

April 18, 1939.

D. E. MAXFIELD

2,154,521

METHOD OF MANUFACTURE OF FILLED CONTAINERS

Filed Feb. 15, 1938

2 Sheets-Sheet 1

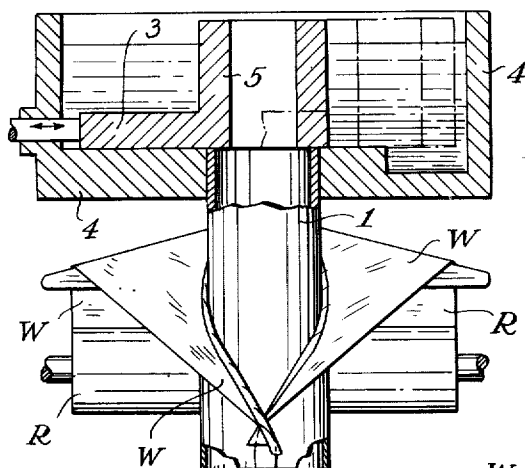


Fig. 1.

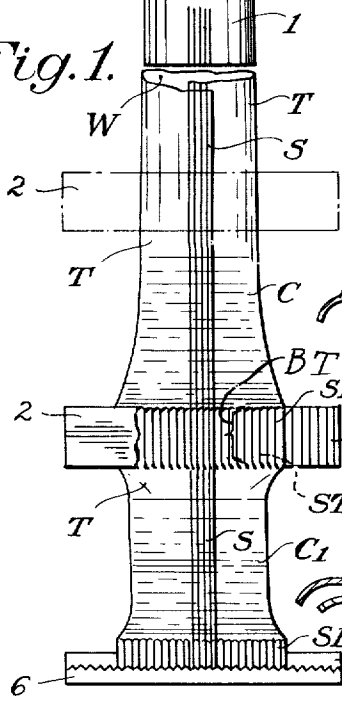


Fig. 2.

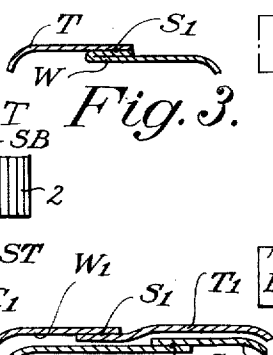


Fig. 3.

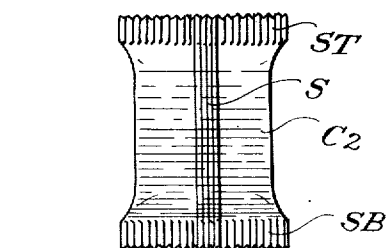


Fig. 4.

Fig. 5.

INVENTOR.
David E. Maxfield,
BY
Cornelius S. Ebert
ATTORNEY.

April 18, 1939.

