United States Patent [19]

Kamikawa et al.

[11] **3,812,644**

[45] **May 28, 1974**

[54] **METHOD FOR PACKAGING FLOWABLE MATERIALS AND APPARATUS FOR MANUFACTURING PACKAGING BAGS**

[75] Inventors: **Kousaku Kamikawa; Seikichi Kawabe,** both of Kanazawa, Japan

[73] Assignees: **Chuba Kikai Co., Ltd.,** Ishikawa-ken; **The Nisseki Plastic Chemical Co., Ltd.,** Minato-ku, both of, Japan

[22] Filed: **Sept. 12, 1972**

[21] Appl. No.: **288,356**

[30] **Foreign Application Priority Data**

Sept. 4, 1971 Japan 46-78044

[52] **U.S. Cl.** ..... **53/29,** 53/46, 93/8 R

[51] **Int. Cl.** **B65b 43/10**

[58] **Field of Search** ..... 53/29, 45, 46, 44; 93/8 R

[56] **References Cited**

UNITED STATES PATENTS

3,148,489 9/1964 Senior et al. ..... 53/29 X

3,280,532 10/1966 Berry et al. 53/46

Primary Examiner—Travis S. McGehee

Attorney, Agent, or Firm—Stewart and Kolasch, Ltd.

[57] **ABSTRACT**

A method for packaging a flowable material comprising folding a flattened tubular film of a thermoplastic material such as polyethylene so that both sides thereof are folded inward; sealing the thus folded tubular film at the position which is to be the top of the finished package; unfolding the opening of the folded tubular film so that the inwardly folded portions are turned outward and the opening comprises two layers; introducing a flowable material in the thus formed bag; sealing the opening in the two layer state; and pressing flat the two layer sealed end to form a bottom. An apparatus for manufacturing thermoplastic packaging bags to be used for this method is disclosed, too.

