Feb. 7, 1939. D. E. MAXFIELD 2,145,941

METHOD OF AND APPARATUS FOR MAKING PACKAGES

Filed April 18, 1938

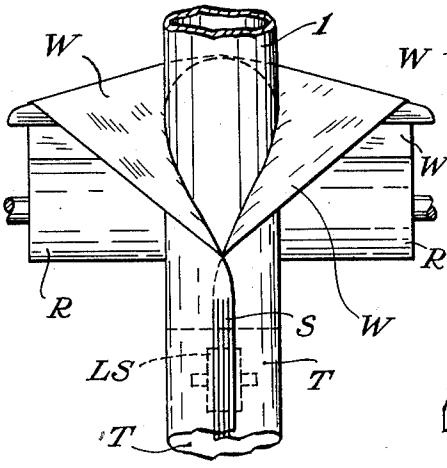

Fig. 1.

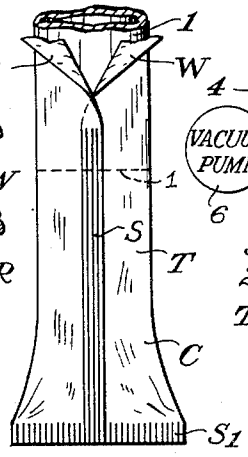

Fig. 2.

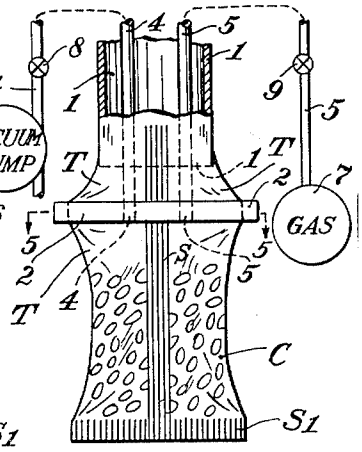

Fig. 3.

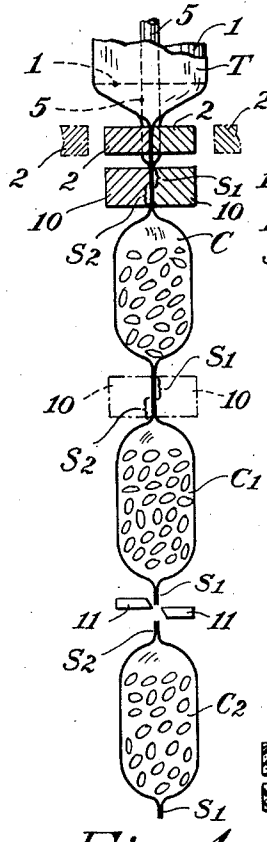

Fig. 4.

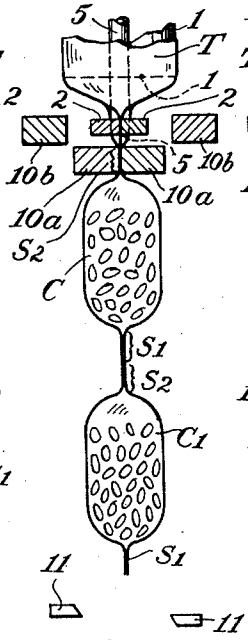

Fig. 4a.

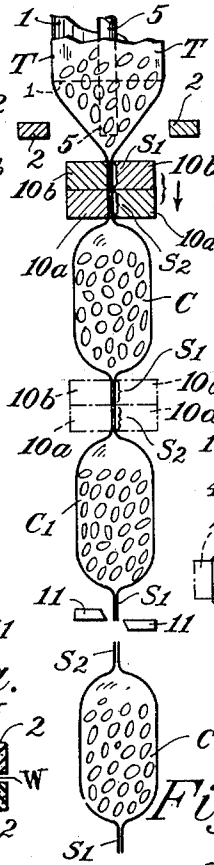

Fig. 4b.

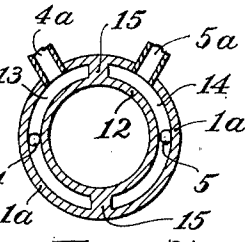

Fig. 7.

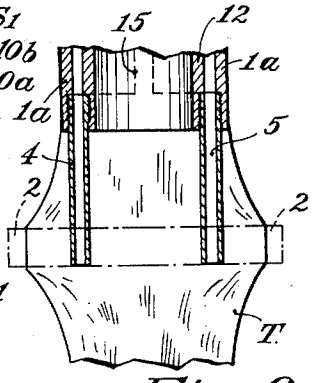

Fig. 6.