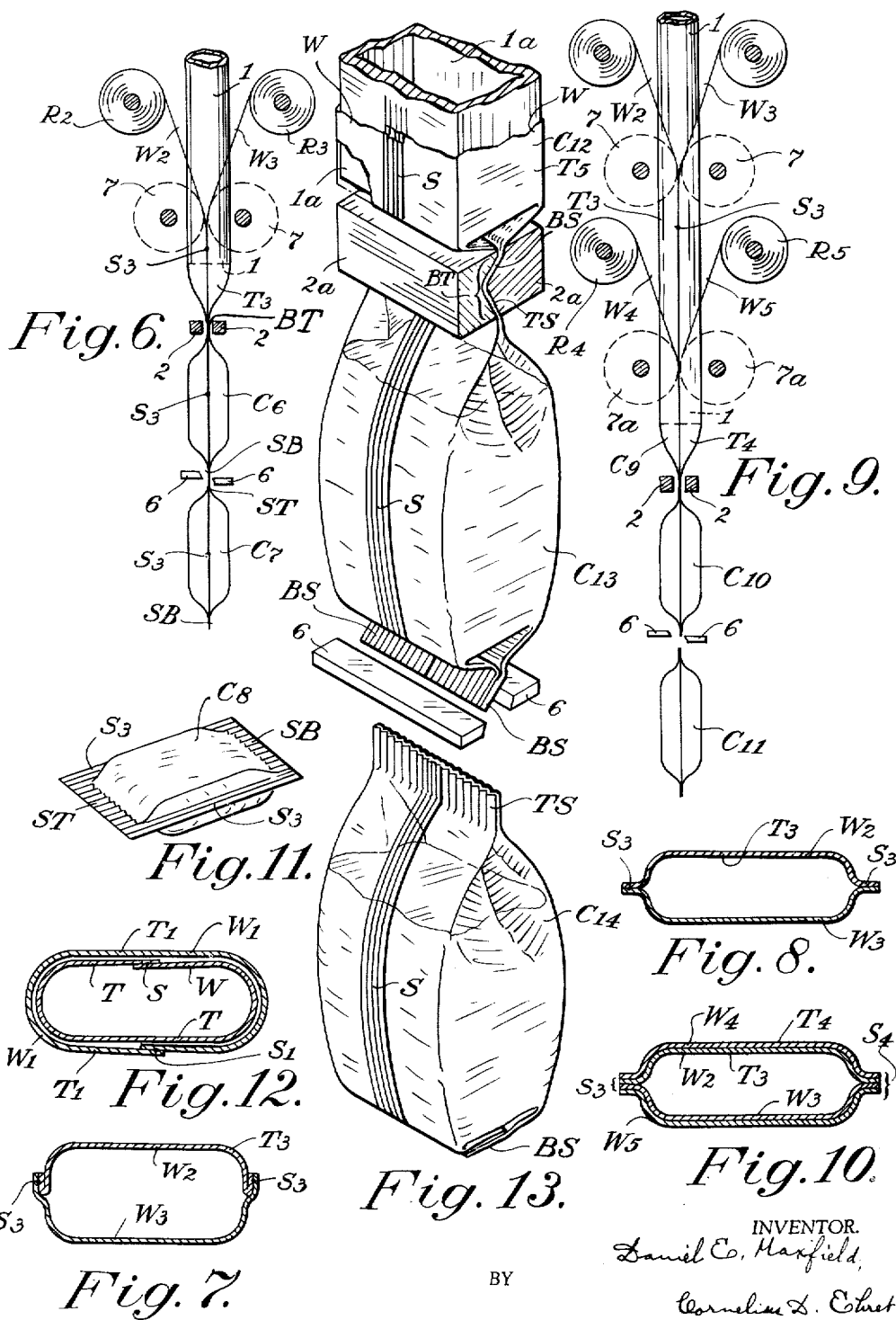
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2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

2,154,521

METHOD OF MANUFACTURE OF FILLED
CONTAINERS

Daniel E. Maxfield, Philadelphia, Pa., assignor
to Stokes and Smith Company, Summerdale,
Pa., a corporation of Pennsylvania

Application February 15, 1938, Serial No. 190,569

13 Claims. (Cl. 92-3)

My invention relates to the manufacture, filling and sealing of containers formed of one or more webs of flexible material, such as paper, paper board, cloth, metal foil, Cellophane, or the like.

In accordance with my invention, one or more webs of flexible material having, because of its composition or because of impregnation or coating, the characteristics of imperviousness to liquid and plastic or adhesive when subjected to heat, is or are brought into tube-forming relation; by application of heat and pressure to the web margins and to longitudinally spaced transverse portions of the tube, there is formed a series of containers in succession detached from the webbing after each has been filled with liquid and sealed by application of heat and pressure.

Further in accordance with my invention, a multi-ply package suited for liquid or non-liquid filling comprises an inner tube formed of a web element whose longitudinal margins are joined, or is formed of a plurality of web elements having their longitudinal margins joined to form a composite tube circumference, and, in either case, there is formed around the inner tube, either simultaneously with or after the joining of the margins of the webbing of the inner tube, at least one outer tube likewise formed of marginally joined web or web components.

Further, when the container is formed of single-ply webbing, regardless of nature of the filling, the web material is preferably cloth, impregnated with one or more materials resistant to moisture and plastic when heated, or is metal foil coated on one side with suitable thermo-plastic material and covered on the other side with paper whose exposed surface is coated with a suitable thermo-plastic material.