10 Claims, 17 Drawing Figures

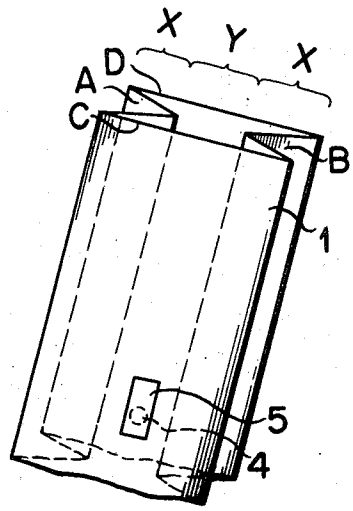


FIG. 1

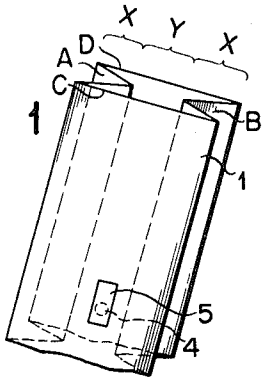


FIG. 2

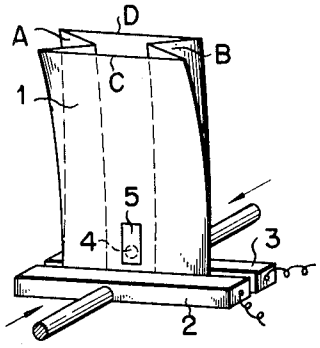


FIG. 3

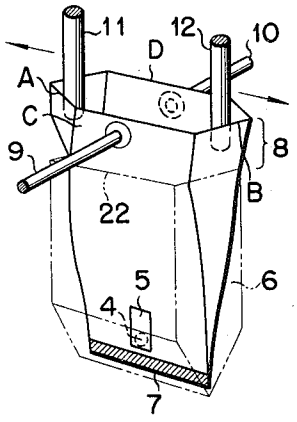


FIG. 4

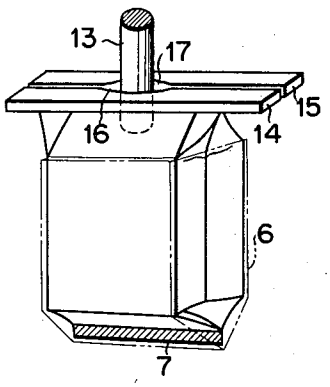


FIG. 5

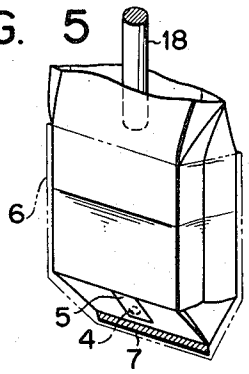


FIG. 6

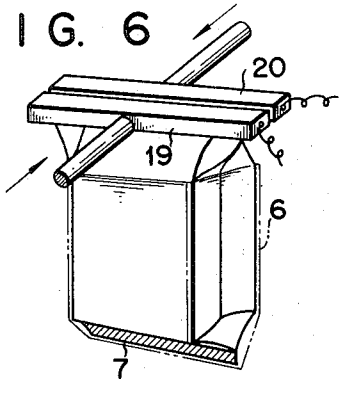


FIG. 7

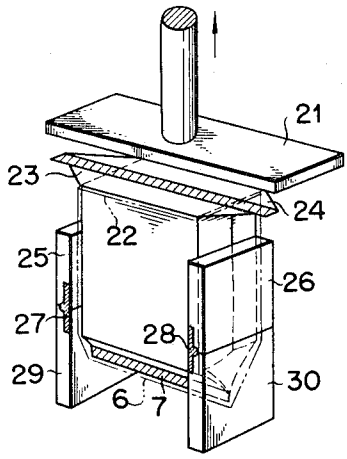


FIG. 8

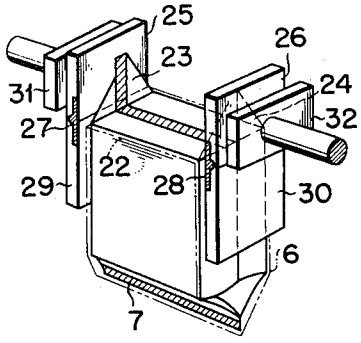


FIG. 9

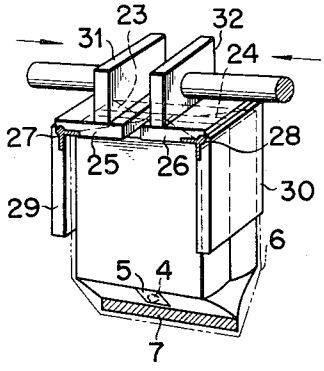


FIG. 10

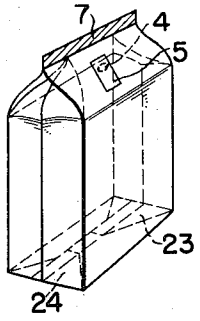


FIG. 11

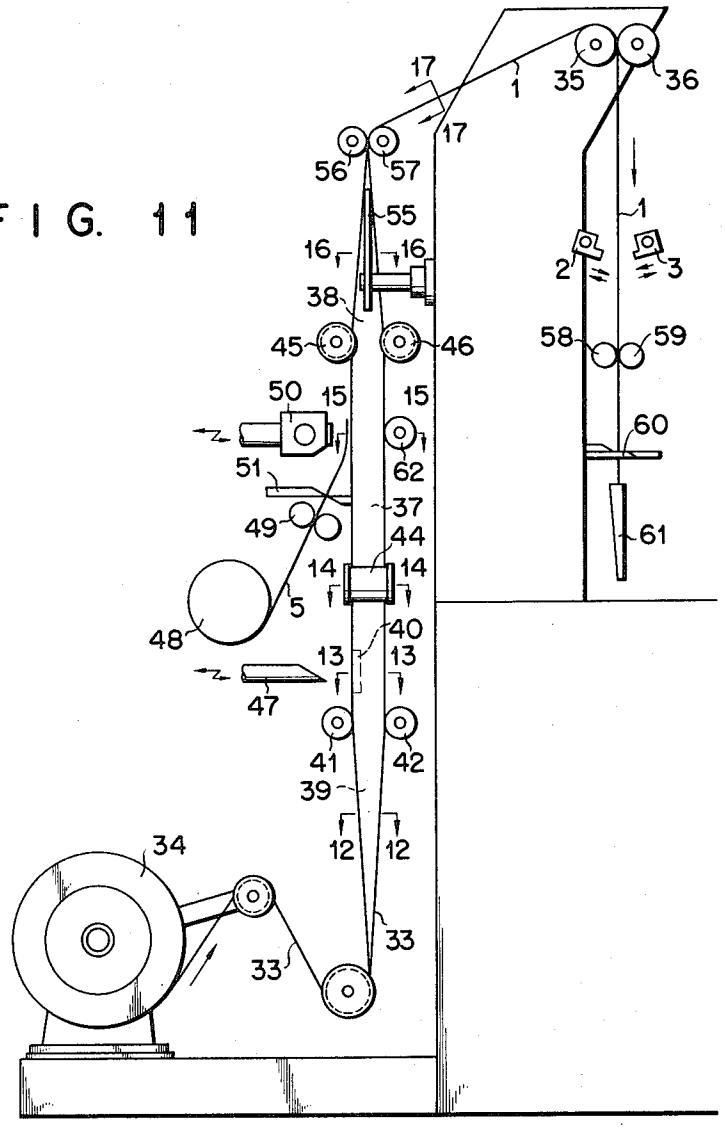

17
1
35
36
17
56
57
55
1
16
16
2
3
38
45
46
58
59
50
15
15
60
51
62
37
49
44
61
14
14
5
48
40
13
13
47
41
42
39
12
12
34
33
33

FIG. 12

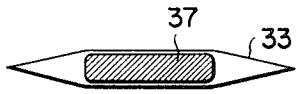


FIG. 13

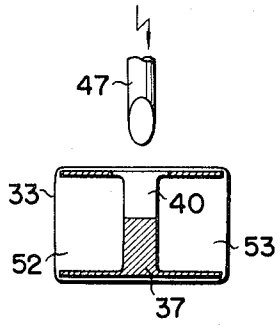


FIG. 14

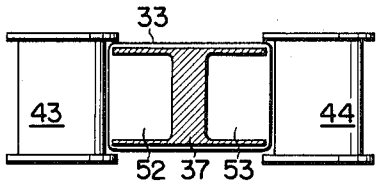


FIG. 15

