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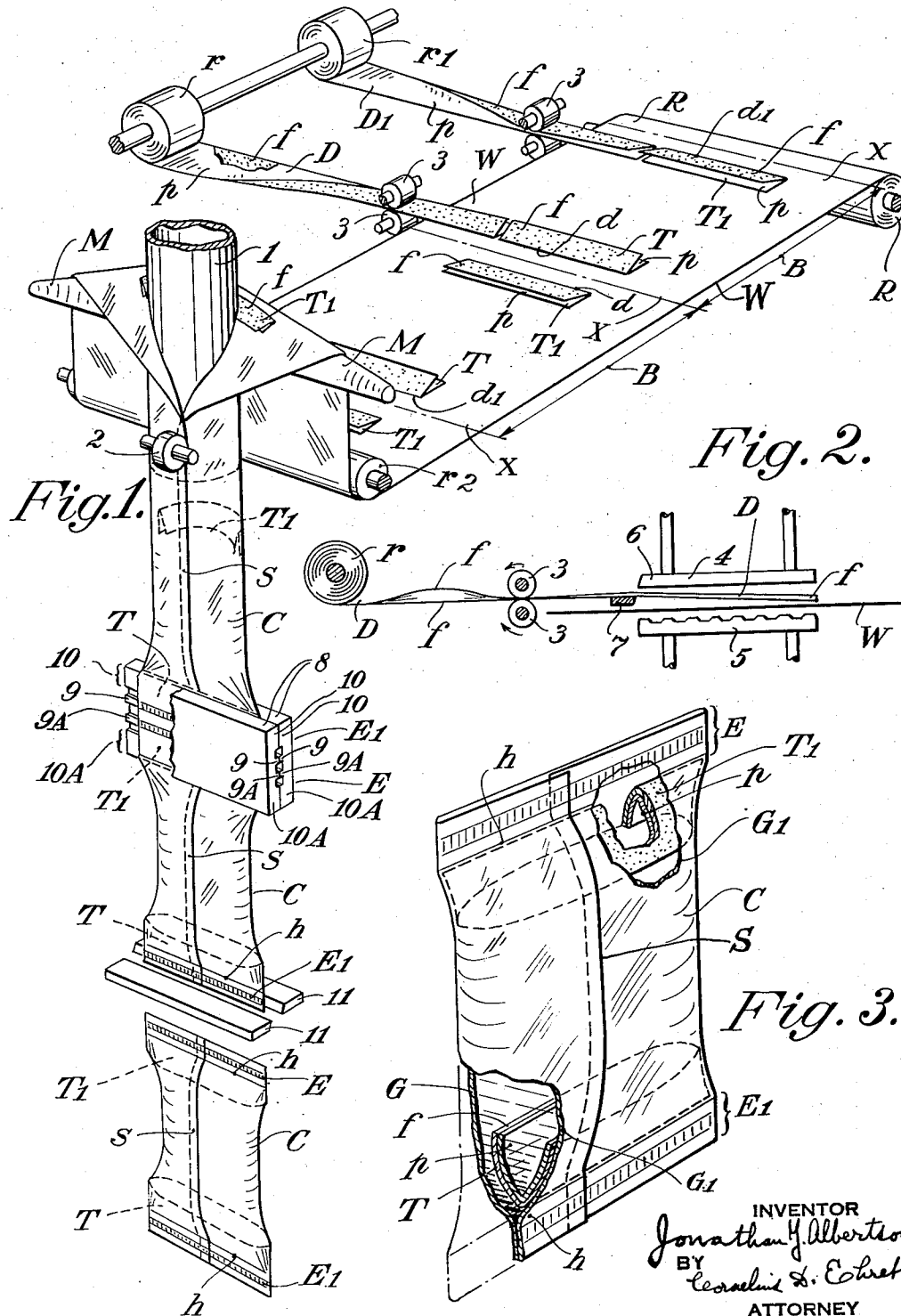
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2,294,220

METHOD OF AND APPARATUS FOR MAKING CONTAINERS

Filed March 13, 1940

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

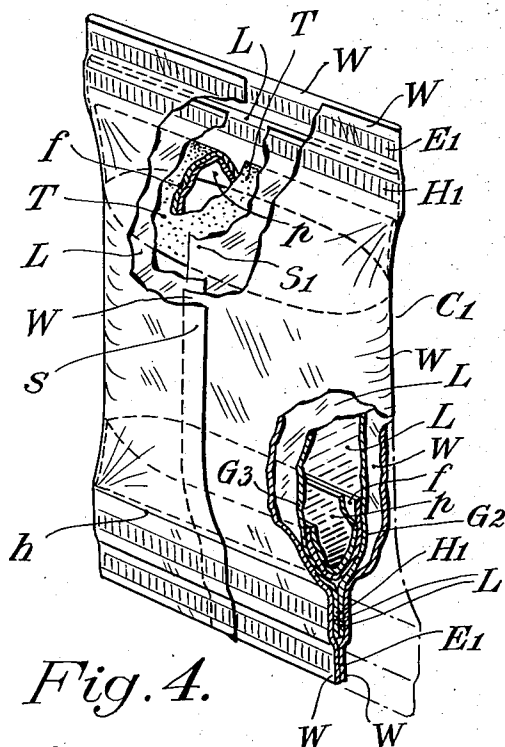


Fig. 4.

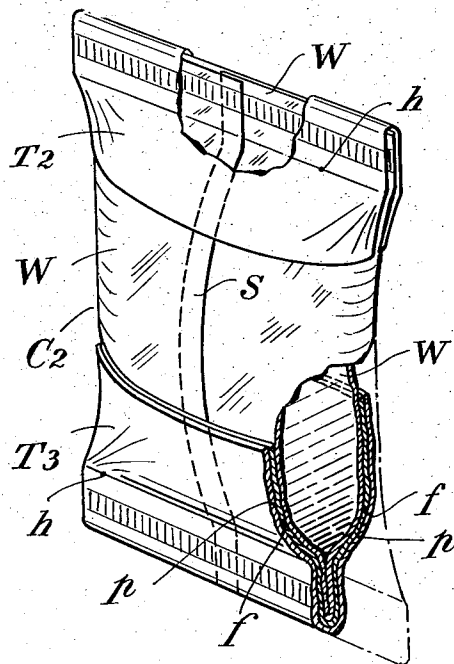


Fig. 5.

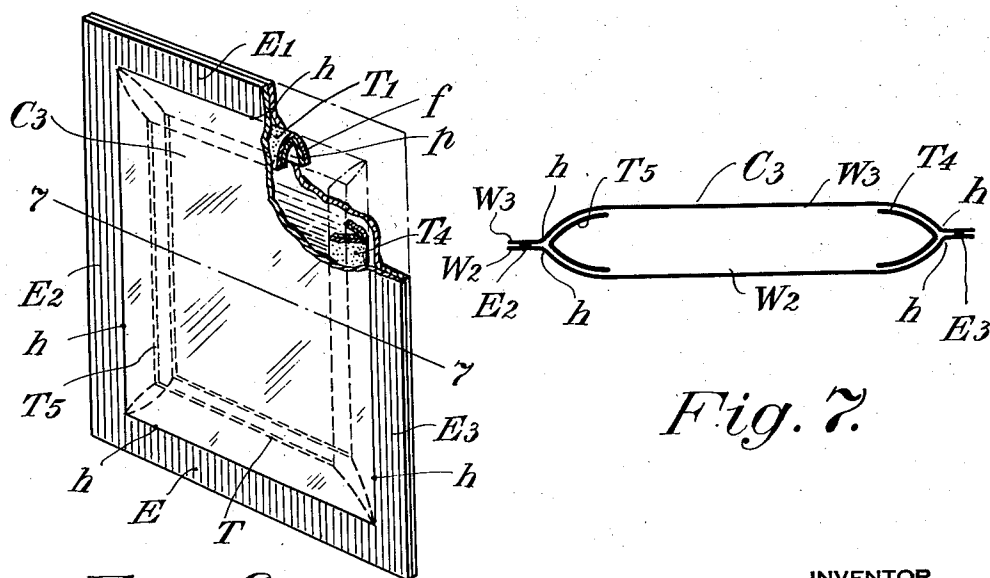


Fig. 6.

Fig. 7.

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2,294,220

METHOD OF AND APPARATUS FOR MAKING CONTAINERS

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12 Claims. (Cl. 93—3)

My invention relates to containers formed from sheet material or webbing, and particularly to containers for fluids or liquids, reinforced interiorly or exteriorly, to protect their seals or joints from rupture or other injury, and which so reinforced are capable of withstanding unusual forces or pressures accidentally or otherwise applied, either exteriorly or interiorly, to the joints or seals; my invention relates to methods of and apparatus for producing such containers.

In accordance with my invention, a container is reinforced adjacent at least one of its seals or joints by an element or strip, of paper or equivalent, which is joined or attached, as by thermo-plastic or other adhesive, to the container walls in such relation with respect thereto that the reinforcing strip or element bridges, or is continuous or jointless across, a joint or seal, or embraces an edge of a seal or joint-forming structure; more particularly, the reinforcing strip or element is disposed within and attached to the inner wall of the container, as in position intervening between the filling in the container and a seal or joint thereof, to bridge the joint or seal; and in accord with a further aspect of my invention, the reinforcing means is applied to the exterior of the container and embraces a seal or extends across the joint terminating at the edge of the seal structure.

Further and in accordance with one method of producing and so reinforcing containers, the reinforcing strips or elements are folded lengthwise and attached to the webbing, before formation into containers, at suitable intervals lengthwise thereof, or to a lining sheet thereon; more particularly, completion of attachment of a reinforcing strip or element is effected after performance of one or more container-forming operations upon the webbing, and preferably concurrently with formation of the container seal or joint it is eventually to protect against rupture or other injury.

My invention further resides in the methods of and apparatus for making containers, herein-after described and claimed.

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

Fig. 1, in perspective, illustrates a method of and apparatus for producing reinforced containers from webbing;

Fig. 2 is a fragmentary view illustrating apparatus for attaching reinforcing elements to webbing and preferably for severing them from the stock from which derived;

Fig. 3 is a perspective view on enlarged scale and partly in section, of a portion of a container shown in Fig. 1;

Fig. 4, in perspective, partly in section and in part broken away, illustrates a portion of another form of my container;

Fig. 5, in perspective, partly in section, shows a further modified form of my container;

Fig. 6, in perspective, illustrates a wafer or pillow type of container reinforced in accordance with the invention;

Fig. 7 is a sectional view taken on the line 7—7 of Fig. 6.

Referring to Fig. 1, the webbing W, preferably coated with, impregnated with, or comprising thermoplastic material, is fed from roll R over the tubular form 1 with the margins of the web overlapping each other. The margins are adhesively joined, as by application of heat and pressure when the web is of thermoplastic material, such as Pliofilm, or water-proofed Cellophane, to form a seal S extending longitudinally of the tube shaped from the webbing. The seal or seam S may be formed by a heated pressure-applying roll 2 during feed of the webbing, generally as shown in Zwayer Patent No. 1,986,422, or by an intermittently actuated heated plate which presses the webbing while at rest between its feeding movements against form 1, generally as disclosed in Letters Patent 2,200,971 granted upon co-pending application Serial No. 259,748, jointly filed March 4, 1939, by myself and another.

When each of the containers to be formed from the webbing W is to be reinforced at both ends, there are applied two folded reinforcing elements or strips T, T' to each increment or length B of the webbing, corresponding with the length required for a container as defined by the lines x where the webbing eventually is transversely severed.

Each of these elements may be pre-formed and fed from stacks thereof, or fed flat from stacks and then folded; or, and preferably, and as shown in Fig. 1, a pair of them may be cut from their respective strips of stock D and D' for each feeding movement of the web W.

One face of each of the reinforcing elements T, T', of paper or other suitable material, p, is coated with any suitable adhesive, preferably hardened thermoplastic, f, and the other face, eventually presented to the filling in the container, is or may be uncoated; or the reinforcing elements and the strips from which they are cut may be of two-ply material, one, p, of paper, for

example, and the other, *f*, of Pliofilm adhesively attached or thermoplastically bonded thereto.

As the strips *D*, *D1* are fed from rolls *r*, *r1*, by rolls *3*, *3*, actuated in timed relation to actuations of the within described web-feeding structure, toward and over the webbing *W*, they are so folded, as by said rolls *3*, *3*, that both outer faces of the folded strip are those which are of adhesive or adhesively coated. The two strips are oppositely folded so that their lines of fold or creases, *d*, *d1* are respectively presented toward the corresponding ends of their web increment *B*, i. e., toward the portions of increment *B* destined to constitute seals to be protected.

While web *W* and strips *D*, *D1* are at rest between their respective feeding movements, the cold member or stencil *4*, Fig. 2, descends to press the adhesive faces of the leading portions of the strips *D*, *D1* against the upper face of the web *W* backed by heated plate *5*, preferably corrugated as indicated, which has substantially concurrently ascended from below web *W* toward the cold stencil *4*, so as to effect adhesive attachment to the upper face of the web of the under or adhesive faces of the folded strips or elements.

Aforesaid portions of strips *D*, *D1* substantially concurrently with their aforesaid adhesive attachment to web *W* are severed to constitute elements *T*, *T1*; for example, and preferably, one edge *6* of the cold stencil *4* co-acts with a blade *7* disposed above the webbing *W* and over which strips *D*, *D1* are fed as aforesaid, to shear or sever a pair of reinforcing elements *T*, *T1*, from their respective strips *D*, *D1* during each descent of the cold stencil *4* toward web *W*.

After a pair of reinforcing elements *T*, *T1* has been so attached to the webbing *W*, the latter is fed toward form *1* over idler roll *r2* and member *M* to extent corresponding with the length *B* of another container, and strips *D*, *D1* are again fed transversely over web *W*, each to an extent corresponding with the length of reinforcing elements *T*, *T1*.

The feed of web *W* may be effected, as in general accord with aforesaid Zwayer patent, by a pair of gripper members *8*, *8* which at definite intervals of time are moved toward each other to clamp and flatten the tube of webbing beyond the lower end of form *1*; thereupon members *8*, *8* are moved downwardly to the position shown in Fig. 1, to extent corresponding with the length *B* of a container.

The web-engaging members *8*, *8* carry, or themselves comprise, pairs of heat sealing members *9* and *9A* which concurrently form neighboring seals *E*, *E1*, destined to become, respectively, the upper and lower container seals; the upper seal becomes the bottom seal *E1* of a container *C* to be filled, and the lower seal becomes the upper seal *E* of a previously filled container, all as more fully described in aforesaid Letters Patent 2,200,971.

As the web is shaped into a tube upon hollow form *1*, each of the elements *T*, *T1* extends substantially half way around the inner periphery of the tube, Fig. 1, with its unapplied coated face *f* presented toward the remainder of the periphery for attachment thereto as hereinafter described.

The web-engaging members *8*, *8* carry, or comprise, the pairs of heat and pressure applying sealing members *10*, *10* and *10A*, *10A*; the lower sealing members *10A*, *10A* engage and flatten that region of the tube of webbing *W* within which a reinforcing element *T1* is disposed so to

effect bonding of the coated face of the reinforcing element *T1* with the internal faces of the flattened walls of tube of webbing immediately below the seal *E*, concurrently formed by tools *9*, *9A*.

Similarly, and concurrently, the sealing members *10*, *10* effect attachment of the coated or prepared face of a reinforcing element *T* with the internal faces of the flattened walls of the next lower container immediately above its lower seal *E1* concurrently formed by tools *9A*, *9A*.

Between successive feeding movements of the vertically reciprocable grippers *8*, *8*, filling is introduced into the containers through the passage within form *1*; the particular type of container herein disclosed is particularly suited for liquids, including such as oils, introduced into it preferably while its lower end is clamped by the sealing elements *10*, *10*. Upon separation from each other of the members *8*, *8*, the filling within the container, particularly when a liquid, distends the bottom of the container so that the lower reinforcing element *T* assumes the position shown in Fig. 3, in which it bridges the joint between the container walls sealed to each other to constitute seal *E1*, so protecting the joint or seal against pressure by the filling due either to pressure upon the exterior of container *C* or to internal pressure by the filling, due, for example, to inertia of the filling, as when the filled container is dropped or otherwise subjected to accident.

The reinforced containers so formed and filled are thereafter in succession detached from the webbing, as by the knives *11*, *11*, actuated in timed relation to aforesaid rolls *3*, *3* and members *4*, *5*, *6*, *7* and *8*, *8*. Knives *11*, *11* transversely sever the webbing between the bottom seal *E1* of one container and the top seal *E* of the next previously formed container. The seals *E1* and *E* may be formed as a single wide seal, transversely severed by the knives *11*, *11* to detach the lowermost container from the webbing; in such case, each pair of tools *9*, *9A* is replaced by a single wide tool.

The relation of reinforcement *T* to the container is shown in Fig. 3; the outer face or ply *f* is adhesively attached to the inner faces of both side walls *G*, *G1* of the container; the strip *T*, or its outer ply *p*, forms a container partition, bottom, cap or trough, with or on which the filling contacts or is supported, and which is continuous across the joint or inner edge or limit of the seal *E*. The relations of the top reinforcing element *T1* to the top seal *E* and walls *G*, *G1* of the container are the same.

When containers, not so reinforced, are dropped or pressed, as during handling or transport, the filling, particularly when liquid, tends to spread apart the walls of the seal from their inner limits or edges outwardly, and to break the container walls adjacent those edges generally along line *h*. Both of these tendencies are overcome by the reinforcing elements *T* and *T1*; the continuity of the strips *T* and *T1* across the inner edges or exposed joints of the seals *E* and *E1* respectively, prevents them from being forced open by the weight of the liquid, or other filling, and the attachment of the sides of the strips *T*, *T1* to the webbing adjacent the seals there reinforces the web material where it is weakest because of aforesaid heat-sealing operation.

The containers *C* are preferably formed, sealed, filled and detached by the continuous method described; however, they may be formed

from individual sheets each corresponding with increment B of web W, Fig. 1.

In the modification shown in Fig. 4, the container C1 is of multi-wall construction; preferably, each of the inner seals, of which H1 is exemplary, is within a related outer seal, of which seal E1 is exemplary. The inner and outer seals are preferably formed by attachment to each other of associated areas of the same sheet material; for example, the seal E1 is formed by applying heat and pressure to a tubular section formed from web or sheet W and the seal H1 is formed by applying heat and pressure to overlying areas of sheet L forming the inner container wall or lining. Multi-wall containers of this type may, as described and claimed in Letters Patent 2,257,823 to Stokes, be formed from a continuous web W to which is applied, at suitable intervals, a series of sheets L, which are shaped concurrently with the webbing to form a series of nested tubular sections which are transversely sealed to form a succession of multi-wall or lined containers.

To form the containers shown in Fig. 4, by modification of the method shown in the aforesaid Stokes patent, there is applied to each of the successive sheets L, generally as shown in Fig. 1 hereof, a pair of reinforcing elements T, T1 to strengthen the ends of the containers, as in Fig. 3, to prevent them from opening or breaking at the seals when accidentally dropped or unduly pressed.

As shown in Fig. 4, the reinforcing element T of container C1 bridges the inner edge of the joint of the inner seal H1, and is attached, on both sides of the seal H1, to the inner faces of the opposite sides G2, G3 of the inner container wall or lining L.

The inner container L may be of paper, Cellophane, Pliofilm, or any suitable sheet material, preferably coated with, impregnated with, or comprising thermoplastic material, and the outer container of webbing W may be of the same or any suitable different material, but, as previously stated, is preferably capable of heat-sealing. The inner container L may be entirely free of attachment to the outer container, or may be in part, or wholly, joined thereto.

The seal S1 extending longitudinally of the inner container may be formed by adhesively joining overlapping margins of the sheet material L, and the seam so formed may underlie, or be staggered with respect to, the longitudinal seam S of the outer container.

The container C2, Fig. 5, is strengthened adjacent its seals E, E1 by the externally applied reinforcing elements T2 and T3 which embrace the seals; there may be also provided the internal reinforcing elements T and T1, Figs. 1 and 3. The reinforcing element T2 is adhesively applied to one face of the container C2 adjacent its upper seal E, extends across or embraces the seal over or at its upper exterior edge, and then extends downwardly across the other face of the seal into adhesive attachment with the opposite face of the container.

Similarly, the reinforcing element T3 is adhesively applied to one face of container C2 adjacent the seal E1 and extends downwardly across one face of the seal and under its outer edge, and thence, upwardly against the other face of the seal into adhesive engagement with the other side of the container.

Each of the reinforcing elements T2, T3 may be single or multi-ply; when of single ply, the

elements, with adhesive freshly applied to their inner faces, are brought into contact with the outside of the container and held there until the adhesive has sufficiently set; preferably, these reinforcing elements are faced with hardened thermoplastic, previously applied either as a coating, or as a layer of Pliofilm, or the like. In the latter case, the reinforcing elements are simply folded over the ends of the container, and heat and pressure applied to bond them to the sides and ends of the container.

In brief, each of the elements, T2, T3, is preferably, throughout its length and width, adhesively attached, preferably thermoplastically, over the sealed ends of container C2.

The container C2 may be formed generally in accordance with the method of Fig. 1, and one or both of the reinforcing elements T2 and T3 applied after detachment of the container from the webbing; or if inner elements T, T1 are to be omitted, then container C2 is formed as in aforesaid Zwayer patent, and elements T2, T3 are thereafter applied.

In this modification, as in Figs. 3 and 4, the sheet material constituting container C2 is reinforced adjacent the edges of each of the seals E, E1 along the lines h, but in Fig. 5, the reinforcing elements do not, unlike Figs. 3 and 4, effectively prevent opening of the seals E, E1 along their edges inside the container.

The container C3, Figs. 6 and 7, is formed from two sheets W2, W3, preferably of, or comprising, thermoplastic material, joined at their edges to provide the four fin-type, or exteriorly projecting, seals E, E1, E2, and E3. The edges inside the container of the two end seals E, E1 are bridged by reinforcing elements T1 and T respectively, so that a cross-section of each end of this container is identical with that of the modification shown in Figs. 1 and 3. The edge inside the container of each of the seals E2 and E3 is similarly bridged by reinforcing elements T4 and T5, Fig. 7, each having the same relation to its associated seal as the reinforcing element T or T1 has to its associated seal E or E1.

The adhesively coated face of each of the four reinforcing elements T1—T4, is attached to the inner face of the container wall adjacent to and on opposite sides of the edge of a seal across which the reinforcing element is continuous. Thus the inner edges of all seals of the container are protected against rupture or opening by pressure applied to or by the filling of the container, and, as in all modifications previously described, the container is reinforced at and adjacent the edges of the seals to prevent its breakage along lines h defined by those edges of the seals.

The container C3 may be formed, as shown in Figs. 6 and 7, from two individual sheets or, preferably, by a continuous method, substantially similar to that disclosed in Fig. 5 of the aforesaid Stokes patent, from two continuous webs.

What I claim is:

1. A method of making a container which comprises shaping sheet material and attaching margins thereof to each other to form a tube, flattening the tube at least at one end and adhesively attaching to each other opposite sides of the flattened end to form a seal, and attaching to said sheet material a reinforcing strip which is continuous across an edge of said seal and is adhesively attached to areas of said sheet material comprised in opposite sides of the container and contiguous to but exclusive of areas thereof joined to form said seal.

2. A method of forming a container which comprises folding a reinforcing element and adhesively attaching one face thereof to sheet material, shaping and effecting adhesive attachment of margins of said sheet material to form a tube partially internally bounded by said reinforcing element, flattening said tube to effect attachment of another face of said reinforcing element to the sheet material to complete its attachment to the internal periphery of said tube, and transversely sealing said tube immediately adjacent the fold of said element.
3. A method of making containers which comprises shaping a web to form a tube, applying to the web, before shaping thereof, a series of folded reinforcing elements, transversely sealing the tube adjacent the folded edges of said elements to form containers, and, substantially concurrently with formation of each transverse seal, effecting adhesive attachment of one of said reinforcing elements to the inner faces of opposite walls of the flattened tube substantially throughout the length of the inner boundary of the seal.
4. A method of forming containers which comprises shaping web material to form a tube, attaching to the webbing, before shaping thereof, pairs of folded reinforcing elements spaced longitudinally of the web, transversely flattening and sealing the tube between each pair of said folded reinforcing elements to form and seal the adjacent ends of successive containers, and substantially concurrently effecting attachment of the pair of elements to the inner faces of walls of the flattened tube to reinforce said ends of said successive containers adjacent their said sealed ends and to bridge the inner boundary of each of said seals.
5. Apparatus for making containers comprising means for feeding a web, mechanism for applying folded reinforcing elements at intervals along the web, a form over which the web is fed by said means to shape it into a tube having said elements internally thereof, and means for flattening the tube and effecting attachment of each of said folded elements to the inner faces of sides of the flattened tube.
6. Apparatus for making containers comprising means for feeding a web, mechanism for applying folded reinforcing elements transversely of the web at intervals lengthwise thereof, a form over which the web is fed by said means to shape it into a tube having said elements internally thereof, means for transversely flattening and sealing the tube adjacent each of said elements, and means for effecting attachment of each of said folded elements to the inner faces of sides of the flattened tube.
7. Apparatus for making containers comprising means for feeding a web, mechanism for applying spaced pairs of reinforcing elements transversely of the web at intervals lengthwise thereof, a form over which the web is fed by said means to shape it into a tube having said elements internally thereof, and means for transversely flattening and sealing the tube between said elements of each pair, and for substantially concurrently effecting their attachment to the inner faces of sides of the flattened tube.
8. Apparatus for making containers comprising means for feeding a web, mechanism for applying pairs of reinforcing elements transversely of the web at intervals lengthwise thereof, a form over which the web is fed by said means to shape it into a tube having said elements internally thereof, means for transversely flattening and sealing the tube between the elements of each pair, and for substantially concurrently effecting their attachment to the inner faces of sides of the flattened tube, and means for transversely severing the webbing between said elements of each pair.
9. Apparatus for making containers comprising means operating intermittently to feed a web, means operating in timed relation thereto to feed strip material and for concurrently folding and cutting said strip material to form folded reinforcing elements and for applying them transversely of the web at intervals lengthwise thereof, a form over which the web is fed by said web-feeding means to shape it into a tube having said reinforcing elements internally thereof, means operating in timed relation to said web-feeding means for flattening and transversely sealing the tube adjacent each of said folded reinforcing elements, and means for effecting attachment of each of said elements to the inner faces of the sides of the flattened tube.
10. Apparatus for making containers comprising means operating intermittently to feed a web, mechanism operating in timed relation thereto to apply reinforcing elements at intervals along the web, a form over which the web is fed by said means to shape it into a tube having said elements internally thereof, and means operating in timed relation to said web-feeding means for transversely flattening and sealing the tube between a pair of said elements and for effecting attachment of at least one of said elements to the inner faces of opposite sides of the tube to bridge a boundary of the flattened, sealed portion of the tube.
11. Apparatus for making containers comprising means for feeding a web of thermoplastic material, mechanism for applying folded reinforcing elements transversely of the web at intervals lengthwise thereof and for effecting their thermoplastic attachment thereto, a form over which the web fed by said means is shaped into a tube having said reinforcing elements internally thereof, and heat-sealing means for transversely sealing the tube adjacent each of said reinforcing elements and for effecting their thermoplastic attachment to the inner faces of the sides of the tube.
12. Apparatus for making containers comprising means for feeding a web, mechanism for intermittently feeding strip material to the web and for folding said strip material, and means operating in timed relation to said mechanism for detaching portions of said strip material to constitute folded reinforcing elements and for concurrently applying a face of each of said reinforcing elements to said web.

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