Further, when the package or container is formed of multi-ply individual webs, the web destined to form the outside of the package may be cloth impregnated with one or more substances imparting thereto thermo-plasticity and any other desired characteristic, especially resistance to moisture; the web material, with which the contents of the package comes into contact, may be a moisture-resistant material, such as "Diacene" which is also thermo-plastic, and, if desired, there may be an intermediate web, or paper for example, having a thermo-plastic coating.

Further, for multi-ply packages, the web destined to form the outside of the package may be heavy paper, craft paper for example, having thereon a thermo-plastic coating, at least on the

areas which are subsequently to form the seals of the package, and the web material destined to contact with the contents of the package, especially when to be filled with liquid, may be "Pliofilm" or like material which itself, without impregnation or coating, is liquid or moisture-proof and thermo-plastic.

Further, a package may be formed of a single composite web comprising two or more layers of thermo-plastic paper, between any pair of which may be interposed one or more plies of fabric of open mesh, bonded to the paper by a moisture-resistant material.

My invention further resides in the methods of manufacture of filled containers hereinafter described and claimed.

For an understanding of my invention reference is to be had to the accompanying drawings, in which:

Fig. 1 illustrates the progressive formation of packages from web material;

Fig. 2 is a sectional view of a seal formed by overlapping margins of the web material;

Fig. 3 is a sectional view of a modified seal construction;

Fig. 4 illustrates the formation of packages from several webs of flexible material;

Fig. 5 is a sectional view of the seals of a multi-ply package;

Fig. 6 illustrates a method of forming single-ply containers from two webs of flexible material;

Figs. 7 and 8 are sectional views of packages made in accordance with the method of Fig. 6;

Fig. 9 illustrates the formation of multi-ply packages by a method similar to that of Fig. 6;

Fig. 10 is a section of a package made in accordance with the method of Fig. 9;

Fig. 11 is a perspective view of a package made in accordance with the method of Fig. 6 or Fig. 9;

Fig. 12 is a cross-sectional view of another form of multi-ply package;

Fig. 13 in perspective illustrates a modification of preceding methods.

Referring to Fig. 1, the web W is generically illustrative of a web of flexible material impregnated or coated with a substance such as a suitable wax or resin, rendering it impervious to liquid and plastic under heat, or of some substance such as moisture-proof Cellophane, "Pliofilm" or the like, which itself, without impregnation or coating, has those characteristics. Specifically, the web W may be of cloth impregnated with a resin or wax, or a suitably heavy paper,

such as craft paper, coated with a resin or wax, or metal foil, for example, aluminum foil, lead foil, or the like, backed with paper and having a coating of thermo-plastic material on the exposed faces of the foil and paper, or it may be a composite web formed by bonding together, with a suitable moisture-resistant material such as a resin or wax, two layers of paper coated with a thermo-plastic, and between which is disposed one or more plies of fabric of open mesh.

The web W is drawn from the roll R thereof over the forming tube I of suitable size and shape, and the overlapping margins of the web are pressed against each other with concurrent application of heat to provide a seal S extending longitudinally of the tube T formed by the web on and below the forming tube I. Mechanism suited to feed the web W and to form the sealed tube T therefrom is disclosed in Zwayer Patent #1,986,422. Below the lower end of the forming tube I, the tube T of web material is flattened, as by suitable heated clamping tools 2, to unite the inner faces of the opposite sides of the flattened tube walls thus to form a sealing section BT including a seal SB for the bottom of a liquid-tight container C whose upper open end embraces the forming tube I which is hollow to permit introduction of the liquid contents or filling of the partially formed container C.

Specifically, after the bottom of container C is closed by its seal SB and while its upper end is still open, the slide 3 in the reservoir 4 moves to the position shown in Fig. 1 to discharge into the container through the forming tube I a predetermined amount of liquid. When the slide 3 moves to the right from the position shown in Fig. 1 to the dotted line position, the open-ended receptacle 5 thereof receives a further charge of liquid from the reservoir in which the level of liquid may be maintained substantially constant by a suitable means not shown. The particular mechanism shown for delivering a predetermined amount of liquid to each container as it in turn is in the position of container C, Fig. 1, is per se no part of the present invention and may be replaced by any other suitable known arrangement.

