

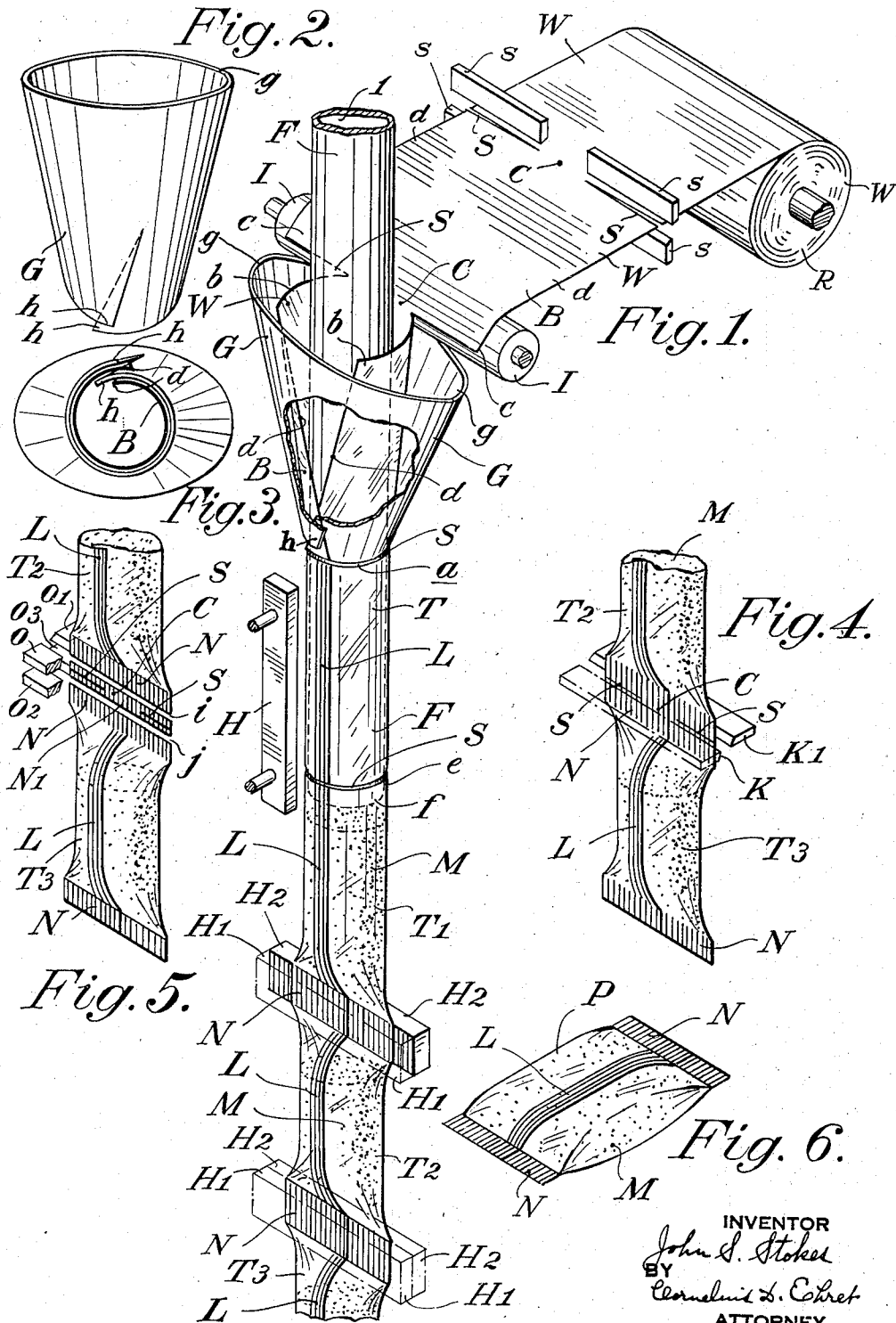
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METHOD OF AND APPARATUS FOR MANUFACTURE OF SEALED PACKAGES

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METHOD OF AND APPARATUS FOR MANUFACTURE OF SEALED PACKAGES

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My invention relates or is applicable to or in methods of and apparatus for producing closed or sealed filled packages, comprising and performing the step of forming receptacles, containers or bags from web or sheet material (for brevity herein generically termed "web" or "webbing"), and such other steps as filling and sealing them.