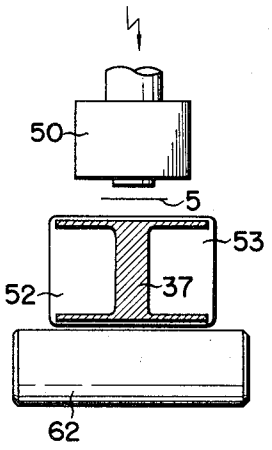


FIG. 16

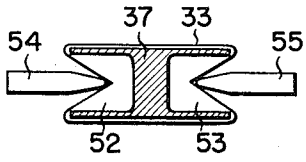
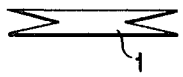


FIG. 17



METHOD FOR PACKAGING FLOWABLE MATERIALS AND APPARATUS FOR MANUFACTURING PACKAGING BAGS

This invention relates to a packaging method for perfectly sealing flowable materials including liquid etc. and an apparatus for manufacturing packaging bags to be used for said method.

In the prior art method for packaging flowable materials that is, liquid or pasty materials, a tubular film of a thermoplastic material is folded flat whereby both sides are folded inward as seen in FIG. **1**, the flat folded film is cut at a predetermined length, one end of the cut tubular film piece is heat-sealed, the sealed part is made flat to form a bottom, a flowable material such as liquid is introduced in the thus formed bag from the opposite opening end, that is, a top of the bag, and finally the opening end is heat-sealed.