After each container in turn has been filled with liquid, the heated clamping tools 2, 2, or equivalent, are moved from their full line position, Fig. 1, to their dotted line position again to flatten the tube T and form a seal SB closing the bottom of the next container to be filled and concurrently forming the seal ST closing the top of and completing the closure of the container just filled. The tools 2, 2 in moving downwardly from the dotted line position to the full line position draw further web material over the forming tube I to form another section of tube T, and the container which has just been filled is moved downwardly to the position of the filled, sealed container C1 of Fig. 1.

The operations of filling the container, of flattening the tube T to seal a filled container and concurrently to form the bottom of the next container to be filled, and of feeding the web material are repeated to form from the web W a series of liquid-filled containers or packages each of which, after filling and complete sealing thereof, is detached from the tube T as by a suitable knife structure 6 which transversely severs a flattened sealing portion BT of the tube to divide it into the aforesaid bottom seal SB for one container C1 and the top seal ST of the previously filled container C2.

When the margins of the web W are brought into the simple overlapping relation described in connection with Fig. 1, the edge E of one of the margins is, as more apparent from Fig. 2, in direct contact with the liquid contents of the package. If the web material is not of itself impervious to moisture, this simple form of seal is not suited for many liquids because the ends of the web fibers exposed at edge E serve as wicks which by capillary attraction cause the liquid to penetrate the web and adversely affect its strength. This difficulty, inherent in coated or impregnated webbing, is overcome by the seal construction S1 shown in Fig. 3; in this modification, the margins of the web are brought into face-to-face sealing engagement with both edges of the web exteriorly of the package and therefore out of contact with its liquid contents; the up-standing flap or flange so formed may, for better appearance and greater strength, be turned back, as shown in Fig. 3, into adhesive engagement with the outer face of the package.

When for additional strength, to meet conditions imposed by the particular nature of the package contents, or to meet other requirements arbitrarily imposed, the package is required to be of multi-ply construction, the method illustrated in Fig. 4 may be employed. As there appears, in manner similar to that described in connection with Fig. 1, a tube T is formed from a web of material W, but, unlike Fig. 1, before the tubing T passes beyond the forming tube I, there is formed thereover a second tube T1 from a web W1. Preferably, the overlapping margins of web W are pressed together to form the longitudinal seal S before the tube T reaches the point where it is surrounded by the tube T1 but this is not essential and the formation of the seal S of tube T may be effected concurrently with the formation of the longitudinal seal S1 of the outer tube T1, in which event if both surfaces of both webs are plastic when subjected to heat, the inner and outer tubes are adhesively joined together longitudinally of their seams S and S1. Preferably, the seam S of the inner tube T is staggered with respect to the seam S1 of the outer tube T1 generally as shown in Fig. 5, or in Fig. 12. From this stage on, the steps of filling and closing the containers and of detaching the filled and closed containers are the same as previously described in connection with Fig. 1. From Fig. 4 it is apparent that by use of additional webs, a container having any desired number of plies may be formed; each web, during the manufacture of the containers, forms a tube nesting with the tubes formed from the other webs.

When the package is of multi-ply construction, it is not essential that all of the plies be of material which is impervious to moisture; the ply in contact with the liquid should be of that nature, but the next ply may be of material selected for strength; and a third ply, if used, may be selected principally for the enhanced appearance it may afford. As typical of desirable construction for multi-ply packages, the web W, Fig. 4, may be moisture-proof Cellophane, "Difane", "Pliofilm", "Parafilm", or like material impervious to moisture and plastic under heat, and web W1 may be suitably heavy paper impregnated or coated with a suitable thermoplastic material. Moisture-proof packages of this type, and of other multi-ply types herein described, are suited not only for liquids, but also for solids, such as coffee, sugar, or the like, which, when packaged, should be prevented from losing moisture

to, or absorbing moisture from, the atmosphere.

