 12 and 13, respectively. FIG. 14 shows a configuration with both the inclined surfaces 22 and 23. The presence of the inclined surface 22 make it hard for the tip of the connecting needle 120 that has come
25 into contact with the rib 20 to enter the hole 21 and the presence of the inclined surface 23 improves the flowability of a nutrient.

[0073] Although the hole 21 has been described by taking a circular shape as an

example, as long as the entry of the connecting needle 120 can be stopped, the shape is not limited to circular and may be polygonal, for example.

[0074] Further, although the inclined surfaces 22 (FIGS. 12, 14) and 23 (FIGS. 13, 14) each having a linear cross-section have been illustrated by way of example, they
5 may have a curved cross-section or a cross-section composed of a combination of a line and a curve.

[0075] Further, the example where the spout 4 is attached to the bag main body 2 through the port portion 3 has been described, the spout 4 may be attached directly to the bag main body 2.

10 [0076] Further, in the above-described embodiment, the exemplary values of the sizes A to D in FIG. 5 and the exemplary value of the area of the hole 21 in FIG. 7 have been mentioned, they have been only mentioned by way of example and may be different values.

[0077] (Embodiment 2)

15 Hereinafter, Embodiment 2 of the present invention will be described. FIG. 15 is a schematic view of a nutrient bottle 30 according to Embodiment 2 of the present invention. The nutrient bottle 30 is obtained by attaching a spout 33 to an outlet 32 of a hollow bottle main body 31 as a liquid container.

[0078] While the nutrient-filling bag main body 2 in Embodiment 1 is made of a soft
20 material, the nutrient-filling bottle main body 31 in the present embodiment is made of a hard material. Therefore, unless external force is particularly applied to the bottle main body 31, the outside shape of the bottle main body 31 is retained.

[0079] Although the example where the bag main body 2 is not filled with a nutrient in the initial state has been described in Embodiment 1, the bottle main body 31 in
25 the present embodiment is pre-filled with a nutrient in the initial state.

[0080] The hollow bottle main body 31 is formed of, for example, a resin material by blow molding. Examples of resin materials include polyethylene terephthalate (PET), polypropylene (PP), polyvinylchloride (PVC), and nylon.

[0081] An opening 34 through which the nutrient bottle 30 is hung is formed in the
30 bottom part of the bottle main body 31.

[0082] FIG. 16 is an exploded perspective view of principal portions of the nutrient bottle 30. A male screw 34 to be screwed into the spout 33 is formed on the outer

edge of the outlet 32. The inside of the outlet 32 is a through hole 35. A sealant 36 is attached to the through hole 35, so that the opening of the outlet 32 is sealed. The sealant 36 is, for example, an aluminum foil, and an outer edge 36a is bonded to an outer edge 32a of the outlet 32.

5 [0083] The spout 33 includes a base portion 40 and a tubular portion 41. The base portion 40 is a portion that is attached to the outlet 32 of the bottle main body 31. A female screw (not shown) is formed inside the base portion 40. By screwing the male screw 34 of the outlet 32 into the female screw, the spout 33 can be attached to the outlet 32.

10 [0084] The tubular portion 41 protrudes from the base portion 40. The inside of the tubular portion 41 is a through hole 42. A tapered surface 41a that increases in diameter from the leading end of the tubular portion 41 towards the base portion 40 is formed on the outer circumferential surface of the tubular portion 41.

[0085] Examples of materials for the spout 33 include polyethylene (PE),
15 polypropylene (PP), polyacetal (POM), polyethylene terephthalate (PET) and polycarbonate (PC).

[0086] Further, a filter 52 is attached to the spout 33. Although the details will be described later with reference to FIG. 20, air is drawn into the bottle main body 31 through the filter 52 when discharging the nutrient through the tubular portion 41.

20 [0087] FIG. 17 is a magnified view of the tubular portion 41. The figure corresponds to the magnified view of the portion B in FIG. 16. The through hole 42 inside the tubular portion 41 of the spout 33 is provided with a rib 43 that narrows the inner diameter of the through hole 42. The rib 43 extends from the inner circumferential surface of the tubular portion 41 towards the central axis 44 side of the through hole 42. A hole 45 surrounded by the edge of the extended rib 43 is
25 formed in the part where the rib 43 is formed. For example, the area of the hole 45 is preferably in the range of 2 to 14 mm², and more preferably 4 to 12 mm².