In this packaging method, a flat bottom is formed prior to the introduction of liquid and the opening is heat-sealed after the introduction. When a liquid is put in a bag which has been formed as explained above, the liquid inevitably wets or adheres to the inside of the opening. As has been seen in FIG. **1**, both sides of the tubular film are folded inward, and therefore, in the folded state, the opening comprises two portions where four layers are superposed on each other (portions X) and one portion where two layers are superposed on each other (portion Y). When the thus folded opening is heat-sealed, perfect sealing is almost impossible. Because the liquid which has adhered to the inside of the opening instantaneously boils up and blows out at the stepped points between the four layer portion and the two layer portion leaving extremely small pinholes. It is a matter of course that the sealing of a package of a liquid such as milk must be absolutely perfect. Therefore the above explained prior art method is not suitable for this purpose. Of course, if heat-sealing is carried out taking too much time disregarding productivity, perfect sealing is not always impossible. However, such inefficient procedure is practically unemployable.

This invention is to provide a method of perfect sealing of a package of flowable materials such as liquid (milk, fermented milk, fruit juice, oils, soup, etc.) and pasty materials (yogurt, for instance).

The method of this invention comprises forming a folded packaging material by folding a flattened tubular film of a thermoplastic material so that the both sides thereof are folded inward; sealing said folded packaging material at the position which is to become the top after the packaging is finished; unfolding the opening spaced from the sealed portion by a predetermined distance so that the inwardly folded portions are turned outside and the opening comprises two layers; introducing a flowable material through this opening; sealing the opening in the two layer state; pressing flat the two layer sealed end so as to form a flat bottom.

In the method of this invention, a tubular film packaging material is sealed at the position which is to become the top of a finished package prior to introduction of a flowable material, and the opening which is to become the bottom of the finished package is unfolded so that the inwardly folded sides are turned outward, and a flowable material is introduced in the thus formed bag, and the opening is sealed in the two layer state.

In this case, even if the inside of the opening is wetted with the flowable material, the opening is sealed perfectly without leaving pinholes. Because all part of the opening is of two layers and there is no folding sandwiched in the two layers and thus there are no stepped points where evaporated flowable material easily blows out. That is to say, packages of flowable materials are perfectly sealed in accordance with this invention.

This invention can be more fully understood from the following detailed description when taken in connection with reference to the accompanying drawings, in which:

FIG. **1** is a perspective view of a thermoplastic folded packaging material used in the method of this invention;

FIG. **2** is a perspective view which shows the step of forming a packaging bag by sealing the material shown in FIG. **1**;

FIG. **3** is a perspective view showing the packaging bag which is inserted in a forming case and is being unfolded at its opening;

FIG. **4** is a perspective view showing the step in which air is blown in the packaging bag;

FIG. **5** is a perspective view showing the step in which a flowable material is introduced in the packaging bag;

FIG. **6** is a perspective view showing the step in which the opening of the packaging bag is sealed;

FIG. **7** is a perspective view showing the step in which the sealed one end of the bag is pressed flat;

FIG. **8** is a perspective view showing the step in which the triangular ears which have been formed in the preceding step are turned upward;

FIG. **9** is a perspective view showing the step in which the triangular ears are folded onto the flat bottom;

FIG. **10** is a perspective view of the finished package containing the flowable material;

FIG. **11** is a schematic elevational side view of an apparatus for manufacturing packaging bags of thermoplastic film used in the method of this invention; and

FIGS. **12, 13, 14, 15, 16** and **17** are cross sections along lines **12—12, 13—13, 14—14, 15—15, 16—16** and **17—17** in FIG. **11**, respectively.