In the modification shown in Fig. 6, the tube of web material which is flattened to form a series of packages comprises two webs W2, W3, which are drawn from rolls R2, R3 over forming tube 1, of suitable size and shape, the margins of the webs projecting outwardly from the forming tube 1 on opposite sides thereof. The web margins are caused to adhere to each other, as by the heated rolls 7, 7, to form longitudinal seals S3 projecting outwardly from opposite sides of the tube T3 of web material, Fig. 8. The circumference of tube T3 is composite; it is formed in part by web W2, and in part by web W3 joined to web W2 at their longitudinal margins.

Below the lower open end of the forming tube 1, the tube T3 is flattened, as in the methods previously described, to provide a flattened section BT the upper part SB of which effects closure of the bottom of a container about to be filled and whose lower part ST closes a previously formed and filled container. After each container is filled with its contents, the tube T3 is pulled downwardly, as by the heated clamping tools 2, 2, to draw further web material from the rolls R2, R3, about the forming tube 1 and thereafter the tube is flattened above the filling to complete the formation of one package and to close the bottom of the next. Each package, in turn, is detached from the webbing or tube T3, as by the knives 6, to form a complete filled and sealed package having the appearance of package C8, Fig. 11, or, if desired, the seal flaps S3 may be flattened against and joined to the outside of the package, Fig. 7. By this method there is formed a single-ply container from two webs of web material which, because of its composition or prior treatment, is impervious to moisture and plastic when subjected to heat. Specifically, one or both of the webs W2, W3 may be cloth impregnated with one or more substances resistant to moisture and plastic when heated, or one or both of webs W2, W3 may be metal foil coated at least on its outer surface with a heat-sealing material and preferably to the other surface of which is suitably attached paper having on its exposed surface a suitable heat-sealing material; or one or both of the webs W2, W3 may be of a composite nature and consist, for example, of two plies of heat-sealing paper between which is disposed a fabric of open mesh bonded to the two paper layers by a suitable moisture-resistant material.

For making multi-ply packages of generally similar construction, and affording a final product having the same appearance as package C8 of Fig. 11, the method of Fig. 9 may be employed. The tube T3 formed from webs W2, W3, generally as described in connection with Fig. 6, is, before it passes beyond the forming tube 1, nested within a tube T4 similarly formed by webs W4, W5, drawn from the rolls R4, R5. The relation between the margins of the webs is apparent from Fig. 10; specifically, the seals S3 formed by joinder of the margins of the webs W2, W3, when subjected to heat and pressure applied by the two pairs of rolls 7, are included within the total seal S4 formed when the margins of webs W4 and W5 are pressed, as by the pairs of heated rolls 7a, into adhesive attachment with the outer faces of the web margins forming the seal S3.

Each container, as will be understood from previous discussion herein of other methods, assumes the positions of containers C9, C10, C11, (Fig. 9) as it is progressively formed, filled, sealed

and detached from the webbing. None of the edges of the webbing is in contact with the liquid contents of the package and there is, therefore, no possibility of the liquid entering any of the webs by capillary attraction.

Any desired number of plies can be obtained by using additional pairs of rolls of web material to form one or more other tubes nesting with those of Fig. 9.

For the multi-ply construction, the webs forming the various plies may be of material identical in character or composition or the successive pairs of webs may be of different material; specifically, the webs W2, W3 destined to contact with the liquid contents of the packages, may be of moisture-proof Cellophane, "Diafane", "Pliofilm", or the like, and the webs W4, W5 may be of cloth impregnated with material resistant to moisture and heat-plastic.

When it is desired the completed packages shall be in the form of closed bags rather than of the pillow or wafer shapes of Figs. 1 and 11, the forming tube 1a is of polygonal cross-section, preferably rectangular as indicated in Fig. 13, and the clamping or heat-forming tools 2a, of suitable shape, engage the tube T5, formed from the web material as hereinbefore described, immediately below the end of forming tube 1a, after suitable tools, not shown, have produced longitudinal folds in the narrow sides of the tube T5. When the heated clamping tools 2a flatten and seal the tube T5, there is formed a gusset fold at the bottom corners of a bag or container C12, and simultaneously the top of the previously formed and filled bag C13 is sealed with the tucked-in sides sealed between the flattened sides. The tools 2, 2 in moving together are also effective to square the bottom of the bag with respect to its sides. Flattening of the tube T5 by the tools 2a produces across the bottom of a bag C12 a liquid-tight seal BS with the edges of the web material out of contact with the contents of the bag or package, and concurrently forms across the top of a filled bag a liquid-tight seal TS; each flattened section BT of tube T5 comprising adjacent sealing sections BS, TS is subsequently divided, as by the knives 6, 6, to detach a filled bag from tube T5.

If desired, the bottom seal BS of each package may be turned upwardly, as indicated in Fig. 13, into adhesive engagement with the bottom of the bag. The tube T5 may be formed by any of the methods previously described to obtain either a single-ply or multi-ply construction, as may be desired; and the web material utilized to form the tube T5 may be of any of the preferred materials previously specifically mentioned.

Each completed package has the appearance of package C14, Fig. 13.

For brevity the term "thermo-plastic" shall be understood to relate to the surface characteristics of the web or film, whether it itself consists of thermo-plastic material, or is a non-thermo-plastic material either impregnated with thermo-plastic material or coated therewith on either or both sides.

While preferred methods and products have been specifically described and illustrated, it is to be understood my invention is not limited thereto, but is coextensive in scope with the appended claims.

What I claim is:

1. The method of manufacturing multi-ply liquid-filled containers which comprises forming nested tubes from a plurality of webs of flexible thermo-plastic material, at least the inner tube

impervious to liquid, during application of heat joining the web margins and flattening the nested tubes transversely at intervals to form sealed liquid-tight containers, filling each container with liquid, and transversely severing the nested tubes at the flattened sections to detach the multi-ply sealed liquid-filled containers therefrom.

2. The method of manufacturing multi-ply containers which comprises forming nested tubes from a plurality of webs of flexible thermo-plastic material, during application of heat joining the web margins and flattening the nested tubes transversely at intervals to form sealed containers, filling each container, and transversely severing the nested tubes at the flattened sections to detach the multi-ply sealed filled containers.

3. The method of manufacturing multi-ply moisture-proof containers which comprises forming nested tubes from a plurality of webs of thermo-plastic material, at least one tube impervious to moisture, during application of heat joining the web margins and flattening the nested tubes transversely at intervals to form multi-ply sealed containers, filling each container before final sealing thereof, and transversely severing the nested tubes at the flattened sections thereof to detach the multi-ply moisture-proof filled containers.

4. The method of manufacturing liquid-filled containers which comprises, during application of heat, joining the margins of a web of thermo-plastic moisture-resistant material to form a tube, during application of heat flattening the tube to form a container open at one end, introducing liquid into the container through the open end thereof, during application of heat flattening the tube above the liquid filling to form a sealed liquid-filled container, and transversely severing the flattened section of the tube above the liquid to detach the sealed liquid-filled container therefrom.

5. The method of manufacturing liquid-filled containers which comprises, during application of heat, joining the margins of thermo-plastic moisture-resistant web material to form a tube with all web edges exterior to the tube, during application of heat flattening the tube to form a container open at one end, introducing liquid into the container through the open end thereof, during application of heat flattening the tube above the liquid filling to form a sealed liquid-filled container, and transversely severing the flattened section of the tube above the liquid to detach the sealed liquid-filled container therefrom.

6. The method of manufacturing multi-ply containers which comprises, during application of heat, joining the margins of thermo-plastic web material to form a tube, forming a second tube about the first tube by joining the margins of at least one additional web, during application of heat flattening the tubes to form a multi-ply container open at one end, filling the container through the open end thereof, during application of heat flattening the multi-ply tube above the liquid filling to form a sealed filled container, and transversely severing the flattened section of the composite tube above the liquid to detach the sealed filled container therefrom.

7. The method of manufacturing, filling and sealing containers which comprises joining the margins of thermo-plastic web material to form a rectangular tube, tucking in one pair of sides

of the tube, during application of heat pressing together other sides of the tube to form a container with a squared sealed end and an open end, filling the container through the open end, tucking in said pair of sides of the tube about the container contents, during application of heat pressing together said other sides of the tube above the container contents to complete the sealing of the filled container, and severing the tube to detach the sealed filled container.

