United States Patent [19]

Saijo

[11] **3,788,374**

[45] **Jan. 29, 1974**

[54] **PARENTERAL SOLUTION BAG**

[75] Inventor: **Mitsuaki Saijo,** Fujinomiya, Japan

[73] Assignee: **Jintan Terumo Co., Ltd.,** Tokyo, Japan

[22] Filed: **Jan. 26, 1972**

[21] Appl. No.: **220,763**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 71,309, Sept. 11, 1970, abandoned.

[52] **U.S. Cl.** ..... **150/1,** 128/214 B, 128/272, 150/8, 229/66

[51] **Int. Cl.** **B65d**

[58] **Field of Search** ..... 150/1, 8, 3; 229/66, 62; 128/272, 227, 214 B, DIG. 24

[56] **References Cited**

UNITED STATES PATENTS

3,343,541	9/1967	Bellamy, Jr.	128/272
3,110,308	11/1963	Bellamy, Jr.	128/272 X
3,426,959	2/1969	Lemelson	229/66 X
3,339,825	9/1967	Grevich	150/3 X

Primary Examiner—William T. Dixson, Jr.
Assistant Examiner—Stephen P. Garbe
Attorney, Agent, or Firm—Kemon, Palmer & Estabrook

[57] **ABSTRACT**

A parenteral solution bag is provided with openings protruding from the perimeter of said bag for taking in or out parenteral solution and with a protective closure for hermetically enclosing this protruded portion. To the protective closure of the protruding portion is fused part of a tab for tearing said protective closure.

3 Claims, 12 Drawing Figures

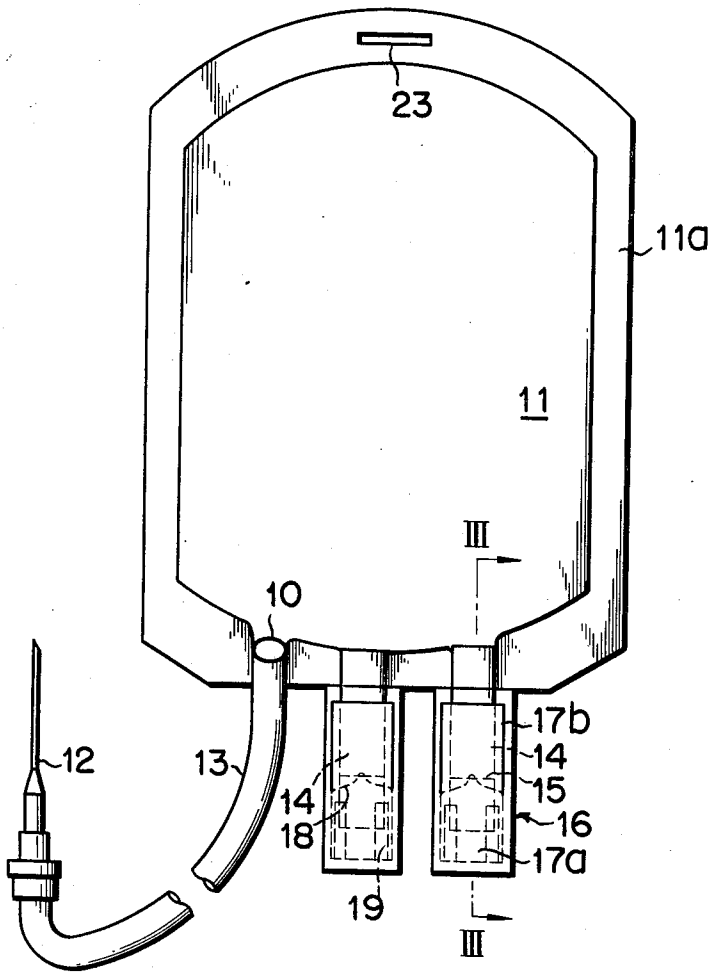


FIG. 1

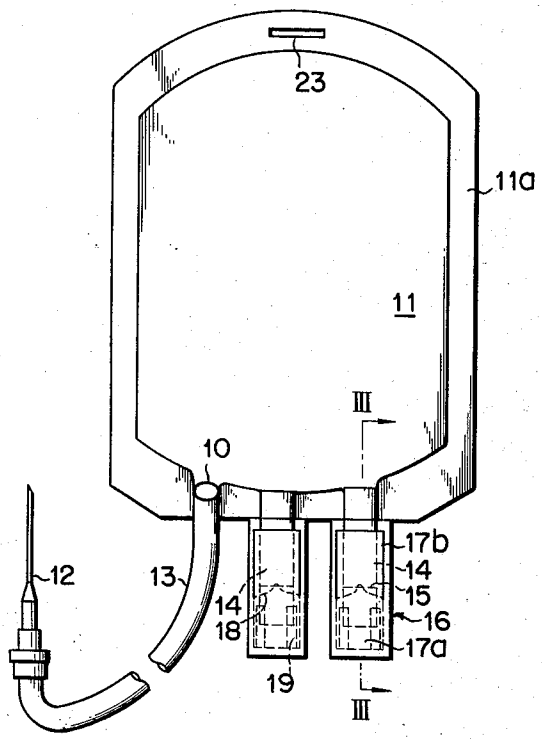


FIG. 2

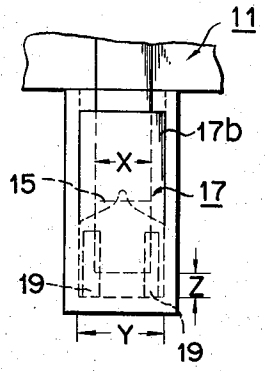


FIG. 3

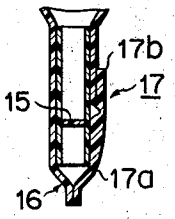


FIG. 4

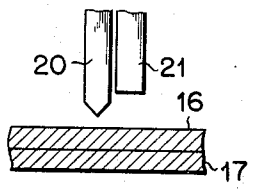


FIG. 5

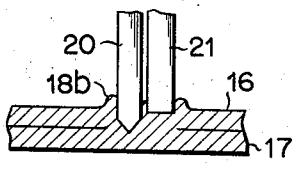


FIG. 6

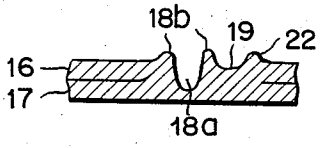


FIG. 7

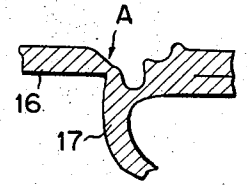


FIG. 8

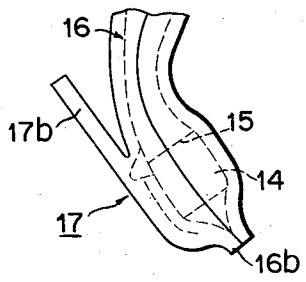


FIG. 9

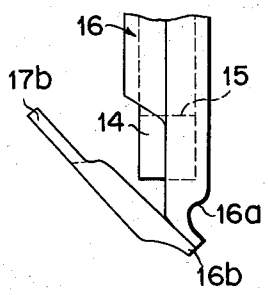


FIG. 10

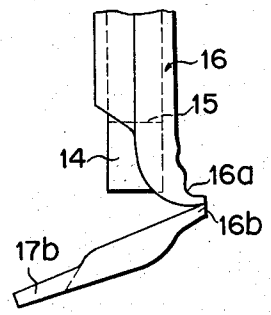


FIG. 11

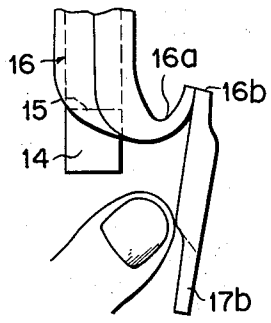
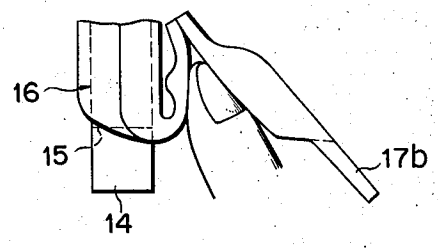


FIG. 12



PARENTERAL SOLUTION BAG

CROSS-REFERENCE TO RELATED APPLICATION

This is Continuation-in-part of the U. S. patent application Ser. No. 71,309, filed on Sept. 11, 1970, now abandoned.

The present invention relates to a parenteral solution bag, particularly to a parenteral solution bag improved in the mechanism for hermetically sealing the opening for taking in or out parenteral solution.

Parenteral solution bags are used for taking out blood or transfusion. A conventional hermetically sealing mechanism for this kind of bag is a rubber plug sealing in which the outlet opening is sealed with rubber plugs,. This type of sealing has many disadvantages: e.g., it is inconvenient to open the seal, the seal is easily polluted after it is opened, the outlet opening is easily polluted when opened, and sterilization of the rubber plug portion is difficult to effect.

The object of the present invention is to provide a parenteral solution bag having a simple sealing mechanism, not pollutable in the inlet and outlet of parenteral solution while hermetically sealed and when unsealed, and sterilizable as a whole under hermetically sealed condition such as in an autoclave, thus eliminating the above-mentioned drawbacks of conventional parenteral solution bags.

Another object of the invention is to provide a parenteral solution bag capable of having its tab peeled easily and reliably, being conveniently handled when opened and also being safely operated from a hygienic point of view.

The attached drawings show an embodiment of the parenteral solution bag according to the present invention, in which:

FIG. 1 is a plan view of a parenteral solution bag according to the present invention;

FIG. 2 is a perspective view of the outlet of the parenteral solution bag;

FIG. 3 is a cross-sectional view taken along III—III line of FIG. 1;

FIGS. 4 to 6 are sectional views showing the process of heat sealing the tab to the protective closure;

FIG. 7 is a sectional view of the tab while it is peeled; and

FIGS. 8 to 12 are lateral views showing the sequential processes of exposing the outlet of the parenteral solution bag.

The present invention will be explained with reference to an embodiment illustrated in the drawings.

The reference numeral **11** denotes a parenteral solution bag of a pliable and transparent plastic such as polyvinyl chloride which contains a proper quantity of ACD solution inside and the perimeter **11***a* of which is heat sealed. From a part of said perimeter **11***a* are derived a tubular extension **13** connected to a blood drawing needle **12** and a pair of solution ports **14.** The numeral **10** indicates a ball valve. Each port **14** is in the form of a hollow cylinder, one end being open to the inside of the bag **11** and the other end open to the outside of the bag **11.** Between said two openings is stretched a diaphragm **15,** through which a cannula can be pierced into the bag **11** and which prevents the outflow of the liquid existing inside bag **11.** Further, protective closures **16** hermetically cover the whole ports **14** so as to prevent the pollution of the ports **14.** Each

protective closure **16** forms a bag and is provided with a tab **17** on one face. The base end portion **17***a* of the tab **17** is fused to the protruding front of said protective closure **16** and the other end portion **17***b* of said tab **17** is lapped over the surface of the protective closure **16** toward the end connected with the parenteral solution bag as a gripping means.

The seal **18** between the joined base portion **17***a* and the free end portion **17***b* of tab **17** is so arranged that is preferably placed over the port **14** and roughly V-shaped.

It is preferred for the reason given later that the end of the V-shaped seal be superposed, as shown in FIG. **1,** on the near upper portion of the diaphragm.

What is important in heat sealing the tab **17** to the protective closure **16** is that the tab **17** be sealed sufficiently airtight to ensure complete sterilization and, when the protective closure is to be unsealed, be opened easily and reliably without being broken off. Therefore, this invention consists in, as illustrated in FIGS. **4** to **7,** heat sealing the tab **17** to the protective closure **16** in the direction in which the latter is set in place and fusing together the sheets of both closure **16** and tab **17** to form a V-shaped groove extending into the tab **17.** There will now be described the process of the invention by reference to these figures. There is first superposed the protective closure **16** on the tab **17.** Then a heater **20** is moved near the superposed assembly from the side of the protective closure **16** (FIG. **4**). The heater **20** is forced into the mass until its end reaches the tab **17** to fuse both sheets together (FIG. **5**). When the heater **20** is taken off, there is obtained a V-shaped groove **18***a*, on both sides of which there are formed upward projecting ribs **18***b*. Another heater **21** is intended to ensure the full fusion of the tab **17** to the protective closure **16,** thereby increasing the flexural strength of the tab **17** when it is peeled. As shown in FIGS. **4** and **5,** the latter heater **21** is placed adjacent to the first mentioned heater **20** to produce both heat seals simultaneously. Since, however, the latter heater **21** is intended simply to ensure the tight fusion of the tab **17** to the protective closure **16,** and also to form ribs **22** so as to elevate the flexural strength of the tab **17,** the latter heater **21** need not be inserted into the superposed mass so deeply as the first mentioned heater **20.**

When the tab **17** is thus heat sealed to the protective closure **16,** the boundary (A) between the fused and nonfused portions of the protective closure **16** becomes slightly thinned, as shown in FIG. **7,** and in consequence is reduced in tear strength, permitting its easy breakage when the tab **17** is pulled. Though, therefore, the sheets of both protective closure **16** and tab **17** originally had the same thickness, the protective closure **16** alone is sure to be broken, eliminating the necessity of making the sheet of the tab **17** thicker than that of the protective closure **16.** This offers in manufacture the advantage of using plastic sheets of the same material and thickness in common to the protective closure **16** and tab **17.** As the material for protective closure **16** and tab **17,** a pliable and transparent film such as soft polyvinyl chloride film or polyolefin resin film may be used.

According to a preferred embodiment, the protective closure **16** has a thickness of a 0.4 mm and an inner width (Y) of about 16 mm as against the port **14** having a diameter (X) of about 7 mm, and the distance (Z) be-

tween the end of the port **14** and the inner end of the protective closure **16** is about 5 mm. The tab **17** consists of the same kind of plastic sheet as the protective closure **16,** and is heat sealed thereto in advance by the process illustrated in FIGS. **4** to **6.** As apparent from FIG. **2,** the final heat seal pattern is such that the side of the base portion of the tab **17** which faces the parenteral solution bag **11** is formed into a pyramidic shape above the port **14** with the pointed top of said pyramidic shape disposed slightly above the diaphragm **15.** When, as shown in FIG. **8,** the port **14** is bent to peel off the tab **17** with its free end **17***b* gripped by hand, the boundary between the port **14** and diaphragm **15** is naturally bent, enabling said free end portion **17***b* to be easily gripped. There is further advantage that since the diaphragm **15** is difficult to bend, the tab **17** can be peel off, as illustrated in FIG. **9,** without loss of the peeling force. The pyramidic heat sealed pattern is not limited to what is indicated, but any other similar pattern may be accepted, provided that it causes the peeling force to be concentrated at a point so as to permit the easy removal of the tab **17.**

There will now be described the process of peeling off the tab **17.** The free end portion **17***b* of the tab **17** is gripped by hand as shown in FIG. **8** so as to be taken off through the steps as illustrated in FIGS. **9** to **12.** Since the tab **17** has its base portion **17***a* integrally formed with the protective closure **16** and there are formed a V-shaped groove **18***a* and ribs **18***b* in the heat sealed portion **18** of the superposed assembly of the protective closure **16** and tab **17,** said heat sealed portion **18** is allowed to have a prominently greater flexural strength than the opposite side **16***a* of the protective closure **16.** When, therefore, the tab **17** is pulled down by the finger as shown in FIG. **11,** the tab **17** is not bent, but the protective closure **16** alone is bent. Further, the end **16***b* of the protective closure **16** is not provided with a V-shaped groove illustrated in FIGS. **4** to **6,** but is fully heat sealed by the ordinary method used in fusing together laminated sheets. When, therefore, the tab **17** is peeled off, said end **16***b* of the protective closure **16** is not taken off together with the tab **17.**

When the tab **17** is peeled, its base portion **17***a* is not bent and the end **16***b* of the protective closure **16** remains fused to the tab **17.** Therefore, the protective closure **16** and tab **17** jointly act as a spring to the finger when it presses the tab **17** from the inside, preventing the tab **17** from getting away from the finger. As shown in FIG. **12,** therefore, the finger can be inserted fully into the protective closure **16** so as to easily expose the port **14.** Accordingly, when there is inserted a cannula into the port **14,** the tab **17** plays the part of holding the finger. Namely, the tab **17** not only serves to tear open the protective closure **16,** but also acts as a stopper for preventing the finger from slipping.

It is also possible, as shown in FIGS. **1** to **6,** to form a pair of heat sealed portions **19** having ribs **22** in the base portion **17***a* of the tab **17** for reinforcement to increase its stopper action.

The parenteral solution bag **11** provided with ports **14** having above-mentioned structure and arranged in the periphery of bag **11** is convenient to manufacture compared with the case in which ports are arranged in the bag face. The advantage of the present parenteral solution bag also lies in that there are further advantages that plastic sheets of the same material and thickness are used for both the protective closure and tab; the tab is unfailingly peeled off; the joint of the protective closure and the tab is easily broken by the peeling of the latter; the tab concurrently acts as a stopper when it is peeled; and the cannula is easily inserted. Further, parenteral solution may be taken out while the bag is suspended by means of a hanger hole **23.** There is no possibility for hands to touch ports **14,** and this is a merit from a hygienic point of view.

In connection with maintaining sterility, since the protective closure is peeled in such a way as illustrated in FIGS. **8** to **12,** there is little possibility that germs sticked to the tab or protective closure fall into the port as the tab is turned over. This is one of the important advantages of the present invention over the known parenteral solution bags.

What is claimed is:

1. In a parenteral solution bag comprising at least one port tube protruding from part of the perimeter of the bag and hermetically enclosed by a bag-like protective closure, a diaphragm provided in the port tube sealing off the port tube from flow-off liquid within the bag through the port tube, and a tab peripherally heat sealed to a portion of said protective closure having an unsealed free end, the improvement which comprises in combination:

a. the free end of the tab extending toward said bag,

b. a V-shaped groove extending through said protective closure and into said tab, said tab and said closure being connected by a heat seal which extends along the periphery of said groove, and a pair of ribs on said closure, said ribs extending adjacent said groove,

c. the apex of said V-shaped groove facing toward the junction of said port tube with said bag,

d. said V-shaped groove being positioned over said port tube and extending transversely to the port tube, and

e. the heat sealed portion of said tab being more rigid than the portion of said protective closure not sealed to said tab so that when the tab is peeled and turned backward towards the opposite side of said port tube, said heat sealed portion of said tab does not bend but instead said portion of said protective closure not sealed to said tube bends.

2. The parenteral solution bag of claim **1** wherein there is on said tab a pair of longitudinal heat seal portions accompanied with ribs spaced apart from one another and depending parallel to the longitudinal axis of said port tube from adjacent said V-shaped groove.

3. The parenteral solution bag of claim **1** wherein said protective closure is a rectangular shaped envelope formed of plastic sheet heat sealed along the two longest sides and one of the shorter sides, the other short side is heat sealed to said bag with said port tube enclosed by said protective closure and said V-shaped groove faces inward toward said port tube and extends from the heat seal along one of said longest sides to the heat seal along the other longest side.

* * * * *