The invention is now described in detail by way of a working example. As shown in FIG. **1**, a folded packaging material **1** is formed by folding a tubular film of a thermoplastic material such as polyethylene so that both sides are turned inside to form folded portions A AND B. Thus the folded packaging material **1** comprises two four-layer portions X which consists of outer films C and D and inwardly folded portions A or B and a two-layer portion Y which consists of two outer films C and D.

As shown in FIG. **2**, the thus formed folded packaging material **1** is sealed, for instance, by heat sealing by means of heat-press members **2** and **3** at the position which is to be the top of the finished package, and is cut off at the position immediately below the seal. Thus a packaging bag is obtained, in which a flowable material is to be contained. In this case, the packaging bags can also be prepared by first cutting a continuous folded tubular film at the position which is to be the top of the finished package and then sealing the cutted end. In the drawings, a hole for sucking the contents out and a sealing film to close said hole are shown at **4** and **5** respectively.

The packaging bag is then inserted into a wedge-shaped case **6** as shown in FIG. **3** with its sealed end **7** downward so that its open end **8** extends upward from the upper edge **22** of the case **6.** Suction tubes **9** and **10** are applied to the surface of outer films C and D so as to pull apart said films, and a pair of rods **11** and **12** are inserted in the opening and are moved apart so that the inwardly folded portions C and D are turned outward.

In the next step, an air-blowing tube **13** is inserted into the opening as shown in FIG. **4,** and at the same time a pair of press members **14** and **15** hold the opening therebetween so that the opening remains in the two layer state. In this case, the press members **14** and **15** are respectively provided with a semicircular recesses **16** and **17** to receive the air blowing tube **13.** When air is blown into the bag, the bag expands so as to conform with the configuration of the case **6** since the opening thereof is closed by the press members **14** and **15.** Then the press members **14** and **15** are withdrawn and the air-blowing tube is removed, and a supply tube **18** is inserted into the bag so that a predetermined amount of a flowable material such as milk or fruit juice is introduced therein as shown in FIG. **5.** Moreover, suitable methods other than aforementioned air-blowing method can be used to expand the bag. After the feeding of the flowable material is finished, the supply tube **18** is removed and the opening is sealed, for instance, by a pair of heat-press members **19** and **20** as shown in FIG. **6.** As has been explained above with respect to FIG. **3,** the opening is kept in the two layer state, and therefore the sealing is effected in the two layer state, too. Therefore, when the heat-press members **19** and **20** are applied together to the opening, there is no fold held between the outer films, and thus there is no stepped point. Therefore blow holes are not generated even if the inside of the opening is wetted with the flowable material. In this way a very perfect sealing is effected in accordance with this invention.

The upper opening of the packaging bag which has been sealed as explained above is then pressed flat, as shown in FIG. **7,** by means of a flat press member **21** which presses down the sealed part which extends out of the upper end **22** of the case **6.** As explained above, the opening is sealed in the state that the inwardly folded portions are turned outward. Therefore, when the sealed part is pressed flat, triangular ears **23** and **24** are formed on both sides, which extend out of the side walls of the case **6.** When the press member is withdrawn upward, side guide plates **29** and **30,** which are respectively provided with hinged wings **25** and **26** and hinges **27** and **28** are raised along the sides of the case **6** so as to bend upward the outwardly extending triangular ears **23** and **24** as shown in FIG. **8.** When the side guide plates are raised until the hinges **27** and **28** thereof reach the upper end **22** of the case **6,** the wings **25** and **26** are turned inward by means of a pair of plungers **31** and **32** so as to bend the now upwardly extending triangular ears **23** and **24** inward as shown in FIG. **9.** In this case, if the wings are arranged so as to be heated when they are turned inward, the bending of the ears is more effectively carried out. The ears may be bonded to the flat bottom by spot heat sealing or area heat sealing, or by the aid of an adhesive. The triangular ears can remain extending outward if it is not inconvenient in storage or transportation.

The thus finished package is removed from the case **6** and is allowed to stand upside down, that is, on the flat bottom as shown in FIG. **10.** The flowable material is perfectly sealed therein.