[0088] By means of the rib 43 formed inside the through hole 12, the tubular portion 41 prevents accidental insertion of connecting needles. A description will be given
30 later for this with reference to FIGS. 21 to 24.

[0089] Hereinafter, the procedure of administering a nutrient using the nutrient bottle 30 will be described specifically. The nutrient bottle 30 is transported in the

state of FIG. 15. A tube is not attached to the spout 33 in the state of FIG. 15. Thus, a long tube does not get in the way of the transportation, and the nutrient bottle 30 can be transported easily.

[0090] The smaller the protruding dimension h (FIG. 15) of the tubular portion 41 from the base portion 40, the more advantageous it is in transporting the nutrient bottle 30 alone. In contrast, attachment of a tube to the tubular portion 41 becomes harder as the protruding dimension h becomes larger. Moreover, the possibility of breakage caused by bending of the tubular portion 41 increases. For these reasons, the protruding dimension h is preferably 10 mm or less, and more preferably 5 mm or less.

[0091] On the other hand, when the protruding dimension h is too small, the contact area between the tubular portion 41 and a tube decreases, causing difficulty in ensuring the airtightness. Thus, the protruding dimension h is preferably 1 mm or more. For the reasons mentioned above, the protruding dimension h is preferably 1 mm or more and 10 mm or less, and more preferably 1 mm or more and 5 mm or less.

[0092] Further, since the outlet 32 of the bottle main body 31 is sealed with the sealant 36 (FIG. 16), leakage of the contents of the bottle main body 31 is prevented. Thus, the nutrient bottle 30 can be oriented laterally when being transported.

[0093] After the nutrient bottle 30 has been transported to a destination, a connector 45 and a tube 46 (FIG. 19) are attached to the spout 33. When attaching them to the spout 33, the spout 33 is first removed from the bottle main body 31. This is to remove partially or entirely the sealant 36 sealing the outlet 32 to allow discharge of the nutrient in the bottle main body 31.

[0094] FIG. 18 is a perspective view showing a state immediately before attaching the now-removed spout 33 to the bottle main body 31. In the state of this figure, the sealant 36 shown in FIG. 16 has been removed. The spout 33 is attached to the outlet 32 by screwing the male screw 34 of the outlet 32 into the female screw (not shown) inside the base portion 40 of the spout 33.

[0095] FIG. 19 is a perspective view of a state immediately before attaching the connector 45 and the tube 46 to the bottle main body 31 to which the spout 33 has been attached. The nutrient administering tube 46 is inserted in the connector 45. Although the tube 46 has a certain length so as to administer the nutrient, only the

tube 46 on the connector 45 side is partially illustrated in FIGS. 19 and 20 for the sake of convenience. The tube 46 is made of a material softer than that of the spout 33, and is attachable to and detachable from the tubular portion 41.

[0096] By press fitting the tubular portion 41 in the inner circumferential surface of the tube 46 and engaging the connector 45 with hooks 48 provided on a pedestal 47, the connector 45 and the tube 46 are connected to the spout 33. By bringing the connector 45 into contact with the surface of the base portion 40 and rotating the connector 45 to fit the hooks 48 into openings 49 formed in the connector 45, the connector 45 and the hooks 48 are engaged with each other. In this state, since convex portions (not shown) formed on the connector 45 engage in the lower side of the hooks 48, the connector 45 is fixed to the spout 33, thereby preventing the connector 45 from falling out.

[0097] Meanwhile, a flange (not shown) is formed at the end of the tube 46, and the end of the connector 45 engages in the flange. As a result, the tube 46 is prevented from falling out of the connector 45.

[0098] That is, in the state where the connector 45 is fixed to the spout 33, the tube 46 is press fitted on the tubular portion 41 and also is engaged with the connector 45 fixed to the spout 33. Consequently, the tube 46 is prevented from falling out.

[0099] Note that a variety of connection schemes can be used to connect the spout 33 and the tube 46 to each other, and the connection scheme of FIG. 19 is one example.

[0100] FIG. 20 is a perspective view of a state where the connection of the connector 45 and the tube 46 to the spout 33 is completed. As described above, the sealant 36 (FIG. 16) has been removed entirely or partially prior to attaching the spout 33.

Thus, in the state of FIG. 20, the space inside the bottle main body 31 and the space inside the tube 46 are connected to each other. Therefore, in a state where the bottle main body 31 is hung on a hook through the opening 34 (FIG. 15), in other words, in the state where the bottle main body 31 is upside down in FIG. 20, it is possible to let the nutrient in the bottle main body 31 flow into the tube 46, so that the nutrient can be administered.

[0101] Here, when administering a nutrient from a pouch-like bag made of a soft material as in Embodiment 1, the nutrient is discharged while the bag deforms into the form of a sheet. On the other hand, it is difficult for the bottle main body 31

made of a hard material to deform like the pouch-like bag. To the spout 33 according to the present embodiment, the air-permeable filter 52 is attached. The filter 52 is a hydrophobic filter, so that air can pass through the filter but a liquid cannot.

[0102] When the nutrient is discharged from the bottle main body 31, air is drawn
5 into the bottle main body 31 through the filter 52 attached to the spout 33. This makes it easy to discharge the nutrient from the bottle main body 31.

[0103] Next, when the nutrient bottle 30 according to the present embodiment is used in place of the conventional nutrient bag 100 shown in FIG. 25, since there is no room for inserting a connecting needle in the state after connecting the tube 46 to the
10 spout 33 as shown in FIG. 20, no accidental insertion occurs. Meanwhile, in the state before connecting the tube 46 as in FIG. 19, there is a possibility of inserting the needle 114 into the tubular portion 41, even though the needle 114 is supposed to be inserted into the drug solution bag 110.

[0104] Similarly to Embodiment 1, the spout 33 of the nutrient bottle 30 according to
15 the present embodiment is structured to prevent such accidental insertion. In this regard, a description will be given below.

[0105] FIG. 21 is a perspective view showing a state where the connecting needle 120 is entering the tubular portion 41. FIG. 22 is a cross-sectional view taken in the central axis direction of the tubular portion 41 in FIG. 21. In FIGS. 21 and 22, the
20 connecting needle 120 is not for being connected to the nutrient bottle 30. The connecting needle 120 corresponds to the connecting needle 114 for the drug solution bag 110 in the example of FIG. 25.

[0106] As shown in FIGS. 21 and 22, the tip of the connecting needle 120 is inserted in the hole 45 whose diameter is narrowed by the rib 43. The tip part 120b of the
25 connecting needle 120 increases in diameter towards the main body part 120a. At one point between the tip part 120b and the main body part 120a, the diameter of the tip part 120b becomes larger than the diameter of the hole 45. Thus, the tip part 120b of the connecting needle 120 enters the hole 45 but the entry of the tip part 120b is limited.

[0107] That is, the connecting needle 120 only can be inserted for a small distance, so
30 that accidental insertion is likely to be noticed. In this case, the connecting needle 120 will be removed, so that accidental insertion is prevented.

[0108] Further, unlike Embodiment 1, a cap corresponding to the liquid stopper cap 5 (FIG. 10) is not attached to the tubular portion 41 in the present embodiment.

Therefore, when inserting the connecting needle 120, it is possible visually to check the opening at the leading end of the tubular portion 41. In this case, accidental

5 insertion may be prevented as soon as the presence of the rib 43 is noticed.

[0109] Further, the hole 45 is surrounded by the edge of the rib 43 that extends from the inner circumferential surface of the tubular portion 41. That is, since there is no other hole between the edge of the rib 43 and the inner circumferential surface of the tubular portion 41, the rib 43 is a structure advantageous in preventing breakage and

10 deformation.

[0110] Although the examples of FIGS. 21 and 22 show that the tip of the connecting needle 120 is in the hole 45, there may be a case where the tip of the connecting needle 120 does not enter the hole 45 but comes into contact with the rib 43. FIG. 23

is a perspective view showing a state where the tip of the connecting needle 120 is in contact with the rib 43. FIG. 24 is a cross-sectional view taken in the line C-C in FIG. 23.

[0111] As shown in FIGS. 23 and 24, when the tip of the connecting needle 120 comes in contact with the rib 43, the entry distance of the connecting needle 120 becomes smaller in comparison with the case where the tip of the connecting needle

20 120 enters the hole 45. Thus, it is advantageous in preventing accidental insertion.

[0112] In the example of FIGS. 23 and 24, an inclined surface 46 is formed on the rib 43 on the leading end side of the tubular portion 41. This makes it hard for the tip of the connecting needle 120 that has come into contact with the rib 43 to enter the hole 45. The inclined surface 46 is formed so as to surround the hole 45. The inclined

25 surface 46 is inclined in the leading end side of the tubular portion 41 towards the central axis 44 of the through hole 42.

[0113] As a result of forming the inclined surface 46, the tip of the connecting needle 120 that has come into contact with the rib 43 as in FIGS. 23 and 24 is guided by the inclined surface 46 and is likely to slip in the direction away from the hole 45. Thus,

30 when the tip of the connecting needle 120 once comes into contact with the rib 43, the connecting needle 120 is unlikely to enter the hole 45.

[0114] Also in the present embodiment, a configuration corresponding to the inclined

surface 23 may be provided as in FIG. 13 of Embodiment 1 so as to improve the flowability of a nutrient to be discharged through the tubular portion 41.

[0115] Further, configurations corresponding to the inclined surfaces 22 and 23 may be provided as in FIG. 14 of Embodiment 1 so as to make it hard for the tip of the connecting needle 120 to enter and to improve the flowability of a nutrient.

[0116] Further, the example where the tubular portion 41 protrudes from the base portion 40 of the spout 33 has been described, but the tubular portion 41 may be formed inside the spout 33 so as not to protrude the tubular portion 41 from the base portion 40.

[0117] Further, although the example where the connector 45 and the tube 46 as a soft material are attached to the spout 33 has been described, as long as a nutrient can be administered through the spout 33, the attachment portions may have a different structure and different specifications. For example, without using the connector 45, the tube 46 may simply be press fitted on the tubular portion 41 of the spout 33.

[0118] Further, the liquid container has been described by taking the pouch-like bag in Embodiment 1 and the hollow bottle in Embodiment 2 as examples, the bottle may be used in Embodiment 1 and the bag may be used in Embodiment 2.

[0119] Further, as described above, since the spouts according to Embodiments 1 and 2 can prevent accidental insertion of connecting needles, bags and bottles to which the spouts are to be attached are not limited only to those for nutrients but also to those for other applications.

Industrial Applicability

[0120] As described above, since the spout according to the present invention can prevent accidental insertion of connecting needles with more certainty, it is useful as, for example, a spout of a nutrient bag.

Description of Reference Numerals

30	[0121]	1	nutrient bag
		2	bag main body
		4, 33	spout

	5	liquid stopper cap
	9, 41	tubular portion
	12, 42	through hole
	13, 44	central axis
5	20, 43	rib
	21, 45	hole
	22, 23, 46	inclined surface
	30	nutrient bottle
	31	bottle main body
10	40	base portion
	52	filter

CLAIMS

[1] A spout that can be attached to a liquid container and through which contents filled in the liquid container are discharged, the spout comprising:

5 a tubular portion in which a through hole is formed and from a leading end of which the contents are discharged; and

a rib that extends from an inner circumferential surface of the tubular portion towards a central axis side of the through hole,

wherein a hole surrounded by an edge of the rib is formed in a part where the rib is formed.

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[2] The spout according to claim 1, wherein an inclined surface that inclines in the leading end side of the tubular portion towards the central axis of the through hole is formed on the rib on the leading end side of the tubular portion.

15 [3] The spout according to claim 1, wherein an inclined surface that inclines in the leading end side of the tubular portion towards the central axis of the through hole is formed on the rib on a base end side of the tubular portion.

[4] The spout according to claim 1, wherein inclined surfaces that incline in the leading end side of the tubular portion towards the central axis of the through hole are formed on the rib on the leading end side and a base end side of the tubular portion, respectively.

[5] The spout according to claim 1, further comprising a base that is attached to the liquid container,

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wherein the tubular portion protrudes from the base, and a protruding dimension of the tubular portion from the base is 1 mm or more and 10 mm or less.

[6] The spout according to claim 1, further comprising an air-permeable filter.

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[7] The spout according to claim 1, wherein the liquid container is a pouch-like bag or a bottle.

[8] A liquid container with a spout comprising the spout according to claim 1.

[9] The liquid container according to claim 8, further comprising a liquid stopper
5 cap for sealing the spout,

wherein when the liquid stopper cap is attached to the spout, the minimum
distance between a leading end of the liquid stopper cap and the rib is 5 mm or less.