In accordance with my invention, more particularly for avoidance of those adverse effects upon appearance and strength of the web in the eventual packages caused by creasing, waving, crimping or wrinkling incident to pulling or feeding and forming the web to and about a former member, the web is transversely cut, slit or notched, at intervals longitudinally thereof to define sections or blanks each of a length preferably substantially or approximately corresponding with the length of a bag or container, inwardly from either or both edges of the web and to extent or extents limited to leave an unsevered portion constituting a connector element between neighboring blanks or sections and of cross section sufficient without rupture to transmit the necessary pull or feeding stress exerted upon the web throughout one or more of the succeeding steps, such as forming, filling and sealing the receptacles or bags.

Further in accordance with my invention, each transversely partially severed section or blank of the web is pulled or fed to and worked around the former member by progressively guiding and forming it into a tube; for which passage, formation and working of the blank there may be used any suitable means, such, for example, as the inner surface of a guiding and/or forming chute or tubular member, funnel-like in the sense the size of its bore or passage diminishes in the direction of pull or feed of the blank, effecting, preferably, overlap of its edges or margins, to constitute a tube of web material, which thereafter may be operated upon in any number of steps of any suitable characters, such for example as may effect attachment to each other of the aforesaid margins to constitute a longitudinal closure or seal, as may effect transverse sealing or closure of the tube to constitute, precedent to filling, a closed end, as may effect a second transverse closure or seal, and as may effect eventual severance of the so made and filled unit from the tube of web material.

Further in accordance with my invention, the eventual severance of a filled sealed unit from the tube of web material may be effected along a line substantially coincident with aforesaid

transverse slits, cuts or notches, or by severing the unit from the tube on opposite sides of aforesaid slits, cuts or notches, so in effect removing a transverse strip of the seal.

More particularly, my methods having the characteristics hereinabove stated and hereinafter described, are preferably continuous in character, notwithstanding the web or sheet material or tube formed therefrom intermittently may come to rest for performance of any one or more steps; and my apparatus, utilizable for performing such methods, in like sense operates continuously, cycle after cycle.

My invention resides in methods and apparatus of the character hereinafter described and claimed.

For an understanding of my invention, and for illustration of some of the characteristics and forms of my methods and apparatus, reference is had to the accompanying drawing, in which:

Fig. 1, in perspective, illustrates aspects of my method and apparatus;

Fig. 2, in perspective, represents a chute or funnel-like member which may guide and form the web;

Fig. 3 is a bottom plan view of the exit end of the structure shown in Fig. 2;

Fig. 4, in perspective, illustrates the step of and means for severing a filled and closed or sealed unit from the tube of web material;

Fig. 5, in perspective, illustrates a modification of the step and apparatus for severance of a filled and closed or sealed unit by removal of a portion of a closure or seal;

Fig. 6, in perspective, illustrates a filled closed or sealed package, constituting the filled unit after severance by the steps or apparatus illustrated in Figs. 4 and 5.

As illustrative, but not limitative of methods and apparatus in or to which my methods and apparatus are utilizable or applicable, reference may be had to United States patents to Zwayer No. 1,986,422 or Aldrich No. 1,937,501.

Heretofore in pulling or feeding and working webbing to and around a former member to form a tube from the webbing, it has in advance of reaching the former member been passed over a yoke or shoulder-like structure or equivalent, for example such as designated 2, 2, or equivalent, in Fig. 4 of U. S. patent to Maxfield No. 2,160,367, or such as designated 21, 22, or equivalent, in Fig. 10 of aforesaid Zwayer Patent No. 1,986,422. So pulling the webbing over the shoulder or yoke structure or equivalent and flexing and working it to and around the former

tube (such as 4 of aforesaid Maxfield patent or 24 of aforesaid Zwayer patent) the webbing is subjected to such stresses as to cause it to become creased, wrinkled, crimped, folded, waved or otherwise affected, all for brevity comprehended by the term "creased," with resultant reduction in strength of the webbing continuing throughout the further steps performed thereon and into the stage of completion of a detached closed or sealed filled package, and with resultant disfigurement or detracting from the appearance of the walls of the eventual package.

Referring to Fig. 1, and associated figures, as illustrative of and generically exemplifying my improvements in method and apparatus for avoiding adverse effects including aforesaid reduction in strength or change in appearance of the webbing, there is provided a roll or supply R of webbing W, which may consist of one or more plies of such flexible or workable materials as may or may not be thermoplastic in character. For example, the web material may be paper, glazed paper, waxed paper, "Cellophane," moisture-proof "Cellophane," "Pliofilm," "Diafane," "Protectoid" and the like, some of which are thermoplastic in character, well suited to sealing or attachment by application of heat and pressure, and some of which, not being thermoplastic in character, may be sealed or attached by recourse to contained or applied adhesive, wax, or the like. The term thermoplastic is here applicable to material which consists of or which is impregnated or coated with a thermoplastic; and when the web material comprises more than a single ply, it may as to one or more of the plies be thermoplastic in character, and as to the other ply or plies may in character be non-thermoplastic, but adhesive or capable of sealing or attachment by adhesive.

Webbing W is worked into the form of a tube T by passing it to and forming it about and along the former member F, which itself may be a tube through whose bore I the filling for the containers formed from the webbing is introduced into them. At any suitable region longitudinally of the tube T may be applied to the web W a pull exerted thereon to withdraw it from the roll R and through such number of succeeding steps or stages as may be suitable or desirable.

In the example illustrated, the web W is fed to and formed about and along the former member F without recourse to, but in avoidance of the use and above described effects of, aforesaid yoke or shoulder structure, or equivalent.

In lieu of employment of such yoke or shoulder structure or any other equivalent structure or means having the aforesaid adverse effects upon the strength or appearance of the webbing, web W is, transversely partially severed, by cutting, slitting or notching it inwardly from either or both of its longitudinal edges as indicated at the cuts, slits or notches S, S. In the example illustrated the web is cut or slit, as by cooperating shearing members s, s, preferably actuated during a pause in the pull upon or feed of the web W; in lieu of simply cutting or slitting the webbing W, there may be employed suitable structure for notching the webbing, effective to cut out of the web suitably narrow strips of tapering, rectangular or other shape, located, however, at the intervals and positions here described respecting the slits or cuts S, S. The term cut or slit shall be understood in addition to comprehend a notch.

Successive actuations of the shearing members s, s, or the notching members employed as aforesaid in lieu thereof, occur with such spacing longitudinally of the web or at such intervals of time as to define between successive slits or notches blanks or sections B, each of extent longitudinally of web W at least sufficient to insure desired length of the finished package, or preferably of a length substantially equal to or approximately corresponding with the length of each receptacle, container or bag subsequently formed from web W.

So incompletely transversely slitting or notching the web leaves connector portions or elements C, at like intervals lengthwise thereof, of sufficient cross-section to withstand, without rupture, the pull or feeding stress exerted upon the web W throughout its feed from roll R to or through any later stage, usually and preferably including the stage of final closure or sealing of each filled unit or the stage of severance thereof to effect an unattached filled and sealed package.

Each section or blank B passes over the idler roll I, suitably adjacent the former member F, while continuing substantially flat except for some incidental curvature in accord with the surface of the roll I. Broadly, the opposite lateral portions of blank B are directly, in the sense of avoidance of use and of the effects (for brevity generically termed creases or creasing) of aforesaid shoulder or yoke structure or equivalent, curled toward each other, to extent eventually to simulate or constitute a tube. More specifically viewed the leading corners c, c of blank B first are brought to embrace, or be curled or formed around, the member F, while progressively partaking during web feed of further curl or circular formation of concurrently progressively decreasing diameter, until the leading transverse edge of slit S and blank B reach approximately the position a, at which time its trailing transverse edge b, b forms an open or incomplete circumference, while more or less spaced from the outer surface of the member F. Thereafter, in descending (along and in contact with the former F or equivalent, if employed) the trailing edge b, b progressively approaches the former F, and the gap between the longitudinal edges d, d of the blank progressively closes, preferably with overlap of the longitudinal marginal portions of the leading end of the blank B; such action proceeds until the trailing end of the blank reaches approximately the position a and its leading end reaches approximately the position e, corresponding approximately with the lower end f of former F, at which formation of the upper tube section or unit T is completed, preferably with its longitudinal margins overlapping or otherwise disposed in readiness for attachment to each other, and with its upper connector element C still integral with the blank B immediately above.

There are in succeeding intervals formed from web W further blanks or sections B, integrally and continuously united in train through aforesaid connector element C, at least throughout the stage of formation of uppermost tube section or unit T, and preferably throughout later steps or stages to that of final detachment of a filled and closed tube unit.

The following steps of longitudinally and transversely closing or sealing, filling and detaching filled tube units are exemplary only, without limitation of my invention to them or any of them, except as hereinafter may be claimed.

The margins of unit T are joined, to form the

longitudinal closure or seal L, preferably corrugated as shown, adhesively or by any equivalent method, such as heat sealing by any suitable heater, generically represented by the electrically or otherwise heated member H periodically pressed against aforesaid overlapping margins, backed by the former F.

The tube-clamping members H1, H2, at least one of which is electrically or otherwise heated, and of which one may be corrugated to form a transverse corrugated seal N, in some cases effectively complete or integral at and across the slits S, S, those portions of seal N to either side of seal L. Seal N is of extent longitudinally of tube unit T1 sufficient to include the slits or notches S, S in the web material; it is also wide enough to provide the top seal of filled tube unit T2. Members H1, H2, having effected such transverse bottom seal of unit T1, the filling M is introduced into it, as through the bore of member F.

The complete or integral sealing aforesaid at and across the slits or notches S, S is not essential to my invention, though procurable in especially those instances when the web material is to suitable extent thermoplastic. In any event, however, whether or not the web material be thermoplastic, the attachment or sealing of parts of the web material to each other is perfect and continuous throughout each connector element C and throughout those portions of the seals N above and below the slots or notches S, S if they remain open; and whether or not they remain open, final severance of a filled and sealed tube unit, such as T3, is preferably so effected, as in Figs. 4 and 5, that said slits or notches are not within the wall or seal structure of, and do not appear in, the finished package P.

For brevity herein the term "seal" comprehends in addition to the definitely described seals L and N, all those types of closures and web-attaching means equivalent to seals L and N for the purposes of and within the spirit of my invention.

The sealing members H1, H2, while tightly clamping the tube, are periodically moved from their upper or full-line position, to the lower position indicated in dotted lines, so pulling downwardly, to the extent of the length of a blank B, the upper tube unit and blanks B, B, and web W from roll R; after which the members H1 and H2 separate and return to their aforesaid upper position.

The tube unit T3, Figs. 1 and 4, next below unit T2 of Fig. 1 and previously bottom sealed, filled and top sealed, is in readiness for complete severance through the seal N and the therein comprehended slits or notches S, S and connector unit C. Such complete and final severance is effected by the cooperating knife or shearing members K, K1 actuated, as well understood in the art, in suitably timed relation to the operations of the sealing members H, H1 and H2, in timed relation with which operations my aforesaid cutter or notching members s, s are actuated. The line of severance effected by aforesaid members K, K1 may and preferably is substantially coincident with the aligned slits or notches S, S.

The so finally and completely severed filled tube unit T3 becomes then an unattached closed or sealed and filled package P, Fig. 6. Such packages are completed by performance of steps of the character above described or of equivalent steps in rapid succession, constituting a con-

tinuous method, notwithstanding intermittance in movement of the web W, blanks B and tube units T etc.

In Fig. 5, as in Fig. 4, there is shown the lower portion of the tube unit T2 of Fig. 1, which has been bottom sealed, filled and top sealed. And below it is the previously produced filled and sealed unit T3 just after severance, from unit T2, at *i* and *j*, into a final package P, Fig. 6. The effect of severance at both *i* and *j* is to cut out from the transverse seal N a section N1 within which are included a connector element C and its adjacent slots or notches S, S. The upper portion of seal N constitutes the bottom seal of unit T2, and the lowermost portion of seal N constitutes the top seal of unit T3. Severance, as aforesaid, at *i* and *j*, is effected by the pairs of shearing elements O, O1 and O2, O3, actuated in timed relation, as in the case of knife elements K, K1 of Fig. 4, to the precedent operations in the method or of the apparatus.

The formation of a blank or section B in its first stage of relation to the former F, may be controlled or accomplished by recourse to any suitable means, exemplified by the tubular or funnel-like member G, surrounding the former F, and at its upper end *g* sufficiently widely spaced therefrom to accommodate entry of the leading edge and corners *c, c* of the blank B as it leaves the roll I. As blank B within the member G is pulled downwardly, it is guided or formed by the inner surface of member G to effect a generally or approximately conical formation of the blank whose lower end, at approximately the position *a*, is closed, and as its such leading end descends, its upper portions are progressively contracted to the form and dimensions of the lower end of member G, which serves as a forming aperture, with the longitudinal margins of the blank B overlapping, so constituting the tube unit T.

As indicated in Figs. 2 and 3, at its lower end and for some distance above it, the wall of the member G is slit, and its edges *h, h*, as indicated in Fig. 3, overlap and are spaced from each other to form a gap, whereby said margins of blank B are caused to overlap as aforesaid as they progressively pass from within member G through the lower or exit end thereof, so forming tube unit T with its margins overlapping.

Besides being unitary, of width sufficient alone to form a tube T, each blank may be composite, comprised of a plurality of narrower components, each slit or notched transversely inwardly from each or both of its edges as hereinbefore described, the total of the widths of the several components then being sufficient to form the tube; the webbing for such components may be stored on and withdrawn from two rolls as generically indicated in Fig. 10 of Maxfield U. S. Patent 2,146,831. The two components are then slit or notched, and then simultaneously passed to and individually directly, in avoidance of creasing either blank component, curled about the former F, each component forming a half tube, whose longitudinal edges or margins are then attached or sealed to those of the companion half tube, as described in connection with a unitary blank, to constitute a tube unit T. For brevity, in the claims the term "blank" comprehends both unitary and composite blanks.

Such forces and working as are, by practice of my invention, imposed on the unitary or composite blank of web material in forming it into a tube or equivalent, do not at all, or at most

negligibly, affect its strength or appearance; and the slits or notches S, S, involved do not adversely affect the various marginal or transverse closures or seals, and preferably do not appear in the final product.

What I claim is:

1. A method of making, filling and sealing packages comprising transversely partially severing webbing to define a blank remaining integrally attached to the webbing through the unsevered portion thereof, in avoidance of creasing the blank directly curling it into tubular form, attaching longitudinal marginal portions of the tube to each other, transversely sealing the tube throughout an area within which lie severed and unsevered portions of the blank, introducing filling material into the tube through the open end thereof, transversely sealing said open end throughout an area in which lie severed and unsevered portions of the blank, and detaching the filled sealed tube at said last named area.

2. A method of making, filling and sealing packages comprising transversely partially severing webbing to define a blank remaining integrally attached to the webbing through the unsevered portion thereof, in avoidance of creasing the blank directly curling it into tubular form, attaching longitudinal marginal portions of the tube to each other, transversely sealing the tube throughout an area within which lie severed and unsevered portions of the blank, introducing filling material into the tube through the open end thereof, transversely sealing said open end throughout an area in which lie severed and unsevered portions of the blank, and detaching the filled sealed tube substantially at the severed and unsevered portions in said second named area.

3. A method of making, filling and sealing packages comprising transversely partially severing webbing to define a blank remaining integrally attached to the webbing through the unsevered portion thereof, in avoidance of creasing the blank directly curling it into tubular form, attaching longitudinal marginal portions of the tube to each other, transversely sealing the tube throughout an area within which lie severed and unsevered portions of the blank, introducing filling material into the tube through the open end thereof, transversely sealing said open end throughout an area in which lie severed and unsevered portions of the blank, and detaching the filled sealed tube by removing from said second named area a section thereof within whose area are included severed and unsevered portions of the web material.

4. Apparatus for forming, filling and sealing packages comprising a former member, a supply of webbing, means for feeding the webbing from said supply with respect to said former member, means in advance of said former member for slitting the webbing transversely in partial severance thereof to form a blank, means for directly curling the blank, in avoidance of creasing thereof, about said former member into tubular form, means for closing said tubular form along its longitudinal edges to constitute a tube unit, means for transversely sealing the tube unit adjacent one end thereof throughout an area including slit and unsevered portions of the blank, means for filling the tube unit, means for effecting a transverse seal of said tube unit adjacent its other end throughout an area including slit and unsevered portions of the blank, and means for detaching the sealed filled unit by severance through said seal.

5. Apparatus for forming, filling and sealing packages comprising a former member, a supply of webbing, means for feeding the webbing from said supply with respect to said former member, means in advance of said former member for slitting the webbing transversely in partial severance thereof to form a blank, means for directly curling the blank, in avoidance of creasing thereof, about said former member into tubular form, means for closing said tubular form along its longitudinal edges to constitute a tube unit, means for transversely sealing the tube unit adjacent one end thereof throughout an area including slit and unsevered portions of the blank, means for filling the tube unit, means for effecting a transverse seal of said tube unit adjacent its other end throughout an area including slit and unsevered portions of the blank, and means for detaching the sealed filled unit by severance through said seal in substantial alignment with the slit and unsevered portions included therein.

6. Apparatus for forming, filling and sealing packages comprising a former member, a supply of webbing, means for feeding the webbing from said supply with respect to said former member, means in advance of said former member for slitting the webbing transversely in partial severance thereof to form a blank, means for directly curling the blank, in avoidance of creasing thereof, about said former member into tubular form, means for closing said tubular form along its longitudinal edges to constitute a tube unit, means for transversely sealing the tube unit adjacent one end thereof throughout an area including slit and unsevered portions of the blank, means for filling the tube unit, means for effecting a transverse seal of said tube unit adjacent its other end throughout an area including slit and unsevered portions of the blank, and means for removing from said seal a portion thereof including slit and unsevered portions of the blank to effect detachment of a sealed filled unit.

7. Apparatus for forming webbing into tubular form comprising a former member, means for feeding the webbing in one direction toward said former member and in substantially different direction along the former member, means in advance of said former member for slitting the webbing transversely in partial severance thereof to form a blank, and means for directly curling the blank, in avoidance of creasing thereof, about said former member into tubular form.

8. Apparatus for forming webbing into tubular form comprising a former member, means for feeding the webbing in one direction toward said former member and in substantially different direction along the former member, means in advance of said former member for slitting the webbing transversely in partial severance thereof to form a blank, a funnel-like member surrounding said former member to receive the webbing adjacent the change in direction of its feed, and means for directly curling the blank, in avoidance of creasing thereof, within said funnel-like member and about said former member into tubular form.

9. Apparatus for forming webbing into tubular form comprising a former member, means for feeding the webbing in one direction toward said former member and in substantially different direction along the former member, means in advance of said former member for slitting the webbing transversely in partial severance thereof to form a blank, a funnel-like member surrounding

and spaced from said former member adjacent the change in direction of feed of the webbing and having at least adjacent its portion of smaller diameter a slit whose longitudinal edges overlap in spaced relation to each other, and means for directly curling the blank, in avoidance of creasing thereof, within said funnel-like member and about said former member with its margins overlying the spaced overlapped edges of said funnel-like member.

10. A method of making, filling and sealing containers which comprises slitting webbing at intervals longitudinally thereof partially transversely to sever it, shaping the webbing, so partially severed in avoidance of creasing during shaping, and joining longitudinal edges thereof to form a tube having slits at intervals longitudinally thereof, transversely sealing the tube to form containers whose interiors are isolated from each other and from the slits, filling each of said containers after closure of an end thereof by a transverse seal, and severing the webbing between the closed ends of adjacent containers in succession to detach filled sealed containers from the webbing.

11. A method of making, filling and sealing containers which comprises slitting webbing at intervals longitudinally thereof partially transversely to sever it, shaping the webbing, so partially severed in avoidance of creasing during shaping, and joining longitudinal edges thereof to form a tube having slits at intervals longitudinally thereof, transversely sealing the tube adjacent each of the slits to form and close adjacent ends of a container to be filled and a filled container, and severing the webbing between the closed ends of adjacent containers in succession to detach sealed filled containers from the webbing.

12. A method of making, filling and sealing containers which comprises shaping webbing about a hollow form and joining longitudinal edges thereof to form a tube, at intervals longitudinally thereof transversely partially severing the webbing in advance of the form in avoidance of creasing of the webbing during aforesaid shaping thereof, transversely sealing the tube at intervals longitudinally thereof to define a series of containers with the severed portions of the webbing located between adjacent containers and isolated therefrom by the transverse seals, introducing filling into the containers through said form, and transversely severing the webbing to detach filled sealed containers therefrom.

13. A method of working webbing into a tube which comprises feeding the webbing in one direction toward a form, shaping the webbing about the form during feed of the webbing in a substantially different direction along the form and in advance of said form transversely partially severing the webbing in avoidance of creasing thereof during aforesaid shaping.

14. A method of working webbing into tubular form comprising feeding the webbing toward a former member, in advance of the former member transversely partially severing the webbing to define a blank remaining integrally attached to the webbing through the unsevered portion thereof, imparting to the feed of the blank a direction at a substantial angle to said first-named

direction of feed and substantially nearer parallelism with the forming surface of said former member, in avoidance of creasing the blank incident to aforesaid change in direction of feed thereof directly curling the blank about said former member into form converging progressively from larger diameter thereof adjacent its integral attachment to smaller diameter thereof, and converting the so curled blank into tubular form.

15. A method of working webbing into tubular form comprising feeding the webbing toward a former member, in advance of the former member transversely partially severing the webbing to define a blank remaining integrally attached to the webbing through the unsevered portion thereof, imparting to the feed of the blank a direction at a substantial angle to said first-named direction of feed and substantially nearer parallelism with the forming surface of said former member, in avoidance of creasing the blank incident to aforesaid change in direction of feed thereof directly curling the blank about said former member into form converging progressively from larger diameter thereof adjacent its said integral attachment to smaller diameter thereof, and converting the so curled blank into tubular form with longitudinal margins of the blank overlapping.

16. A method of working webbing into tubular form comprising feeding the webbing toward a cone-like surface, in advance thereof transversely partially severing the webbing to define a blank remaining integrally attached to the webbing through the unsevered portion thereof, imparting to the feed of the blank a direction at a substantial angle to said first-named direction of feed and substantially nearer parallelism with said cone-like surface, in avoidance of creasing the blank incident to aforesaid change in direction of feed thereof converting it into tubular form by passage thereof in contact with said cone-like surface.

17. A method of working webbing into tubular form comprising feeding the webbing toward a forming aperture, in advance thereof transversely partially severing the webbing to define a blank remaining integrally attached to the webbing through the unsevered portion thereof, imparting to the feed of the blank for passage through said forming aperture a direction at a substantial angle to said first-named direction of feed, in avoidance of creasing the blank incident to aforesaid change in direction of feed thereof curling it with its margins overlapping at least at its leading end, and converting the portion of the blank trailing its said leading end into tubular form by drawing the curled blank through said forming aperture.

18. A method of detaching filled closed packages of web material from a tube thereof formed from blanks defined by transverse partial severance of the webbing and each joined to the preceding and subsequent blanks by unsevered portions of the webbing, comprising removing an area, including severed and unsevered portions of the webbing, between closed ends of neighboring packages formed from immediately succeeding blanks.

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