The thermoplastic materials for the folded packaging material of this invention include polyolefin such as polyethylene, polypropylene, etc., polyvinyl chloride and paper both surfaces of which are coated with polyethylene, etc.

In the package of this invention, the roof-shaped top of the package is sealed prior to introduction of a flowable material. Therefore the sealing of the top can be perfectly effected although there are inward folds on both sides held between the outer films, since there is no flowable material sticking to the inside of the opening. Also, the bottom of the package can be perfectly sealed as mentioned above.

As the package of this invention has a flat bottom, it stably stands by itself, and therefore it is very convenient for storage and transportation.

Further explanation is given pertaining to an apparatus for manufacturing packaging bags used in the method of this invention in reference to FIGS. **11** to **17.**

In FIG. **11,** a supply roller for rolling a continuous flattened tubular film **33** of a thermoplastic material, polyethylene for instance, is shown at **34.** The tubular film is drawn out by means of a pair of rollers **35** and **36** and is led to a guide body **37,** which is uprightly provided in front of the supply roller **34.** The guide body **37** is a long I-shape section body (Refer to FIGS. **13** to **16**) the upper and lower ends **38** and **39** of which are gradually reduced in thickness and width. That is, the guide body has grooves on both sides and on the front (facing the film supply roller **34**) surface at lower middle position a recess **40** is provided.

The flattened tubular film **33** drawn out of the supply roller **34** is led to clothe the guide body **37** therewith and is passed upward. The guide body is held by a pair of rollers **41** and **42** on the front and back at the lower position, by a pair of rollers **43** and **44** on both sides at the middle position, and by a pair of rollers **45** and **46** at the upper position. The rollers support the clothing film pressing it toward the guide body.

At a position corresponding to the recess **40** of the guide body **37,** there is provided a cutting edge **47** which is intermittenly protruded so as to give a cut in the passing tubular film. This cut becomes a sucking hole **4** in the finished package. (Refer to FIG. **10**)

Above the cutting edge **47,** a supply roller **48** for a sealing film (aluminium foil laminated with a polyethylene film on the back side, for instance) is provided. By means of roller **49,** the sealing film **5** is drawn out by the length necessary to seal the sucking hole of the tubular film **33,** and sealed thereupon when the hole comes to a predetermined position. For this purpose a heat-press member **50** is provided at the position, and the sealing film is pressed upon the cut hole of the tubular film and is cut off by means of a cutting knife **51** at a suitable position.

At the upper position of the guide body, a pair of guide plates **54** and **55** are provided, which fold inward the side surfaces of the up-traveling tubular film into the grooves **52** and **53** provided on both sides of the guide body **37.** Thereafter the tubular film **33** leaves the guide body **37** and is pressed flat by means of a pair of rollers **56** and **57,** and thus the tubular film is formed

into a flat folded tubular film **1** having inwardly folded portions as shown in FIG. **1.**

The thus formed folded tubular film is heat-sealed by means of a pair of heat press members **2** and **3** which intermittently nip the tubular film. The sealed tubular film is then sent to a cutter **60** by means of a pair of rollers **58** and **59** and is snipped off at the position immediately below the seal by means of a cutter **60** which is intermittently operated.

Thus formed packaging bags are taken out by funnel **61** and passed to the packaging operation as explained above with reference to FIGS. **3** and **10.** Incidentally, member **62** is a supporting roller provided against the heat-press **50.**

From the above description it is apparent that packaging bags to be used for the method of this invention are easily and efficiently manufactured by an apparatus as explained above.

What we claim is:

1. A method for packaging a flowable material comprising forming a folded tubular packaging material by folding a flattened tubular film of a thermoplastic material so that both sides thereof are folded inward; sealing said folded packaging material at the position which is to become the top after the packaging is finished; unfolding the opening spaced from the sealed portion by a predetermined distance so that the inwardly folded portions are turned outside and the opening comprises two layers; introducing said flowable material through this opening; sealing the opening in the two layer state; and pressing flat the two layer sealed end so as to form a flat bottom.