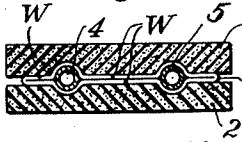

Fig. 5.

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2,145,941

UNITED STATES PATENT OFFICE

2,145,941

METHOD OF AND APPARATUS FOR MAKING PACKAGES

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

Application April 18, 1938, Serial No. 202,663

14 Claims. (Cl. 93—3)

My invention relates to the manufacture, filling and sealing of gas-tight packages of flexible web material.

In accordance with my invention, after each package is filled at atmospheric pressure, but before final sealing thereof and detachment from the web material, the air is withdrawn therefrom and, if desired, may be replaced with a suitable conditioning gas.

In accordance with my invention, the margins of one or more webs of suitable flexible material, preferably a material which consists of, is impregnated with, or coated with a thermo-plastic, are joined, as by application of heat and pressure, to form a tube which is transversely flattened at intervals to form a series of containers, and, after each container is, in turn, filled with its intended contents, and before its severance from the webbing, it is flattened above or beyond its contents to close or seal off the interior thereof except for provision permitting its subsequent communication with a vacuum pump or equivalent and thereafter with a source of suitable conditioning gas; after exhaustion of air from the container and replacement thereof by suitable gas, the sealing of the container is completed, and it is thereafter severed from the web.

My invention further resides in the methods and systems hereinafter described and claimed.

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

Fig. 1 in elevation shows formation of a tube from web material;

Fig. 2 illustrates flattening of the tube of Fig. 1 to form a container;

Fig. 3, partly in section and in part diagrammatic, illustrates a step of package formation subsequent to Figs. 1 and 2;

Fig. 4, partly in section, illustrates the remaining steps of one method for making gas-filled packages;

Figs. 4*a* and 4*b* illustrate an alternative method of completing the package of Figs. 1 to 3;

Fig. 5 is a plan view in section, taken on line 5—5 of Fig. 3;

Fig. 6 is a detail view, on enlarged scale, of modification of parts appearing in Figs. 1 to 3;

Fig. 7 is a plan view in section of the filling tube construction of Fig. 6.

For the packaging of many products, it is desirable that little or no air or oxygen be permitted to remain in the package for contact with the contents; moreover, it is often desirable that the air removed from the package be replaced by a gas, or gases, having a beneficial or preserving effect. The choice of conditioning gas is determined by the nature of the package contents and desired effect upon those contents of the conditioning gas.

Although these ends have been accomplished by various methods when the package contents to be preserved are in rigid containers such as metal cans, bottles or the like, those methods are not applicable to flexible packages or containers during their formation from web material.

In accordance with my invention, these ends are accomplished by inclusion of the steps of exhausting the air and replacing it with the conditioning gas as part of a continuous method which involves the formation of containers, filling thereof, exhaustion of air, introduction of conditioning gas, complete sealing of the packages, all of which steps are performed before the packages are detached from the webbing and without need to enclose the packages in a vacuum tank or equivalent.

Specifically referring to Fig. 1, the web W, which is generically illustrative of a single or multi-ply web of any suitable flexible material, for example, "Pliofilm", "Diafane", "Protectoid", moisture-proofed Cellophane or waxed-paper, is withdrawn from a roll R and shaped about a tube 1 of suitable size to form tubing T having longitudinally thereof a seam S which is formed by joinder of the overlapping margins of the web. Preferably the W consists of, or is impregnated with, or coated with, a thermo-plastic in which case the seam or seal S may be formed simply by pressure of a heated roll LS applied to press the overlapping web margins against the periphery of the forming tube 1.

Below the lower open end of the forming tube 1 the tubing T is flattened, as by application of suitable heated tools, to provide a seal S1 extending across the tubing to form the bottom of a container C whose upper, open end is in communication with the lower open end of the forming tube 1; after seal S1 has been formed, the intended contents of the container, for example, medicinal powders or tablets, tobacco, food products, or the like, may be introduced into the interior thereof through the forming tube 1.

After the container C has been so filled, it is flattened above its contents, as by the two resilient clamping members 2, 2 (Figs. 4 and 5) which cut off communication between the interior of the container and the filling tube 1 which is open to atmosphere. Being yieldable, the clamping

members 2, 2 permit tubes 4 and 5 to be utilized for communication of the interior of the container with a suitable air-exhausting apparatus, such as vacuum pump 6, and with a source of conditioning gas 7. Whether or not the members 2, 2 need be relieved or cut away to afford a good seal at the region adjacent tubes 4, 5 depends inter alia upon the shape and size of the tubes.

After the clamping tools 2, 2 have moved to the position indicated in Figs. 3 and 5 to effect a temporary seal, the valve 8 is opened to exhaust the air from the container C, the contents of the package preventing its collapse under atmospheric pressure which throughout the methods herein described is always exerted on the exteriors of the packages. When the exhaustion has proceeded to suitable extent, valve 8 in the vacuum line 4 is closed and valve 9 in the gas line 5 is opened to permit a desired vapor or gas, such as nitrogen, carbon dioxide or a mixture of gases, from the source 7 to enter the package. It is desirable the valves 8 and 9 be located as near as possible to the open ends of pipes 4, 5 for minimum cost of vacuum and gas equipment and for most economical operation.

The tubing T forming the upper part of container C may then be flattened below the soft clamps 2, 2, as by heated clamping tools which permanently seal the upper end of the container C, thus to complete the formation from web material of a package whose contents are within a protective gas. The container C becomes an individual container upon severance of the tubing T above the upper seal.

For continuous production of gas-filled packages, there may be utilized a machine similar to that disclosed in Zwoyer Patent #1,986,422, or Aldrich Patent 1,937,501, suitably modified, to incorporate additional clamping tools corresponding to the resilient clamping tools 2,2, and to include pipes 4, 5 and the other necessary auxiliaries herein mentioned for removal of air from and supply of gas to the containers as they are in turn formed. It is not necessary for performance of the methods herein described that the supply hoppers or any of the package-forming mechanism be within a vacuum chamber.

Referring to Fig. 4, and in explanation of those steps of one method of completing a package, which steps are subsequent to those of Figs. 1 to 3, after the container C has been filled with gas and before separation of the resilient clamping tools 2, 2, the heated clamping tools 10, 10 flatten the upper end of the container suitably below the lower ends of the pipes 4, 5 thus to complete the sealing of the container C and to prevent ingress of air or other gas upon separation of the clamps 2, 2. The seal formed by the heated clamping tools 10, 10 comprises the sealing section S2 for the upper end of the container C and the sealing section S1 for the bottom of the next container to be filled.

The clamping tools 10, 10 while in engagement with the web or tubing T are moved downwardly to their dotted line position, Fig. 4, thus to bring the seal S1, S2, between two previously formed containers C1, C2, in position for operation thereon of the knives 11, 11 to detach from the web a complete gas-filled package C2, and also to draw more of the web W from the roll R about the forming tube 1 for ultimate formation of similar packages.

From the foregoing, it is to be understood that each container, in turn, is formed on tube 1, filled with its intended contents, connected in sequence to the vacuum pump and a source of conditioning gas, and thereafter sealed and detached from the webbing.

The method, whose final steps are exemplified by Fig. 4, is satisfactory for many kinds of web material, and for many classes of products, but in some cases, the marking or weakening of the web material at the regions where the clamping tools 2, 2 draw the web tightly around the tubes 4, 5 is objectionable. To avoid this difficulty, there may be utilized the alternative method whose steps, subsequent to the steps of Figs. 1 to 3, are exemplified in Figs. 4*a* and 4*b*. In accordance with this method, before the resilient clamping tools 2, 2 are moved away from their position of Figs. 3 and 5, the top of container C is flattened below tools 2, 2 by the heated clamping tools 10*a*, 10*a*, which form the seal S2 closing the upper end of the container C; then after separation of the resilient clamping tools 2, 2, the heated clamping tools 10*b*, 10*b* flatten the tubing T to form the seal S1 of the next container; and this section S1 includes those regions where the resilient clamping tools 2, 2 had previously stretched the webbing around the tubes 4, 5. Thus, whether or not the web is weakened by the stretching thereof about conduits 4, 5 is of no consequence because those weakened areas are reinforced or healed when joined in the seal S1 and, in any event, are not in such location that if broken through permit escape of gas from the package.

While all four tools 10*a*, 10*b* are in engagement with the web, they move downwardly to the dotted line position, Fig. 4*b*, to bring the webbing to such position that upon operation of the knives 11, 11, each flattened sealing section between two adjacent containers is divided to detach from the webbing or tubing T a completed gas-filled package whose lower end is sealed by seal S1 and the upper end by the seal S2.

The methods herein described are not limited to use of a single web whose margins are overlapped, but is equally applicable to other methods of forming filled packages from one or more webs, such as are exemplified in my copending applications Serial Nos. 183,427 and 190,569, filed January 5, 1938 and February 15, 1938, respectively.

As indicated in Figs. 6 and 7, the pipes 4 and 5, for connection of the interior of the successive containers with a vacuum pump and a source of conditioning gas, may be threaded into the bottom of forming tube 1*a* which actually, or in effect, comprises an outer forming tube about which the webbing W is formed into tubing T and inner or filling tube 12 through which the contents of the packages are introduced, and the annular space between the tubes 1*a* and 12 is divided into two passages 13 and 14 maintained independent of each other by the barriers 15, 15. The lower end of each of these passages 13 and 14 is closed except for an opening which receives one or the other of the pipes 4, 5. Connection of the passages 13 and 14, vacuum pump and gas supply is afforded by pipes 4*a*, 5*a* which join the tube 1*a* suitably above the region at which the web W is turned around the tube.

The upper end of filling tube 12 is in communication with a hopper or equivalent source of material for filling of the packages. The hopper and filling tube are at all times in communication with atmosphere and need not be in a vacuum tank or equivalent for exhaustion of air from the successively formed packages.

In any of the modifications shown, if it is not

desired to replace the air exhausted from the packages with a conditioning gas, the tube 5 or equivalent may be omitted, plugged, or valve 9 left closed.

What I claim is:

1. The method which comprises forming a receptacle from sheet material, filling and sealing the receptacle to form a gas-tight package, and, between said filling and sealing of the receptacle, and while its exterior is exposed to atmospheric pressure, withdrawing air therefrom by producing a vacuum therein.

2. The method which comprises forming a receptacle from sheet material, filling the receptacle while its interior is in communication with atmosphere, and thereafter and while the exterior of the receptacle is exposed to atmospheric pressure exhausting air from the receptacle by production of a vacuum therein and sealing the receptacle.

3. The method which comprises forming a receptacle from sheet material, filling the receptacle while its interior is in communication with atmosphere, and thereafter, and while the receptacle is exposed externally to atmospheric pressure, effecting withdrawal of air from the receptacle to exhaust it, introduction of a conditioning gas into the exhausted receptacle, and sealing of the receptacle.

4. The method of making, filling and sealing packages which comprises joining the margins of web material to form a flexible tube, flattening the tube transversely to form a receptacle open at one end, filling the receptacle through said end while its interior is in communication with atmosphere, and thereafter, and while the receptacle is exposed to atmosphere, partially closing said end of the receptacle and discontinuing communication of the interior thereof with atmosphere, withdrawing air from the container through said partially closed end, and subsequently sealing said receptacle.

5. The method of making, filling and sealing packages which comprises joining the margins of web material to form a flexible tube, flattening the tube transversely to form a receptacle open at one end, filling the receptacle through said end while its interior is in communication with atmosphere, and thereafter, and while the receptacle is exposed to atmosphere, partially closing said end of the receptacle to interrupt communication of the interior thereof with atmosphere, withdrawing air from the container through said partially closed end, replacing the air with conditioning gas, and subsequently sealing said receptacle.

6. The method of making, filling and sealing packages which comprises joining the margins of web material to form a flexible tube, flattening the tube transversely at spaced intervals to form sealed packages, in succession filling the packages by introducing material into the tube between successively flattened sections thereof, severing the tube transversely through the flattened sections to detach the packages in turn from the web material, and, after filling of each of the packages and while it is externally exposed to atmosphere and attached to said tube of web material exhausting the package interior of gas to effect removal of air therefrom.

7. The method of making, filling and sealing packages which comprises joining the margins of web material to form a flexible tube, flattening the tube transversely at spaced intervals to form sealed packages, in succession filling the packages by introducing material into the tube between successively flattened sections thereof, severing the tube transversely at the flattened sections to detach the packages in turn from the tube of web material, and, after filling of each of the packages and while it is externally exposed to atmosphere and attached to said tube of web material, producing a vacuum within the package interior to exhaust it of air and subsequently introducing a conditioning gas into the exhausted receptacle.

8. A system for forming, filling and sealing packages comprising a filling tube over which tubing of sheet material is drawn, means for flattening and transversely sealing the tubing to form a receptacle filled through said filling tube, a source of vacuum, a hollow member extending beyond said filling tube and providing for communication between said source and said receptacle, resilient means for flattening the tubing about said member to prevent communication of the interior of said receptacle with atmosphere and to permit withdrawal of air therefrom, and means for transversely flattening and sealing the tubing between the filling material of said receptacle and said resilient means.

9. A system for forming, filling and sealing packages comprising a filling tube over which tubing of sheet material is drawn, means for flattening and transversely sealing the tubing to complete closure of a filled package and to close one end of a receptacle to be filled through said tube, a source of vacuum, a hollow member extending beyond said filling tube and providing for communication between said source and said receptacle, and resilient means for flattening the tubing about said member, after filling of said receptacle and in advance of complete closure and sealing thereof by said first means, to prevent communication of the interior of said receptacle with atmosphere and to permit withdrawal of air therefrom.

10. A system for forming, filling and sealing packages comprising a filling tube over which is drawn tubing of sheet material, a source of vacuum, a hollow member extending beyond said filling tube and providing for communication between said source and the interiors of the successive packages after filling thereof, resilient temporary-sealing means for flattening the tubing and clamping it about said member to isolate the interior of a filled package from atmosphere and to permit withdrawal of air therefrom, and means for transversely sealing the tubing between the contents of each package and said temporary-sealing means before disengagement of the latter from the tubing.

11. A system for forming, filling and sealing packages comprising a filling tube over which is drawn tubing of sheet material, a source of vacuum, a hollow member extending beyond said filling tube and providing for communication between said source and the interiors of the successive packages after filling thereof, resilient temporary-sealing means for flattening the tubing and clamping it about said member to isolate the interior of a filled package from atmosphere and to permit withdrawal of air therefrom, and means for transversely sealing the tubing between the contents of each package and said temporary-sealing means before disengagement of the latter from the tubing and for thereafter transversely sealing the tubing at a region previously clamped by said temporary-sealing means.

12. A system for forming, filling and sealing

packages comprising a filling tube over which tubing of sheet material is drawn, a source of vacuum, a source of conditioning gas, hollow structure extending beyond said filling tube providing for connection to said sources of the interiors of packages in succession formed from said tubing, resilient temporary-sealing means for flattening the tubing and clamping it about said structure during connection of the interior of a filled package with said sources, and means for transversely flattening and permanently sealing the tubing between the contents of each package and said temporary-sealing means before disengagement of the latter from said tubing.

13. The method which comprises forming a receptacle from sheet material, filling the receptacle while its interior and exterior are exposed to atmospheric pressure, thereafter reducing the pressure interiorly of the filled receptacle to exhaust air therefrom while its filling supports its wall structure against the external atmospheric pressure, and thereafter sealing the exhausted receptacle.

14. The method which comprises forming a receptacle from sheet material, filling the receptacle while its interior and exterior are exposed to atmospheric pressure, thereafter reducing the pressure interiorly of the filled receptacle to exhaust air therefrom while its filling supports its wall structure against the external atmospheric pressure, thereafter introducing a conditioning gas into the exhausted receptacle, and thereafter sealing the receptacle to retain the conditioning gas and the filling protected thereby.

DANIEL E. MAXFIELD.

CERTIFICATE OF CORRECTION.

Patent No. 2,145,941. February 7, 1939.

DANIEL E. MAXFIELD.

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 33, for "W" read --web W--; page 2, first column, line 38, strike out the comma after the word "modified"; page 3, first column, line 69, claim 6, after "material" insert a comma; 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 11th day of February, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.

Disclaimer

2,145,941. — Daniel E. Maxfield, Philadelphia, Pa. Method of and apparatus for making packages. Patent dated February 7, 1939. Disclaimer filed November 8, 1939, by the assignee, Stokes and Smith Company.

Hereby disclaims from the subject matter and scope of each of claims 1, 2, 3, 4, 5, 13, and 14 of said specification, those methods which are not characterized by the fact the exhaustion of the receptacle or container, while exposed to atmosphere, is effected prior to detachment thereof from the web or sheet material from which formed.

(Official Gazette, November 28, 1939.)