8. The method of manufacturing multi-ply containers which comprises, during application of heat, joining the margins of thermo-plastic web material to form an inner tube with longitudinal seams corresponding in number to the number of webs, joining the margins of at least one additional web to form about the inner tube a second seamed tube, staggering the seams of the nested tubes, flattening the nested tubes transversely at intervals to form sealed containers, filling each container, and severing the nested tubes at their flattened sections to detach the multi-ply sealed filled containers.

9. The method of manufacturing liquid-filled containers which comprises applying heat and pressure to flatten an empty section of a tube formed of thermo-plastic web material impervious to liquid and to form a flattened seal section, pulling the flattened seal section to draw from a supply thereof sufficient web material to form a container, introducing liquid into said tube above said flattened seal section, applying heat and pressure to flatten the tube above said liquid and to form a flattened seal section, and severing the web material through said flattened seal sections to detach a liquid-filled container therefrom.

10. The method of manufacturing liquid-filled containers which comprises applying heat and pressure to form flattened seal sections spaced along a tube of thermo-plastic web material impervious to liquid, intermittently feeding the web material by pulling each seal section in turn to draw from a supply thereof sufficient web material to form a container, severing the web material through said seal sections to detach liquid-filled containers therefrom, and in the interval between formation of successive seal sections introducing liquid into the tube above the first-formed of said successive seal sections.

11. The method of manufacturing liquid-filled containers which comprises forming a strong, liquid-impervious tube by applying heat and pressure to join the margins of a strip of cloth treated with thermo-plastic material, during application of heat flattening the tube to form a container open at one end, introducing liquid into the container through the open end thereof, during application of heat flattening the tube above the liquid filling to form a sealed liquid-filled container, and transversely severing the flattened section of the tube above the liquid to detach the sealed liquid-filled container therefrom.

12. The method of manufacturing liquid-filled containers which comprises forming a strong, liquid-impervious tube by applying heat and pressure to join the margins of a paper web coated with thermo-plastic material, during application of heat flattening the tube to form a container open at one end, introducing liquid into the container through the open end thereof, during application of heat flattening the tube above the liquid filling to form a sealed liquid-filled container, and transversely severing the

flattened section of the tube above the liquid to detach the sealed liquid-filled container therefrom.

13. The method of manufacturing liquid-filled containers which comprises applying heat and pressure to join the margins of liquid-impervious thermo-plastic web material to form a tube, forming a second tube about the first tube by joining the margins of a strong thermo-plastic web, during application of heat flattening the tubes to form a multi-ply container open at one end and

whose plies are thermo-plastically joined at the flattened seal section of the other end, filling the container with liquid through the open end thereof, during application of heat flattening the tubes above the liquid filling thermo-plastically to join the plies at said other end and to form a sealed-filled container, and transversely severing the flattened seal section of the composite tube above the liquid to detach the sealed filled container therefrom.

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CERTIFICATE OF CORRECTION.

Patent No. 2,154,521.

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It is hereby certified that error appears in the above numbered patent requiring correction as follows: In the grant, line 2, and in the heading to the printed specification, address of assignee, after "Summerdale," insert --Philadelphia--, as shown by the record of assignments in this office; page 1, second column, line 38, for "wtih" read --with--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 28th day of January, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

flattened section of the tube above the liquid to detach the sealed liquid-filled container therefrom.

13. The method of manufacturing liquid-filled containers which comprises applying heat and pressure to join the margins of liquid-impervious thermo-plastic web material to form a tube, forming a second tube about the first tube by joining the margins of a strong thermo-plastic web, during application of heat flattening the tubes to form a multi-ply container open at one end and

whose plies are thermo-plastically joined at the flattened seal section of the other end, filling the container with liquid through the open end thereof, during application of heat flattening the tubes above the liquid filling thermo-plastically to join the plies at said other end and to form a sealed-filled container, and transversely severing the flattened seal section of the composite tube above the liquid to detach the sealed filled container therefrom.

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