2. A method as described in claim **1,** wherein the flowable material is a liquid.

3. A method as described in claim **1,** wherein the flowable material is a paste.

4. A method as described in claim **1,** wherein the thermoplastic material is a polyolefin selected from the group consisting of polyethylene and polypropylene.

5. A method as described in claim **1,** wherein the thermoplastic material is a polyvinyl chloride.

6. A method as described in claim **1,** wherein the thermoplastic material is a paper both surfaces of which are coated with polyethylene film.

7. An apparatus for manufacturing packaging bags comprising: a roller for supply of continuous flattened tubular film of a thermoplastic material; a long guide body for guiding the tubular film, the upper and lower ends of which are gradually reduced in thickness and width toward the tips, and which is provided with a groove on both sides and a recess at a position in the front face; supporting rollers which sustain the guide body in an upright position; a cutting edge which moves forward into the recess of the guide body at a predetermined cycle; a heat press member provided at a position spaced from the cutting edge by a predetermined distance and moving forward to the guide body at the predetermined cycle; a means for supplying a film for sealing between the heat press member and the guide body; a pair of guide plates which are provided on both sides of the guide body toward the upper end thereof and which turn inward the sides of the tubular film into the grooves provided in the sides of the guide body; a pair of pressing rollers which press flat the tubular film which has been provided with the inward side folds; a heat-sealer which seals the flat-folded tubular film at a predetermined interval; and a means for cutting off the sealed tubular film at the position immediately below the seal.

8. A method for packaging a flowable material comprising forming a folded tubular packaging material by folding a flattened tubular film of a thermoplastic material so that both sides thereof are folded inwardly, sealing said folded packaging material at a position which is to become the top of the package after the packaging is finished to form a packaging bag, inserting the packaging bag in a forming case with the top of the packaging bag being in the bottom of the forming case, unfolding the opening, which is spaced apart from the sealed portion and which is to become the bottom of the packaging bag, by turning the inwardly folded portions outwardly, thereby forming two opposing layers, blowing air into the packaging bag, introducing a flowable material into the packaging bag, sealing the opening in the two layer state, pressing flat the two layer sealed end so as to form a flat bottom with triangular ears extending therefrom past the sides of the packaging bag, turning said triangular ears upwardly in alignment with said sides of the packaging bag and folding said triangular ears inwardly into the flat bottom.

9. The method of claim **8,** wherein the ears are bonded to the flat bottom.

10. The method of claim **9,** wherein the ears are heated as they are turned inwardly to more readily accomplish the bending of said ears.

* * * * *

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,812,644 Dated May 28, 1974

Inventor(s) Kousaku KAMIKAWA et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading of the patent, that portion concerning "[73] Assignees:" should read as follows:

--[73] Assignees:

Chubu Kikai Co., Ltd., Kanazawa-shi, Japan and
The Nisseki Plastic Chemical Co., Ltd., Kawasaki-shi, Japan--

Signed and Sealed this

Tenth Day of May 1977

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,812,644 Dated May 28, 1974

Inventor(s) Kousaku KAMIKAWA and Seikichi KAWABE

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Heading of the Patent, that portion concerning "[30] Foreign Application Priority Data" should read as follows: -- [30] Foreign Application Priority Data
Sept. 12, 1971 Japan . . . . 70607/71 --

Signed and Sealed this

Twenty-first Day of September 1976

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,812,644 Dated May 28, 1974

Inventor(s) Kousaku KANIKAWA and Seikichi KAWABE

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the heading of the patent, that portion reading Assignees: "Chubo" should read Assignees: -- Chubu Kikai Co., Ltd., Kanazawashi, Japan and the Nisseki Plastic Chemical Co., Ltd., Tokyo, Japan --.

Signed and Sealed this

twenty-sixth Day of *August 1975*

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks