

July 8, 1941.

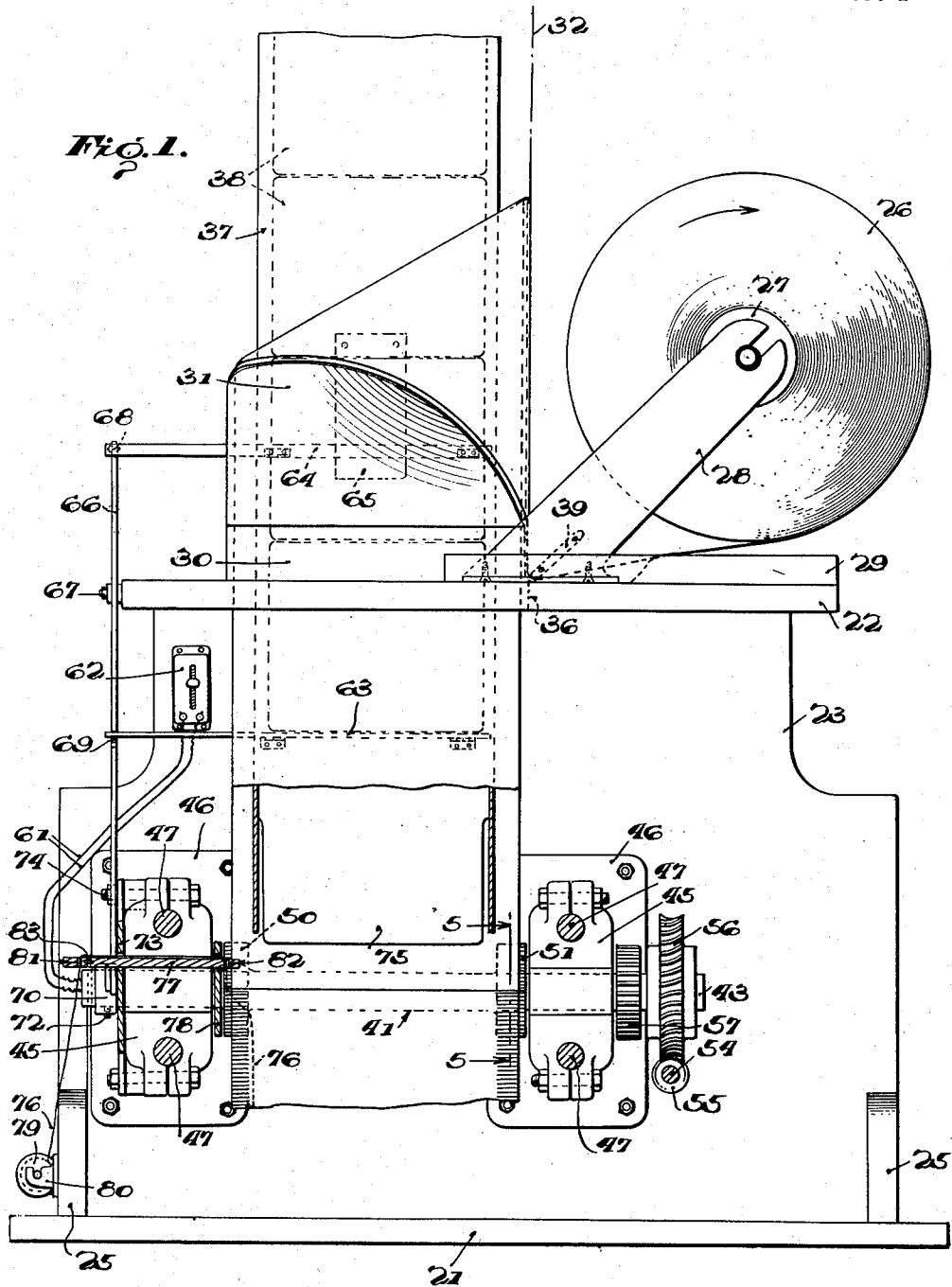
J. H. STROOP

2,248,471

PACKAGING METHOD AND MACHINE

Filed May 25, 1938

6 Sheets-Sheet 1



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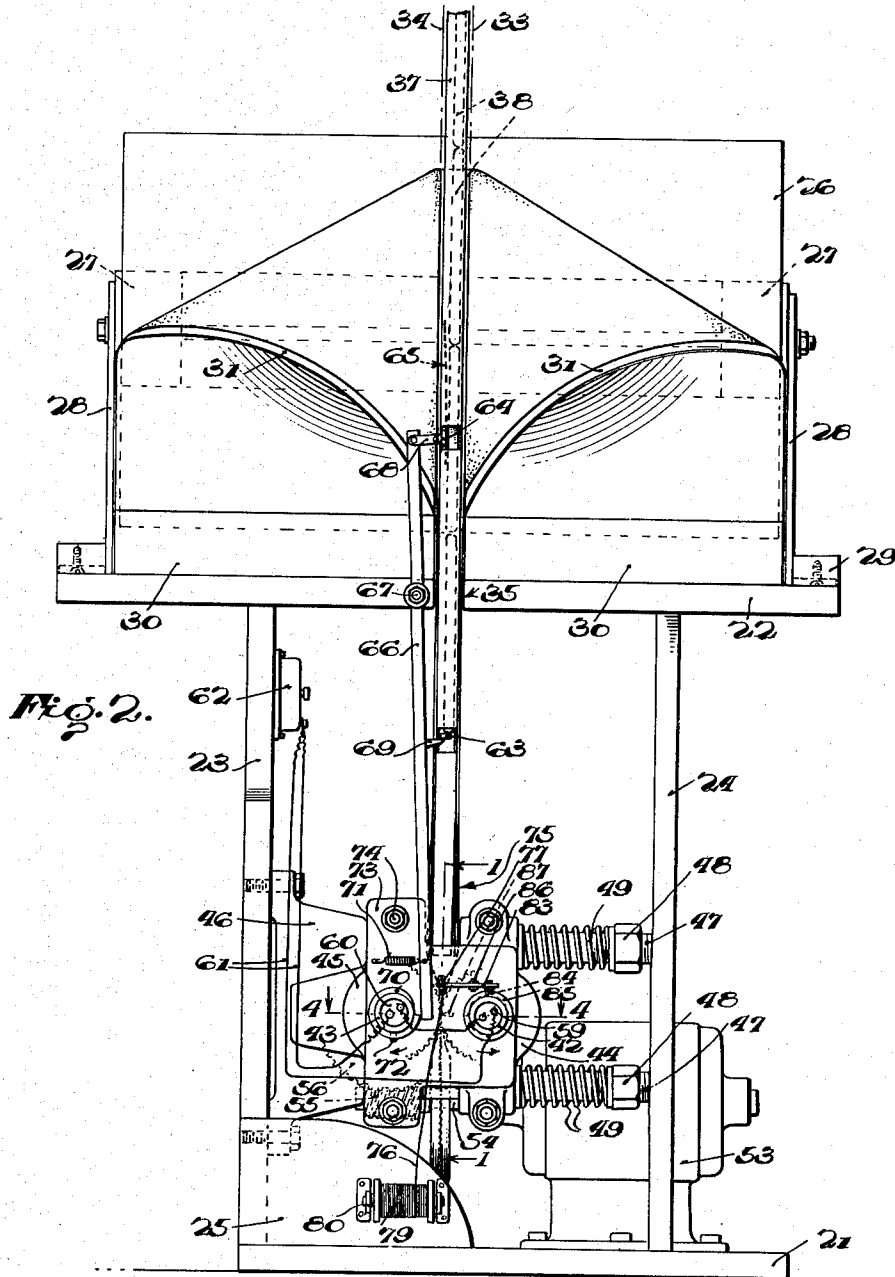
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6 Sheets-Sheet 2



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Fig. 3.

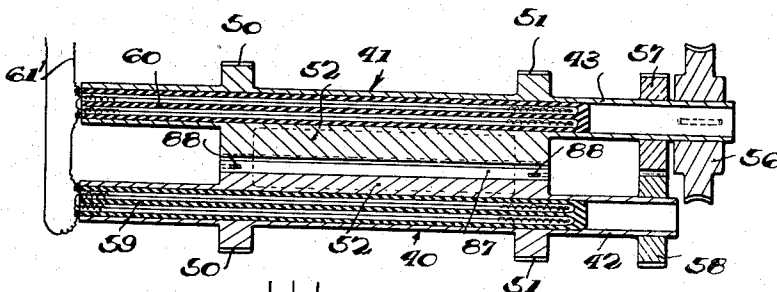
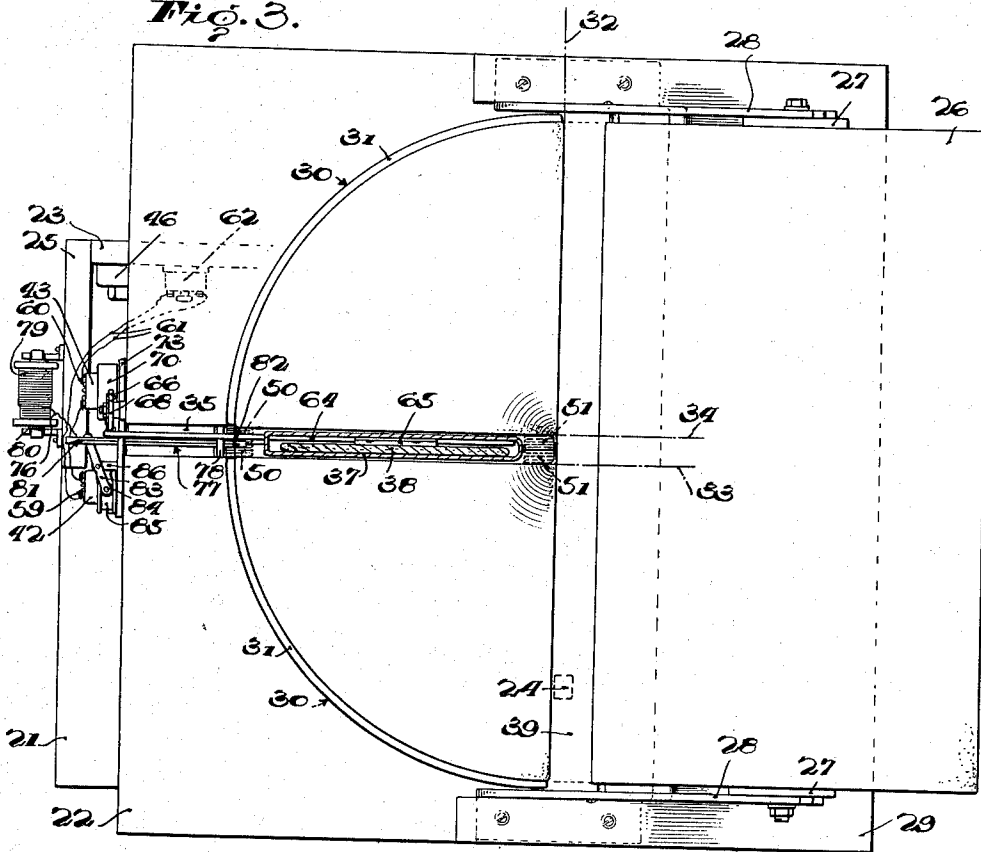


Fig. 4.

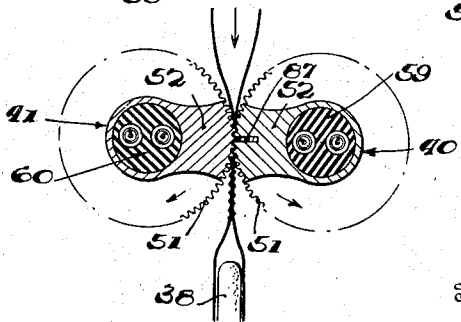


Fig. 5.

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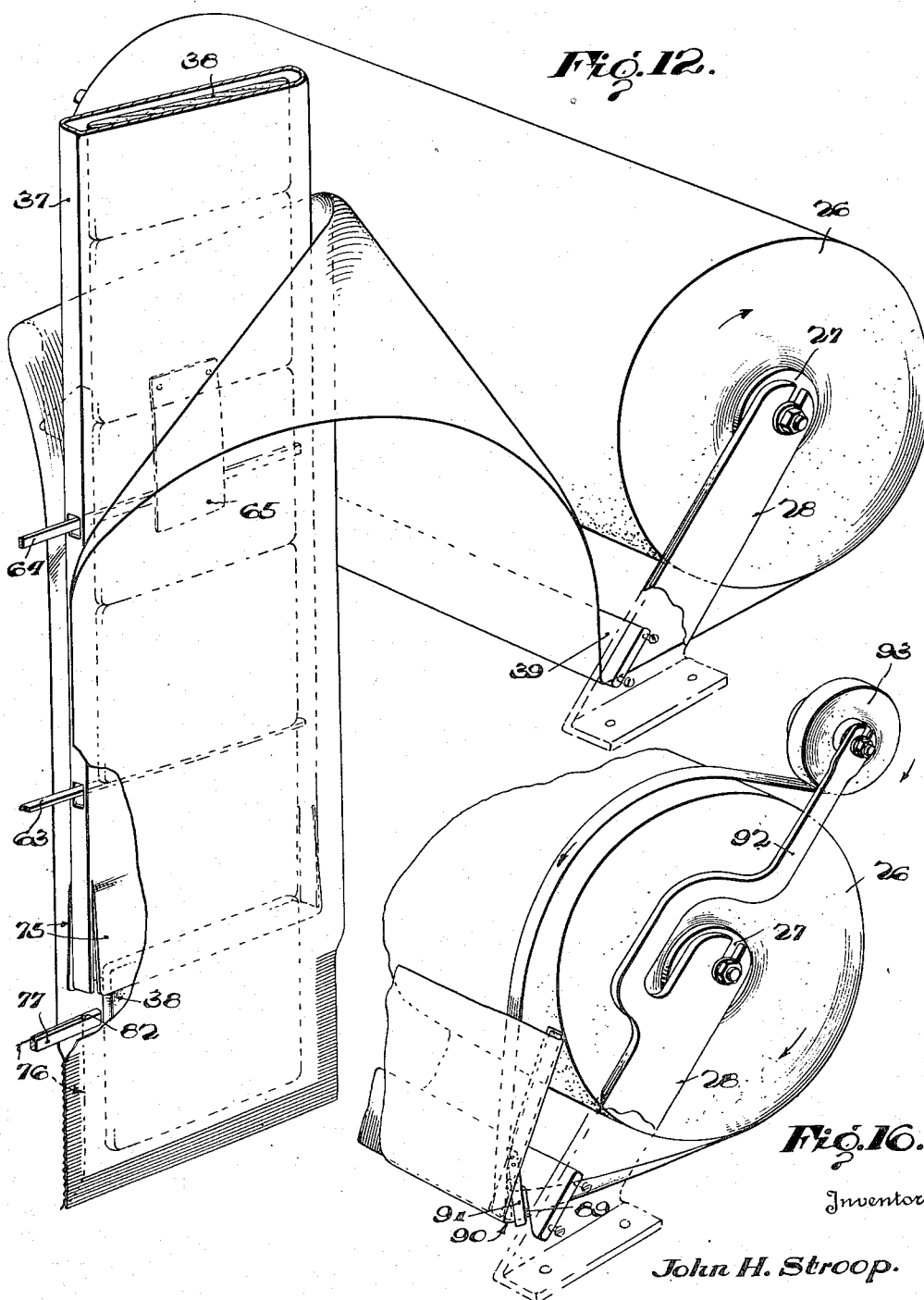
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Fig. 13.

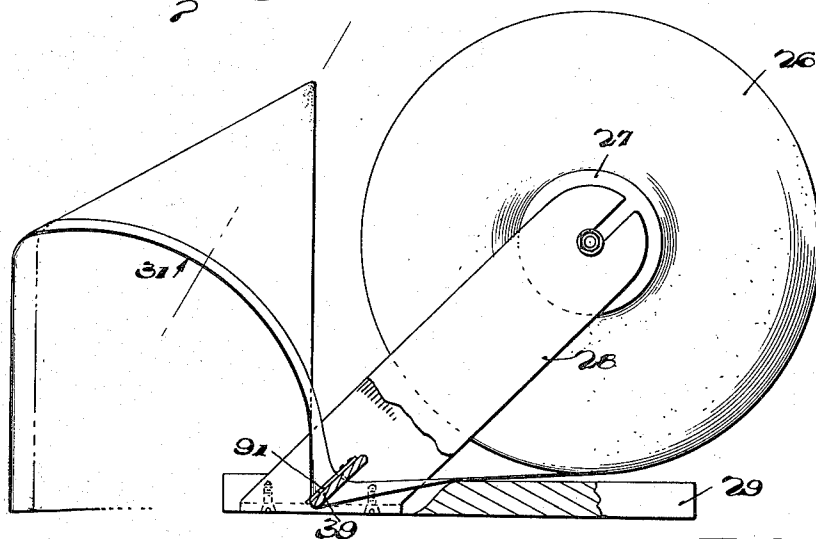


Fig. 14.

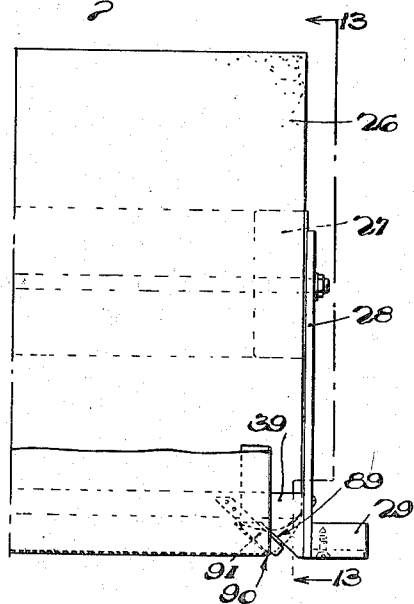
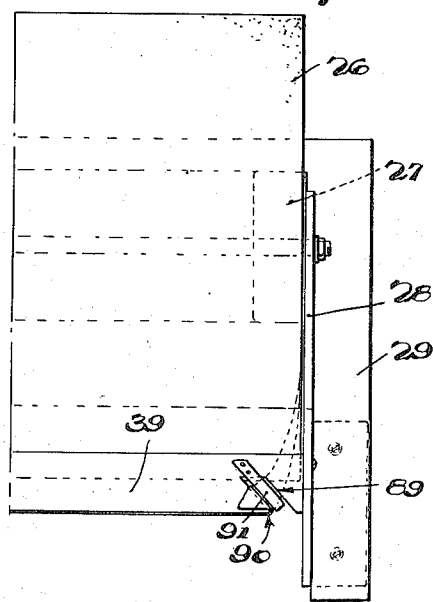


Fig. 15.



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UNITED STATES PATENT OFFICE

2,248,471

PACKAGING METHOD AND MACHINE

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Application May 25, 1938, Serial No. 210,041

37 Claims. (Cl. 93—3)

This invention relates to packaging methods and machinery, and more particularly to methods and machines for forming, filling and closing packages of the envelope type adapted to contain articles of widely varying sizes and characteristics.

One of the objects of the present invention is to provide a packaging mechanism of novel, relatively simple and inexpensive construction by means of which commodity packages of various forms may be automatically fabricated, filled and hermetically sealed at higher speeds than are possible with similar devices now available to the art.

Another object is to provide a new and improved form of packaging machine which is capable of making containers of the envelope type rapidly and inexpensively, and of incorporating in said containers during their manufacture means for facilitating the opening thereof by the ultimate user of the goods packaged therein.

Another object is to provide both a method and a mechanism of novel character by which commodity packages may be formed from flexible packaging materials and given predetermined volumetric characteristics especially suited to the particular type of commodity being packaged.

A further object is to provide a packaging machine of compact construction which is particularly well adapted for high speed manufacture of hermetically sealed packages formed of heat sealable material.

Still another object is to provide an improved type of packaging mechanism which is readily adaptable to the fabrication of a number of specifically different forms of packages, and to the filling of said packages with a wide variety of commodities.

A still further object is to provide a novel and simplified procedure for packaging commodities which will provide the commodity manufacturer with a relatively inexpensive method of packaging his goods in hermetically sealed, readily openable containers without the necessity for purchasing packages made outside his own plant, and which is particularly well adapted to meet the problems involved in high speed, straight line production of packaged goods.

Another object is to provide a packaging mechanism of the type adapted to form containers out of flexible packaging materials which embodies novel means for converting a web of such material into a U shape within a limited space and

without distorting or unduly stressing the material.

Another object is to provide a packaging machine of new and improved construction which is efficient, dependable and rapid in operation, rugged in structure, employs a minimum of moving parts, and requires substantially less space for its installation than packaging devices of the same general character heretofore known.

These and other objects will appear more fully upon a consideration of the detailed description of the embodiments of the invention which follows. Although one complete form of machine and several modifications of its component parts have been described and illustrated in the accompanying drawings, it is to be expressly understood that these drawings are for the purpose of illustration only and are not to be construed as defining the scope of the invention, reference being had for the latter purpose to the appended claims.

Referring now to the drawings, wherein like reference characters indicate like parts throughout the several views:

Fig. 1 is a side elevation of one form of packaging machine embodying the present invention, certain of the parts of the machine being shown as sectioned substantially on the line 1—1 of Fig. 2 in order to better illustrate various features of the construction;

Figs. 2 and 3 are a front elevation and a plan view, respectively, of the machine illustrated in Fig. 1, Fig. 3 showing the top portion of the filling duct in section;

Fig. 4 is a horizontal sectional view through the crimping and sealing elements taken substantially on line 4—4 of Fig. 2;

Fig. 5 is a transverse vertical section through the crimping and sealing elements taken substantially on line 5—5 of Fig. 1;

Figs. 6, 7 and 8 are diagrammatic views illustrating various steps in the formation of packages by the method of the present invention;

Figs. 9, 10 and 11 are diagrammatic views illustrating the same procedural steps as Figs. 6, 7 and 8, but taken at right angles to the latter and showing the crimping and sealing elements in section;

Fig. 12 is a diagrammatic perspective view illustrating the conversion of the packaging material from a flat web into a relatively narrow U shape and the feeding of the goods to be packaged to the interiors of the packages as they are formed, one edge portion of the packaging material being broken away at a point adjacent the

lower end of the filling duct to better show certain of the elements of the structure;

Fig. 13 is a side elevation, partially in section along the line 13—13 of Fig. 14, of a modified form of mechanism for forming a web of flexible packaging material into suitable shape for the fabrication of packages in the manner otherwise indicated in Figs. 1—12, this modification including means for doubling the marginal portions of the web to provide a reinforced edge for the finished packages;

Figs. 14 and 15 are a half front elevation and a half plan view, respectively, of the modification shown in Fig. 13; and

Fig. 16 is a fragmentary, diagrammatic perspective view illustrating the method of forming the doubled edges of the web by the mechanism of Figs. 13—15, this figure also showing still another modification of the invention wherein a strip of reinforcing material is placed within the doubled edge portion of the web during the formation of the latter.

As will be seen from the drawings, the packaging machine of the present invention comprises three principal mechanisms: first, a means for forming a web of flexible packaging material into a U shape with the bight of the U extending along the longitudinal center line of the web; second, a means for effecting a continuous seal between the opposed marginal portions of the U shaped web and for also sealing together transversely extending areas of the opposed portions of the web at spaced points along its longitudinal direction so as to form successive commodity containing spaces each sealed at its end edges and along one side edge, the other side edge being closed by the bight of the U; and third, a means for filling the said spaces with commodities prior to the complete sealing thereof. Suitable means may also be provided for either completely severing each package from the web by a cut within the limits of the transversely extending sealed areas at its end edges, or for perforating or otherwise weakening the web along similarly located, transversely extending lines so as to permit the ready detachment of each package from the web as desired. To perform the functions of the above recited means, and to carry out the method which is also a part of the invention, a novel combination of elements has been devised the details of which will appear from the drawings and from the following description of the disclosed embodiments of the inventive concept.

Referring first to Figs. 1—12, wherein are shown one specific form of machine and one particular method of packaging embodying the invention, the framework of the machine comprises a horizontal base 21, a horizontal platform 22 which is supported above the base 21 in suitable position by means of a vertical wall 23 and post 24, and a pair of reinforcing corner pieces 25 which connect the lower edges of wall 23 and the base 21. The platform 22 constitutes the support for both the supply of packaging material and the mechanism by which the latter is formed preliminarily to the sealing operations, while the sealing mechanism itself and the electrical devices for controlling the operation thereof may be mounted on wall 23.

In the embodiment illustrated, the packaging material is supplied in the form of a rolled web 26 of any suitable substantially transparent, flexible, heat sealable material, the roll being rotatably supported with its axis horizontal in any

desired manner, as by a pair of bearing members 27 entering the core of the roll each of which is mounted in the upper slotted end of a supporting arm or bracket 28. Supporting brackets 28 are in turn secured at their lower ends to, and extend angularly upwardly from, a base 29 which is removably mounted on platform 22.

Also supported on and fixed to platform 22 are a pair of substantially quadrantal blocks or bases 30 on which are mounted a pair of conical formers 31 which are adapted to convert the web of packaging material from the plane form in which it leaves the roll 26 into a relatively narrow U shape while simultaneously effecting a 180° change in the direction of movement of the web. As illustrated, each of the conical formers 31 has the surface of a right circular cone having an apex angle of 60° and its axis positioned at an angle of 60° with respect to both its base 30 and the axis of the other conical former. These two formers are so mounted that the surfaces of both are tangent to a vertical plane, indicated at 32, parallel to the axis of roll 26, while at the same time each is tangent to one of two other vertical planes, indicated at 33 and 34, perpendicular to the first mentioned plane 32 and so positioned as to conform to the planes which it is desired that the opposed portions of the web of packaging material shall occupy after the web has been formed into U shape.

Extending downwardly between the two conical formers 31, and through an opening 35 formed in platform 22 corresponding in width substantially to the distance between the vertical planes 33 and 34 and extending lengthwise (to the right as viewed in Fig. 1) from the edge of the platform to a point, indicated at 36, slightly beyond the vertical plane 32, is a filling duct 37 which is adapted to deliver the commodities to be packaged to the interiors of the packages as the latter are formed. The filling duct 37 may be supported in proper position in any suitable manner, as from above, and may be connected to the delivery end of the machine by which the commodities are manufactured, thus directly associating the packaging machine with the commodity production line.

In the illustrated embodiment of the invention, the goods being packaged are represented as relatively thin, substantially rectangular elements 38; accordingly, the filling duct 37 is likewise relatively narrow in cross section, and only slightly longer in a horizontal direction than the corresponding dimension of the commodities 38. However, it will be understood that the invention is equally applicable to the packaging of commodities of various other sizes and shapes by merely changing the sizes, shapes and relative positions of the various elements of the mechanism. In this connection, it may be pointed out that the horizontal distance between the two parallel planes 33 and 34 to which the conical formers 31 are tangent is only slightly greater than the width of filling duct 37 so as to bring the opposed thicknesses of the web of packaging material substantially flush with the outside side walls of the duct 37 as the material moves away from the formers in its downward travel. It will also be noted that the formers 31 are so proportioned as to project beyond both end walls of filling duct 37 a sufficient distance to enable the formation of the packaging material into a U shape such that both the bight of the U and the opposed edges of the web extend a substantial

distance beyond the edges of the duct 37 and provide adequate marginal areas along the web for engagement by the sealing members later to be described.

In order to properly guide the web of packaging material in its passage from the roll 26 to the conical formers 31, the roll supporting base 29 is provided with a substantially rectangular opening between the legs to which the supporting brackets 28 are connected, and a guide member or bar 39 is placed across said space suitably secured at its ends to supporting brackets 28. As is shown best in Fig. 1, guide bar 39 is positioned with its lower guiding edge slightly above the plane of the bottom of supporting base 29 and slants upwardly toward the axis of roll 26. The guide bar 39 is also so located that, when supporting base 29 is in its proper position on platform 22, the lower edge of said bar is substantially tangent to the vertical plane 32 to which the conical formers 31 are likewise tangent.

With this construction, the web of packaging material passes in plane form from the roll 26, beneath the bottom edge of guide bar 39, and then starts upwardly substantially in the vertical plane 32. As will be seen best from the diagrammatic showing of Fig. 12, after starting upwardly from guide bar 39, the web comes into contact with the formers 31 and its course is governed by the shape thereof until the web completely reverses its direction of movement and also changes its form from that of a flat plane 32 to that of a relatively narrow U shape, the legs of the U conforming to planes 33 and 34 and the height of the U lying substantially along the longitudinal center line of the web, parallel to and closely adjacent plane 32. By the use of conical formers of the characteristics above described, every element of the web moves through the same distance during the transformation from a flat plane into a U shape, and hence the material is not subjected to undue stresses or distortion during the transformation. Moreover, this particular form of mechanism for shaping the web permits its conversion into a U shape within a much smaller space than would be required for the same operation were the latter to be performed by other means heretofore employed by the packaging art.

Although the formers 31 are shown in the drawings as being fixed to their bases 30 with the packaging material sliding over the surfaces thereof, which surfaces are preferably of polished metal so as to reduce friction, it will be understood that the formers may also be made as separate elements rotatable upon their axes, if desired, or that the same function of causing the packaging material to flow in conical paths of the character disclosed may be performed by other means of specifically different construction.

When the packaging material leaves the formers 31 and moves downwardly around filling duct 37 in U shape with the sides of the U maintained in opposed, spaced apart relation by the wall of said duct, it passes through the opening 35 in platform 22 and approaches the sealing mechanism by which the U shaped web is formed into successive, hermetically sealed, commodity containing packages. As is shown best in Figs. 1, 2, 4 and 5, the sealing mechanism of the disclosed embodiment of the invention comprises a pair of rotatable sealing members, indicated generally at 40 and 41, having shafts 42 and 43,

respectively, which are journaled in pairs of bearing blocks 44 and 45 with their axes horizontal and located on opposite sides of the vertical path of travel of the U shaped web of packaging material as it moves downwardly from the formers 31 around filling duct 37. The bearing blocks 45, which support the shaft 43 of sealing member 41, are mounted on vertical wall 23 by means of suitable brackets 46, thus fixing the rotational axis of sealing member 41. Sealing member 40, however, is floatingly supported relatively to sealing member 41 so as to permit it to adjust itself relatively to the latter in accordance with the thickness of the packaging material which passes between said members, and yet continually exert a sealing pressure upon said material. In the form illustrated, this floating support is provided by slidably mounting the bearing blocks 44 on studs 47 which are carried by and project horizontally from bearing blocks 45, said studs being threaded at their outer ends and provided with nuts 48 and compression springs 49 interposed between said nuts and the bearing blocks 44. With this construction, the sealing member 40 is continually urged toward sealing member 41 by the pressure of springs 49.

In the portion of its length between the bearing blocks in which it is rotatably supported, each of sealing members 40 and 41 is provided with a pair of cylindrical sealing rolls 50 and 51, these rolls preferably having corrugated surfaces so as to effect a crimping, as well as a pressure sealing, operation upon the marginal portions of the U shaped web of packaging material as the latter passes between the sealing members. As is shown best in Fig. 1, the rolls 50 are somewhat wider than the width of the sealed area of the web which they are intended to produce, thereby insuring that they extend transversely beyond the opposed edges of the web for a purpose later to be described; for purposes of uniformity, the rolls 51 are preferably of the same width as rolls 50, and likewise project beyond the edge of the sealed area of the web formed thereby.

Each of sealing members 40 and 41 is additionally provided with a transversely extending sealing sector 52, also preferably corrugated on its arcuate sealing surface, said sector being of the same radius as sealing rolls 50 and 51 and extending entirely across the space between said rolls, but being of relatively small extent circumferentially so as to form transversely extending seals between the opposed portions of the U shaped web of packaging material at spaced points along, and of limited width in, its longitudinal dimension. Inasmuch as each of the sealing members of the mechanism illustrated is provided with one such transversely extending sector, and since the arcuate width of the latter is approximately 50°, it will be seen that once in every revolution of the sealing members a transversely extending sealed area is produced of a width approximately one sixth of the width of the unsealed area between successive transverse seals. Of course, if desired, the sealing members may be provided with a plurality of these sectors so as to effect more than one transverse seal during each rotation thereof.

In addition to sealing and crimping the web of packaging material both longitudinally and transversely, the sealing members 40 and 41 of the disclosed embodiment also constitute the means by which said web is moved through the

machine. By thus adapting the rotors to perform both of these functions, the construction of the machine is materially simplified and rendered less expensive.

The drive for sealing members 40 and 41 may be obtained in any suitable manner, as from an electric motor 53 mounted on the base 21 of the frame of the machine. As shown, the rotor of the motor 53 has a shaft 54 on which is mounted a worm 55, the worm in turn engaging with and driving a worm gear 56 fixed to one end (the right-hand end as viewed in Fig. 1) of the shaft 43 of sealing member 41. Shaft 43 also carries a spur gear 57 which is in driving engagement with a similar gear 58 fixed to shaft 42 of sealing member 40. The driving motor 53 is provided with the usual controls (not shown) whereby the speed of rotation of the sealing members may be adjusted and varied as desired.

When, as in the embodiment disclosed, the packaging material used is of a heat sealable character, suitable means are provided for heating one or both of the sealing members 40 and 41 so as to hermetically seal together the desired areas of the opposed portions of the U shaped web when forming the packages. As shown, shafts 42 and 43 of sealing members 40 and 41 are made hollow and have housed therein resistance heating elements 59 and 60 of any suitable construction, these elements being connected by wires 61 to a rheostat 62 by means of which the temperature to which the sealing members are heated may be regulated. The rheostat 62 may conveniently be mounted on vertical wall 23 of the machine frame, and is connected to any suitable source of electrical energy (not shown).

With the mechanism thus far described, it will be apparent that the packaging material is drawn from the roll 26 beneath the lower edge of guide bar 39, upwardly over and then downwardly between conical formers 31, and thence downwardly around filling duct 37 to sealing members 40 and 41 at which point both marginal portions of the U shaped web—that is, both the opposed edges of the web and the opposed thicknesses of web material at the bight of the U—pass between the sealing rolls 50 and 51 and, due to the pressure and heat applied by the latter, are hermetically sealed and simultaneously crimped to form air-tight, relatively stiff side edges for the packages. Although it is not essential to the air-tightness of the packages that the bight portion of the U shaped web be sealed and crimped as described, more efficient and dependable feeding of the web, and less fragile packages, result from the use of two sets of sealing rolls as compared with the results obtained when the set engaging the bight portion of the web is omitted. In addition to the continuous seals thus effected along the marginal portions of the web by the rolls 50 and 51, the web is intermittently sealed along transversely extending areas of limited width by the action of sectors 52, the web thereby being divided into a plurality of successive, hermetically sealed spaces in which commodities may be packaged.

While packages formed in this manner may, if adapted to contain pourable commodities in either solid or liquid form, be filled either prior to or, in some instances, after complete sealing by the use of various suitable filling methods, the machine and method specifically illustrated herein provide for filling the packages with commodities of solid form, such as the elements 38, during the

formation of the packages and prior to the complete sealing thereof. In the form shown, the filling duct 37 extends downwardly inside of the U shaped web to a point just above sealing members 40 and 41, and means are provided for delivering one of the commodities 38 from the duct into each package as the latter is formed by the sealing members. To this end, the duct 37 is provided with lower and upper valve members 63 and 64 which are so constructed and arranged as to control the flow of the elements 38 through the duct, the lower valve member 63 normally being closed and sustaining the entire stack of elements 38 but opening momentarily once during each rotation of the sealing members to permit the lowermost element to drop downwardly out of the duct and into the package then being formed; at the same time that the lower valve member 63 is opened, upper valve member 64 is closed so as to prevent the downward movement of all but the lowermost one of the stack of elements 38 in the duct 37.

As is shown best in Figs. 1 and 2, lower valve member 63 is suitably hinged to one side wall of filling duct 37 in such a manner as to fold downwardly out of a normally horizontal position when opened, while upper valve member 64 is also hinged to duct 37 but in such a manner as to normally occupy a vertical position and to turn downwardly when actuated toward closed position. In order to avoid jamming of the commodities in the filling duct 37, upper valve member 64 is preferably mounted behind a throat plate 65 of flexible material which is secured at its upper edge to one wall of duct 37 but yieldably movable at its lower end toward the opposite wall of said duct when upper valve member 64 is turned downwardly toward closed position. With this construction, actuation of upper valve member 67 toward closed position moves the lower portion of throat plate 65 outwardly against the next to the lowermost commodity element 38 in the duct and frictionally holds said element between said plate and the wall of the duct, thereby preventing any downward movement of those commodities in the duct above the lowermost element.

Any suitable mechanism may be provided for actuating valve members 63 and 64 in timed relation to the operation of sealing members 40 and 41. In the embodiment disclosed, this control is effected by means of a lever 66 which is pivoted on a suitable stud 67 extending outwardly from the edge of platform 22 closely adjacent the opening 35, said lever being connected at its upper end to valve member 64, as by a link 68, and carrying, at substantially the same distance below the pivot stud 67 as the link 68 is above said stud, a finger 69 which normally engages the lower surface of lower valve member 63 and holds the same in horizontal or closed position. The lower end of lever 66 is yieldably urged into contact with a cam 70 by means of a spring 71, the cam 70 being adjustably secured to the shaft 43 of sealing member 41 by means of a suitable set screw 72. The spring 71, which is connected at one end to lever 66, is anchored at its opposite end to a plate 73 suitably supported on the clamping bolts 74 of the bearing blocks 45 in which is journaled the left-hand end (as viewed in Fig. 1) of shaft 43 of sealing member 41. As is indicated best in Fig. 2, plate 73 is of substantial area and is provided with suitable openings through which pass the shafts 42 and 43, the opening for shaft 42 being slightly enlarged to

allow for the floating movement of said shaft and its associated sealing member 40.

The valve actuating cam 70 is so shaped and so positioned on shaft 41 that the valve members 63 and 64 are normally held in the positions shown in the drawings except during a short interval occurring once in each rotation of the sealing members, during which interval the positions of the valves are reversed so as to permit the lowermost commodity element in the filling duct to drop downwardly out of the duct into the package then being formed by the sealing members. In the particular embodiment of the invention herein disclosed, which is adapted to package relatively large commodity units, one to each package, the interval in question occurs during the formation of the transversely sealed area of the web, and preferably corresponds to the last half of the time during which the transverse sealing sectors are in sealing position. That is, the lower valve member 63 is opened and the upper valve member 64 closed immediately after the sectors 52 reach the center position shown in Fig. 9, and remain in said positions long enough for the lowermost commodity element to drop below lower valve member 63 and to enter the package as indicated in Fig. 10; the cam 70 and lever 66 then return the valve members to their normal positions indicated in the drawings. By operating the loading valves during this interval of the cycle of operation of the machine, it will be seen that the commodity element being loaded comes to rest within its package during the time that the transverse sealing sectors 52 are still in contact with the web, thereby preventing the entire force of the falling element from being exerted upon the transversely sealed area of the packaging material, a condition which might, under some circumstances, destroy the seal.

In order to facilitate the filling of the packages and to assist in obtaining the desired volumetric characteristics thereof, the side walls of filling duct 37 adjacent the delivery end thereof are cut away from the end walls, as indicated best in Figs. 1 and 12, and are provided with flexible skirt portions 75 made of resilient material and of such shape as to normally distend outwardly and thereby maintain the opposed thicknesses of the web of packaging material intermediate the marginal portions thereof in spaced apart relation. While the flexible skirt portions 75 normally occupy the distended positions indicated in Fig. 12, they are sufficiently yieldable to permit a narrowing of the space between the opposed thicknesses of the web during the times of formation of the transverse seals.

When a package of the character of those formed by the method and mechanism of the present invention has been hermetically sealed, it is often difficult to open the same by separating the bonded together thicknesses of the packaging material at any of the edges thereof without tearing or otherwise destroying the package, and possibly injuring the goods contained therein. To obviate this difficulty, there is provided by the present invention a novel mechanism which may be utilized for embodying in each package as it is formed an extremely simple but effective means for opening the package along one edge thereof in such a way as to permit the removal of all or any part of the goods contained therein and yet leave the packaging material intact so that the package may be continued in use, and even reclosed, if desired. In the embodiment illustrated (see Fig. 7), the opening

means consists of a string or other thread-like member 76—a narrow strip of "Cellophane" has proven to be quite satisfactory for this purpose, particularly when the packaging material itself is also "Cellophane"—which is so associated with the packages as they are formed that, considering the section of said member corresponding to any one particular package, the central or major portion thereof lies within the goods containing space of the package, entirely inside of the sealed area thereof, while its two ends are embedded in the sealed portion of one of the side edges of the package and extend outwardly of the package sufficiently to enable it to be grasped by the person desiring to open the package.

In order to properly associate the thread-like member 76 with the successive packages as the latter are formed, the machine of the present invention includes a reciprocable needle-like member 77 which is mounted in a horizontal position parallel to and slightly above the plane of the axes of sealing members 40 and 41, and in line with the space between the opposed edges of the U shaped web of packaging material as it approaches the sealing members. The needle-like member 77 is supported in this position for reciprocating movement in its longitudinal direction by suitable bearings provided in the plate 73 and in a guide plate 78 which is loosely mounted on and supported by the shafts 42 and 43 of the sealing members in the space between sealing rolls 50 and the adjacent bearing blocks 44 and 45.

The thread-like member 76 may be drawn from a suitable spool or roll 79 rotatably supported in brackets 80 secured to corner piece 25 of the machine frame, and is maintained in proper cooperative relationship with the needle-like member 77 by passing upwardly through a hole 81 located adjacent the outer end of the latter, then along the top surface thereof, and then downwardly through an eye 82 formed adjacent the inner end of the needle-like member.

The needle-like member 77 is reciprocated in timed relation with the operation of the sealing members 40 and 41 in such a manner that the thread-like member 76 leaving the eye 82 is properly positioned with respect to the opposed edge portions of the web of packaging material to provide a finished package of the form previously described and indicated in Fig. 7. As shown, the reciprocation of the member 77 is effected by means of a horizontally extending lever 83 having a pinned connection with the member 77 at one end and carrying at its opposite end a cam roller 84 which is adapted to fit into the cam groove of a closed, sleeve-type cam 85 adjustably secured to the end of shaft 42 of sealing member 40, the lever 83 being fulcrumed intermediate its ends by means of a suitable fulcrumed bracket 86 carried by and extending outwardly from plate 73. The cam 85 is so shaped and so positioned on shaft 42 that the needle-like member 77 is normally maintained in an inward position such as to place the thread-like member 76 within the space between the opposed thicknesses of the U shaped web and in such a location that, when the longitudinal seal of the associated marginal portion of the web is made by the sealing rolls 50 and 51, the thread-like member will lie inside of said seal—that is, between the unsealed portions of the web which define the commodity containing space. Once during every revolution of the sealing members, the cam 85 moves the needle-like member 77 out-

wardly to a position wherein the thread issuing from the eye 82 is outside of the edges of the web, this movement taking place at the proper time to bring the thread-like member outside of the web at points opposite the transversely sealed areas of the latter. In passing from one extreme position to the other, the needle-like member places the thread in such positions that, as it passes with the web between the sealing members, it is embedded in the sealed areas of the web in the manner indicated best in Figs. 7 and 8.

With the mechanism thus far described, there would be produced a continuous web of hermetically sealed, commodity containing packages each connected to the adjacent packages by the transversely sealed areas, and each having embodied therein a portion of the thread-like opening member. However, in many instances, and particularly where the commodity packages being formed are of substantial size, it is preferable to form the packages as individual units rather than in a continuous web. To this end, the machine of the present invention is provided with suitable means for severing each of the packages from the remainder of the web simultaneously with the completion of the formation thereof.

In the embodiment illustrated, the means for performing this severing function takes the form of a knife member 87 which is housed in a suitable recess formed in the transverse sector 52 of sealing member 40 and is held in place by a pair of curved keys 88 which enter openings in the knife through curved keyways formed in the end faces of sealing rolls 50 and 51. The knife member 87 is located along the center line of the sector 52 and extends completely across the sealing member 40, including the sealing rolls 50 and 51; by thus extending the knife throughout the full length of the sealing member, it is effective to sever the portion of the thread-like member 76 which lies beyond the margin of the web simultaneously with the cut that is made through the packaging material along the center line of the transversely extending sealed area. As is shown best in Fig. 5, the knife member 87 is preferably so adjusted that its cutting edge is flush with the bottom of one of the grooves of the corrugated surface of the sealing member 40, and thus contacts with the top of a corresponding ridge of the sealing member 41 when making the cut.

While the knife member 87 disclosed is of the type such as to completely sever each of the packages from the remainder of the web, it will be understood that, if desired, it may be so constructed as to merely perforate, or otherwise weaken, the transversely sealed areas of the web so as to permit subsequent ready detachment of one or more of the packages from the web.

Although the mode of operation of the mechanism, and the procedural steps of the method, above described should be apparent from the disclosure, and particularly from a consideration of Figs. 6-12 of the drawings, the following summary may be made for convenience. Packaging material of a flexible, substantially transparent, heat sealable character is drawn from the roll 26 in the form of a plane web, passes beneath guide bar 39, and thence moves upwardly over and around the surfaces of conical formers 31 which convert the web from its plane form into a U shape while simultaneously changing its direction of movement by 180°. As the U shaped web moves downwardly away from the formers 31, it contacts with and follows the side walls of filling

duct 37 which maintain the sides of the U in opposed, definitely spaced relation until it reaches the sealing members 40 and 41 which, through the application of pressure and heat, effect continuous longitudinal seals along both marginal portions of the U shaped web, and also longitudinally spaced, transversely extending seals which divide the web into successive, hermetically sealed, commodity containing packages of predetermined volumetric characteristics. As the packages are being formed, the valve members 63 and 64 of filling duct 37, and the control means associated therewith, operate to periodically deliver commodity elements 38 from the filling duct into the commodity containing spaces of the packages, one such element being loaded into each package in the disclosed embodiment of the invention. Simultaneously with the formation of the packages, there may also be embodied therein a thread-like opening member 76, this member being associated with the marginal portion of the web opposite the bight of the U, and being properly placed by the reciprocable needle-like member 77. As the transverse seal at the top end of each package is made by the sealing members, the knife member 87 severs the package, including the portion of the thread-like member associated therewith, from the remainder of the web, thus providing an individual, hermetically sealed commodity containing package of the character illustrated in Fig. 7. It will be understood that as the packages issue from the sealing mechanism, they may be received on a conveyor of any suitable character (not shown) or otherwise delivered from the machine in any desired manner.

In some instances, it is desirable to reinforce the edge of the finished package formed by the sealed together edges of the web by doubling these edges so as to provide four, instead of two, thicknesses of material which are sealed together and crimped at this point. To produce a package of this character, the mechanism already described may be modified as indicated in Figs. 13, 14 and 15 wherein is shown a novel construction for doubling the edges of the web during its passage from the roll 26 to the conical formers 31.

In the modification illustrated, the guide bar 39 is provided adjacent its ends with a pair of slots 89 extending upwardly from the lower edge of said bar and inclined toward one another at angles of approximately 45° with respect to said edge (since the construction is symmetrical with respect to the center line of the machine, only half of the bar 39 has been shown in Figs. 14 and 15). The slots 89 are so positioned along the length of guide bar 39 that the points of intersection between the inner edges of said slots and the lower edge of the bar, one of which points is indicated at 90, are properly located relatively to the web of packaging material to define the lines along which the infolds of the web edges are to take place. While the slots alone would suffice to perform the infolding operation if made of proper width and carefully formed, it has been found preferable from the standpoints of manufacturing convenience and adjustability to provide each of slots 89 with an infold former element 91 which may be in the form of a flat bar, said element being suitably secured at its upper end to guide bar 39 so as to lie with its side edges parallel to the edges of the slot 89 and with its lower portion overlying said slot. Each of the infold former elements 91 is of less width than

its associated slot 89 so as to leave sufficient space between the adjacent slanting edges of the element and slot to permit the passage there-through of the edge portion of the web which is to be folded inwardly.

In using the infold forming mechanism of Figs. 13, 14 and 15, the operation of the machine is substantially the same as that previously described except that, in passing the web of packaging material beneath the guide bar 39, the edge portions of the web are turned inwardly and introduced into the portions of the slots 89 intermediate the inner edges of the slots and the inner edges of the associated infold forming elements 91, in the manner indicated best in Figs. 14 and 15. With this construction, the web edges begin to turn inwardly shortly after the web leaves the roll 26; the fold is approximately half formed by the time that the web edges pass through the slots 89, and is completed as the web is drawn over the conical surfaces of the formers 31, all as indicated in Fig. 13. This edge infolding operation is also illustrated in Fig. 16, wherein the vertical reach of the web with its infolded edge has been inclined backwardly beyond a truly vertical plane in order to better illustrate still another modification of the invention next to be described.

Where it is anticipated that all of the contents of the package will not be consumed when the package is first opened, and it is desired to facilitate reclosure thereof after opening, there may be included in one or both of the doubled or infolded edges of the web as formed by the mechanism of Figs. 13-15, a strip of metal foil or like reinforcing material which is relatively more rigid, and has a greater tendency to remain in a folded position, than the packaging material itself. For this purpose, the machine herein disclosed may be modified as indicated in Fig. 16 by providing either one or both of the roll supporting brackets 28 with a supplemental bracket 92 in the upper end of which is rotatably supported a relatively narrow rolled strip 93 of a suitable reinforcing material, such as metal foil. The strip of foil is led from the roll 93 over the top of the roll 26 of packaging material, then downwardly beneath the lower edge of guide bar 39, and then upwardly within the doubled edge portion of the web of packaging material formed by the slot 89. The strip of foil is preferably slightly narrower than the doubled edge of the web with which it is to be associated, and the roll 93 is so positioned as to lie inwardly of the edge of roll 26 with its own outer edge substantially coplanar with the point 90 which defines the line of the infold. With this arrangement, drawing of the foil over the roll 26 and beneath the guide bar 39 automatically positions the foil within the infolded edge of the web when the fold of the latter has been completed.

While two rigidifying strips of foil may be employed, if desired, one in each of the infolded edges of the web, it is preferable from the standpoint of efficiency in heat sealing to use only one such strip since a perfect seal is then insured between at least three of the four thicknesses of packaging material forming this edge of the packages; on the other hand, if two strips of foil are employed, the transfer of heat to the two innermost thicknesses of packaging material, between which the seal is most important, might be somewhat less than where only one of the double edges of the web is reinforced with foil.

There are thus provided by the present inven-

tion a new and improved method and a novel mechanism for packaging commodities in containers formed of flexible packaging material, which method and mechanism are particularly well adapted to automatic, high speed, quantity production of packaged goods because of their simple, efficient and inexpensive character. With the present invention, the packages are formed, filled and sealed by one continuous procedure and in a mechanism which is substantially more compact than known devices adapted to attain the same ultimate results. The basic construction of the present machine is such that it may be readily modified to handle various kinds of packaging materials and to fill the packages with a wide variety of commodities, whether as single units or in quantities, and including liquids as well as solids. The specific form of package made by the method and apparatus of the invention is likewise susceptible of variation by the incorporation of simple modifications in the procedure and structure. These and other features, including the provision of means for embodying a package opening member in each of the packages as it is formed and filled, endow the present invention with substantial advantages over packaging methods and machines of the same generic character hitherto known to the art.

Although one specific form of machine and several modifications of its component parts have been disclosed, it will be obvious that the invention is not limited to the particular apparatus shown in the drawings, but is capable of a variety of mechanical embodiments. For example, when the invention is applied to packaging materials and commodities of different character than those illustrated herein, it will be understood that the various forming, filling and sealing mechanisms disclosed may be modified accordingly. For instance, the machine of the present invention may be adapted to utilize a packaging material which is not heat sealable, in which event the heating elements within the sealing members may be omitted and the sealing operation may be performed simply by crimping or by the addition of a suitable gluing device in association with the sealing members. Likewise, the packages may be formed out of two separate webs sealed together at their edges, in which case the particular arrangement of conical formers disclosed herein may be replaced by a suitable construction for bringing the two webs into proximity with one another and so shaping them as to produce packages of the desired form and volumetric characteristics. When handling commodities of different character than those illustrated herein, it is obvious that the loading mechanism may be modified in both structure and mode of operation, and that the loading interval may be varied as to both time of occurrence and duration relatively to the sealing cycle. In this connection, it will be recognized that in certain adaptations of the invention, the filling device may comprise something other than a vertical duct, may operate in an inclined or a horizontal plane, and may even require positively driven feeding means. It should also be understood that the machine of the present invention is capable of producing packages of the duplex type consisting of an hermetically sealed inner liner of heat sealable material and an outer container of different material which may be sealed by a gluing operation, if desired. It is likewise contemplated that certain of the mechanisms embodied in the complete machine as illustrated

may be omitted, if desired, or may be used in combination with other mechanisms than those herein disclosed; for example, in certain types of packages the thread-like opening member is unnecessary, and hence the mechanism for embodying this member in the packages may be omitted.

Various other changes, which will now suggest themselves to those skilled in the art, may be made in the procedural steps of the method, and in the form, details of construction and arrangements of the parts of the machine, without departing from the spirit of the invention. Reference is therefore to be had to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. A method of packaging commodities in containers formed of a flexible material comprising the steps of forming a continuous seal between the marginal portions of opposed thicknesses of the packaging material while continuously moving said material in a direction parallel to said marginal portions, sealing together at intervals transversely extending areas of said opposed thicknesses to form a series of sealed envelopes, maintaining the portions of said opposed thicknesses other than said sealed marginal portions in spaced apart relation at all times other than during the formation of said transversely extending seals and independently of the commodity to be packaged so as to form envelopes of predetermined volumetric characteristics, and depositing a commodity in each of said envelopes prior to the completion of the sealing of the marginal portions of said opposed thicknesses of packaging material bounding that particular envelope.

2. A method of packaging commodities as defined in claim 1 including the step of crimping the sealed portions of the packaging material simultaneously with the sealing thereof so as to stiffen the edges of the individual envelopes.

3. A method of packaging commodities as defined in claim 1 including the step of associating container opening means with each of said envelopes substantially simultaneously with the sealing thereof.

4. A method of packaging commodities as defined in claim 1 including the steps of cutting the packaging material transversely within the confines of each of said transversely extending sealed areas to separate each of said envelopes from the others, and associating container opening means with each of said envelopes prior to said cutting operation.

5. A method of packaging commodities in containers formed of a flexible material comprising the steps of forming a single sheet of the packaging material into a U shape, the bight of the U extending along the longitudinal center line of the sheet, sealing the opposed marginal areas of said sheet together, sealing transversely extending areas of the opposed portions of said sheet to one another, said last named areas being spaced along and of limited width in the longitudinal direction of said sheet but extending entirely across the sheet so as to form successive, sealed, commodity containing spaces, associating a container opening thread-like member with each of said commodity containing spaces prior to the completion of said sealing operations, said thread-like member being so placed that the major portion of its length lies within the commodity containing space while its extremities

pass through the transversely sealed areas forming the end edges of each space, and filling said commodity containing spaces with commodities during and prior to the completion of said sealing operations.

6. A method of packaging commodities in containers formed of a flexible material comprising the steps of forming a single sheet of the packaging material into a U shape, the bight of the U extending along the longitudinal center line of the sheet, doubling each of the marginal portions of said sheet individually to form a reinforced edge for the finished packages, sealing the opposed, doubled marginal portions of said sheet together, sealing transversely extending areas of the opposed portions of said sheet to one another, said areas being spaced along and of limited width in the longitudinal direction of said sheet but extending entirely across the sheet so as to form successive, sealed, commodity containing spaces, and filling said commodity containing spaces with commodities prior to the completion of said sealing operations.

7. A method of packaging commodities in containers formed of a flexible material comprising the steps of forming a single sheet of the packaging material into a U shape, the bight of the U extending along the longitudinal center line of the sheet, doubling each of the marginal portions of said sheet individually to form a reinforced edge for the finished packages, associating a strip of reinforcing material with at least one of the doubled marginal portions of said sheet, sealing the opposed, doubled marginal portions of said sheet together, sealing transversely extending areas of the opposed portions of said sheet to one another, said areas being spaced along and of limited width in the longitudinal direction of said sheet but extending entirely across the sheet so as to form successive, sealed, commodity containing spaces, and filling said commodity containing spaces with commodities prior to the completion of said sealing operations.

8. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for forming a web of said packaging material into a U shape, the bight of the U extending along the longitudinal center line of the web, means for effecting a continuous seal between the opposed marginal portions of said U shaped web, means for sealing together transversely extending areas of the opposed portions of said web at spaced points along its longitudinal direction so as to form successive, sealed, commodity containing packages, means independent of the commodity being packaged for maintaining the opposed portions of the web intermediate the marginal portions thereof in spaced apart relation at all times other than during the operation of said transverse sealing means, and means for filling said packages with commodities during and prior to the completion of the sealing thereof, both of said sealing means being positioned closely adjacent but beyond the point of discharge of said filling means.

9. In a packaging machine of the type adapted to form commodity containing packages out of a flexible, heat sealable packaging material, means for forming a web of said packaging material into a relatively narrow U shape, the bight of the U extending along the longitudinal center line of the web, means for applying heat and pressure to the opposed marginal portions of said U shaped web to effect a continuous seal therealong, means

for applying heat and pressure to transversely extending areas of the opposed portions of said web at spaced points along its longitudinal direction so as to form successive, hermetically sealed, commodity containing packages, means independent of the commodity being packaged for maintaining the opposed portions of the web intermediate the marginal portions thereof in spaced apart relation at all times other than during the operation of said transverse sealing means, and means for filling said packages with commodities during and prior to the completion of the sealing thereof, both of said sealing means being positioned closely adjacent but beyond the point of discharge of said filling means.

10. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for forming a web of said packaging material into a U shape, the bight of the U extending along the longitudinal center line of the web, means for effecting a continuous seal between the opposed marginal portions of said U shaped web, means for sealing together transversely extending areas of the opposed portions of said web at spaced points along its longitudinal direction so as to form successive, sealed, commodity containing packages, and means for filling said packages with commodities during and prior to the completion of the sealing thereof including a duct for delivering commodities to said packages extending inside of said U shaped web and maintaining the opposed portions thereof at a predetermined distance apart at all times other than during the operation of said transverse sealing means, both of said sealing means being positioned closely adjacent but beyond the delivery end of said duct.

11. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for forming a web of said packaging material into a U shape, the bight of the U extending along the longitudinal center line of the web, a pair of sealing rotors between which said U shaped web is passed, said rotors being so constructed and arranged as to effect a continuous seal between the opposed marginal portions of said web and transversely extending seals between the opposed portions of said web at spaced points along its longitudinal direction so as to form successive, sealed, commodity containing packages, and means for filling said packages with commodities during and prior to the completion of the sealing thereof, said last named means including a duct for delivering commodities to said packages extending inside of said U shaped web, the delivery end of said duct being positioned adjacent said sealing rotors and having a yieldably expansive skirt tending to maintain the opposed portions of said U shaped web in spaced apart relation at all times other than during the formation of said transversely extending seals.

12. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for supporting a supply of said packaging material, means for continuously drawing opposed thicknesses of said material from said supply comprising a pair of sealing rotors between which said opposed thicknesses are passed, said rotors being so constructed and arranged as to effect both continuous longitudinally extending and longitudinally spaced transversely extending seals

between said opposed thicknesses so as to form successive, sealed, commodity containing packages, and means for filling said packages with commodities during and prior to the completion of the sealing thereof, said last named means including a duct for delivering commodities to said packages extending between said opposed thicknesses and having the delivery end thereof positioned adjacent said sealing rotors, means for maintaining said opposed thicknesses a predetermined distance apart at all times other than during the formation of said transversely extending seals, and means operative in timed relation to the operation of said sealing rotors for periodically delivering commodities from said duct into said packages while the latter are being sealed.

13. A packaging machine as defined in claim 15 including a knife associated with said sealing rotors for cutting the successive packages from the remainder of said packaging material during the formation of said transversely extending seals.

14. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for forming a web of said packaging material into a U shape with the bight of the U extending along the longitudinal center line of the web, means for folding the marginal portions of said web inwardly toward the longitudinal center line thereof to provide doubled edges for said web, means for sealing the doubled edge portions of said web together, means for effecting transversely extending seals between the opposed portions of said web spaced along and of limited width in the longitudinal direction of the web but extending entirely across the latter to form successive, sealed, commodity containing packages, and means for filling said packages with commodities.

15. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for supporting a rolled web of said packaging material, means for forming said web into a U shape with the bight of the U extending along the longitudinal center line of the web, means interposed between said supporting means and said forming means for folding the marginal portions of said web inwardly toward the longitudinal center line thereof to provide doubled edges for said web, means for sealing the doubled edge portions of said web together, means for effecting transversely extending seals between the opposed portions of said web spaced along and of limited width in the longitudinal direction of the web but extending entirely across the latter to form successive, sealed, commodity containing packages, and means for filling said packages with commodities.

16. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for supporting a rolled web of said packaging material, means for forming said web into a U shape with the bight of the U extending along the longitudinal center line of the web, means interposed between said supporting means and said forming means for folding the marginal portions of said web inwardly toward the longitudinal center line thereof to provide doubled edges for said web, said folding means comprising a guide member having an edge parallel to the plane of said web and a pair of slots angularly

disposed with respect to said edge, the marginal portions of said web passing through said slots while the remainder of the web passes around said edge, means for sealing the doubled edge portions of said web together, means for effecting transversely extending seals between the opposed portions of said web spaced along and of limited width in the longitudinal direction of the web but extending entirely across the latter to form successive, sealed, commodity containing packages, and means for filling said packages with commodities.

17. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for forming a web of said packaging material into a U shape with the bight of the U extending along the longitudinal center line of the web, means for folding the marginal portions of said web inwardly toward the longitudinal center line thereof to provide doubled edges for said web, means for introducing a strip of reinforcing material into at least one of the thus doubled edge portions of said web, means for sealing the doubled edge portions of said web together, means for effecting transversely extending seals between the opposed portions of said web spaced along and of limited width in the longitudinal direction of the web but extending entirely across the latter to form successive, sealed, commodity containing packages, and means for filling said packages with commodities.

18. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, means for forming a web of said packaging material into a U shape with the bight of the U extending along the longitudinal center line of the web comprising means for moving said web longitudinally, and a pair of conical formers over and between which said web is drawn by said moving means, the conical surface of each of said formers being tangent to two planes at right angles to one another, one of said planes being that of the web before its formation into U shape and the other being that of one of the opposed portions of said web after its formation into U shape.

19. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, means for forming a web of said packaging material into a U shape with the bight of the U extending along the longitudinal center line of the web and simultaneously effecting a 180° change in the direction of its movement comprising means for moving said web longitudinally, and a pair of conical formers over and between which said web is drawn by said moving means, said formers having apex angles of 60° and axes disposed at an angle of 60° relatively to one another, the conical surface of each of said formers being tangent to two planes at right angles to one another, one of said planes being that of the web before its formation into U shape and the other being that of one of the opposed portions of said web after its formation into U shape.

20. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for forming a web of said packaging material into a U shape with the bight of the U extending along the longitudinal center line of the web, means for sealing the opposed marginal portions of said web together, means for effecting transversely extending seals between

the opposed portions of said web spaced along and of limited width in the longitudinal direction of the web but extending entirely across the latter to form successive, sealed, commodity containing packages, means for filling said packages with commodities, and means for associating package opening means with the successive packages substantially simultaneously with the sealing of the marginal portions of said web.

21. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for forming a web of said packaging material into a U shape with the bight of the U extending along the longitudinal center line of the web, means for sealing the opposed marginal portions of said web together, means for effecting transversely extending seals between the opposed portions of said web spaced along and of limited width in the longitudinal direction of the web but extending entirely across the latter to form successive, sealed, commodity containing packages, and means for placing a thread-like opening member in each of said packages prior to the complete sealing thereof.

22. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for forming a web of said packaging material into a U shape with the bight of the U extending along the longitudinal center line of the web, means for sealing the opposed marginal portions of said web together, means for effecting transversely extending seals between the opposed portions of said web spaced along and of limited width in the longitudinal direction of the web but extending entirely across the latter to form successive, sealed, commodity containing packages, and means for associating a thread-like opening member with each of said packages prior to the complete sealing thereof comprising a needle-like element for normally placing said thread-like member between the opposed portions of said web, and means for reciprocating said needle-like element transversely to the direction of movement of said web to periodically withdraw said thread-like member outwardly beyond the opposed edges of said web, the operation of said reciprocating means being so synchronized with that of said sealing means as to bring said thread-like member outwardly beyond the opposed edges of the web at points opposite said transversely sealed areas.

23. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for forming a web of said packaging material into a U shape with the bight of the U extending along the longitudinal center line of the web, a pair of rotatable sealing members between which said U shaped web passes, said members being so constructed and arranged as to effect a continuous seal between the opposed marginal portions of said web and to also seal together transversely extending areas of the opposed portions of said web at spaced points along its longitudinal direction so as to form successive, sealed, commodity containing packages, means for filling said packages with commodities, and means for associating a thread-like opening member with each of said packages comprising a needle-like element for placing said thread-like member mounted adjacent said rotatable sealing members for reciprocating movement parallel to the axes of the latter, and means for

reciprocating said needle-like element in timed relation to the rotation of said sealing members, said reciprocating means being so constructed and arranged as to normally place said thread-like member between the opposed portions of said web but to bring the same outwardly beyond the opposed edges of the web at points opposite said transversely sealed areas.

24. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for forming a web of said packaging material into a U shape with the bight of the U extending along the longitudinal center line of the web, a pair of rotatable sealing members between which said U shaped web passes, said members being so constructed and arranged as to effect a continuous seal between the opposed marginal portions of said web and to also seal together transversely extending areas of the opposed portions of said web at spaced points along its longitudinal direction so as to form successive, sealed, commodity containing packages, means for filling said packages with commodities, an needle-like element for placing a thread-like opening member in each of said packages mounted adjacent said rotatable sealing members for reciprocating movement parallel to the axes of the latter, means for reciprocating said needle-like element in timed relation to the rotation of said sealing members, said reciprocating means being so constructed and arranged as to normally place said thread-like member between the opposed portions of said web but to bring the same outwardly beyond the opposed edges of the web at points opposite said transversely sealed areas, and means for cutting both said web and said thread-like member along transversely extending lines lying within the confines of said transversely sealed areas.

25. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for supporting a supply of said packaging material, a walled filling device for delivering commodities to the packages as the latter are formed, means for drawing opposed thicknesses of packaging material from said supply around said filling device, the walls of the latter serving to hold said thicknesses a predetermined distance apart to provide packages of predetermined volumetric characteristics, the edges of said opposed thicknesses of packaging material projecting beyond the walls of said device, said drawing means comprising a pair of rotatable sealing members positioned beyond the delivery end of said device between which said opposed thicknesses of packaging material pass and having rolls for continually engaging and sealing together the opposed projecting edge portions of said material and sectors of limited peripheral extent for sealing together transversely extending areas of said opposed thicknesses of material at spaced points along and of limited width in the direction of movement of said material, whereby successive, sealed, commodity containing packages are formed, and means operative in timed relation to the operation of said sealing members for periodically delivering commodities from said filling device into said packages during the formation thereof.

26. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for supporting a supply of said packag-

ing material, a walled filling device for delivering commodities to the packages as the latter are formed, means for drawing opposed thicknesses of packaging material from said supply around said filling device, the walls of the latter serving to hold said thicknesses a predetermined distance apart to provide packages of predetermined volumetric characteristics, the edges of said opposed thicknesses of packaging material projecting beyond the walls of said device, said drawing means comprising a pair of rotatable sealing members positioned adjacent the delivery end of said device between which said opposed thicknesses of packaging material pass and having rolls for continually engaging and sealing together the opposed projecting edge portions of said material and sectors of limited peripheral extent for sealing together transversely extending areas of said opposed thicknesses of material at spaced points along and of limited width in the direction of movement of said material, whereby successive, sealed, commodity containing packages are formed, means operative in timed relation to the operation of said sealing members for periodically delivering commodities from said filling device into said packages, and means associated with the delivery end of said device for yieldably urging the opposed thicknesses of packaging material apart to facilitate the filling operation.

27. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for supporting a supply of said packaging material, a walled filling device for delivering commodities to the packages as the latter are formed, means for drawing opposed thicknesses of packaging material from said supply around said filling device, the walls of the latter serving to hold said thicknesses a predetermined distance apart to provide packages of predetermined volumetric characteristics, the edges of said opposed thicknesses of packaging material projecting beyond the walls of said device, said drawing means comprising a pair of rotatable sealing members positioned adjacent the delivery end of said device between which said opposed thicknesses of packaging material pass and having rolls for continually engaging and sealing together the opposed projecting edge portions of said material and sectors of limited peripheral extent for sealing together transversely extending areas of said opposed thicknesses of material at spaced points along and of limited width in the direction of movement of said material, whereby successive, sealed, commodity containing packages are formed, means operative in timed relation to the operation of said sealing members for periodically delivering commodities from said filling device into said packages, and means for associating package opening means with one of the side edges of the successive packages substantially simultaneously with the sealing of said edge by said rolls.

28. In a packaging machine of the type adapted to form commodity containing packages out of a flexible packaging material, the combination of means for supporting a supply of said packaging material, a walled filling device for delivering commodities to the packages as the latter are formed, means for drawing opposed thicknesses of packaging material from said supply around said filling device, the walls of the latter serving to hold said thicknesses a predetermined distance apart to provide packages of

predetermined volumetric characteristics, the edges of said opposed thicknesses of packaging material projecting beyond the walls of said device, said drawing means comprising a pair of rotatable sealing members positioned adjacent the delivery end of said device between which said opposed thicknesses of packaging material pass and having rolls for continually engaging and sealing together the opposed projecting edge portions of said material and sectors of limited peripheral extent for sealing together transversely extending areas of said opposed thicknesses of material at spaced points along and of limited width in the direction of movement of said material, whereby successive, sealed, commodity containing packages are formed, means operative in timed relation to the operation of said sealing members for periodically delivering commodities from said filling device into said packages, and means for associating a thread-like opening member with each of said packages comprising a needle-like element for placing said thread-like member mounted adjacent said rotatable sealing members for reciprocating movement parallel to the axes of the latter, and means for reciprocating said needle-like element in timed relation to the rotation of said sealing members, said reciprocating means being so constructed and arranged as to normally place said thread-like member between the opposed thicknesses of packaging material but to bring the same outwardly beyond the edges of said opposed thicknesses at points opposite said transversely sealed areas.

29. A method of packaging commodities comprising the steps of forming a series of envelopes from a continuous moving supply of flexible packaging material by sealing together, at a single point in the path of movement of said material, continuous longitudinally extending and longitudinally spaced transversely extending areas of opposed thicknesses of said material to form the sides and ends, respectively, of consecutive envelopes, maintaining the walls of each envelope, other than the longitudinally extending sealed portions thereof, in spaced apart relation independently of the commodity to be packaged throughout the interval between formation of the transverse seals closing the ends of said envelope, and depositing a commodity in each of said envelopes during formation of the longitudinally extending sealed areas thereof.

30. A method of packaging commodities in containers formed of a flexible material, comprising the steps of forming the packaging material into an envelope having the walls thereof spaced a predetermined distance apart, continuously sealing the opposed marginal areas of said envelope together while maintaining the remaining opposed areas thereof in spaced apart relation independently of the commodity to be packaged, intermittently sealing transversely extending areas of the opposed portions of said envelope to one another simultaneously with the sealing of the coplanar marginal areas so as to form successive, sealed, commodity containing spaces of predetermined volumetric characteristics and uniform width throughout their length, including the transversely sealed portions, and filling each of said commodity containing spaces with commodities during and prior to the completion of the sealing of the marginal areas of said envelope bounding said space.

31. A method of packaging a commodity in a

container of flexible material comprising the steps of forming a web of the packaging material into an envelope with the marginal areas of the web in opposed unsealed relation while continuously moving said web in its longitudinal direction, sealing the walls of said envelope together transversely of the web to close one end of the package, progressively sealing the marginal areas of the web together to close the package laterally after formation of said first end closure and while maintaining the walls of said envelope in predetermined spaced apart relation independently of the commodity being packaged, sealing together the walls of the envelope at the opposite end of the package, and depositing a commodity within said package during and prior to the completion of the sealing of the marginal areas of said web bounding said package.

32. A method of packaging commodities comprising the steps of forming from a continuous supply of flexible packaging material, sealing and, simultaneously with their sealing, filling a succession of commodity containing packages, embodying in each of said packages during its sealing a package opening member in the form of a portion of a continuous thread-like member, and simultaneously severing each of said packages and its associated portion of said thread-like member from said continuous supply of packaging material and the remainder of said continuous thread-like member.

33. A method of packaging commodities in containers formed of a flexible material comprising the steps of bringing two thicknesses of packaging material into opposed spaced apart relation, forming a continuous seal between the longitudinal edges of said opposed thicknesses, sealing together transversely extending areas of said opposed thicknesses at spaced points along and of limited width in the longitudinal direction thereof so as to form successive, sealed, commodity containing spaces, depositing a commodity in each of said spaces during the interval between formation of the transverse seals bounding said space, and placing a portion of a thread-like member between the opposed thicknesses of packaging material bounding each of said spaces just prior to the sealing of said boundary.

34. A method of packaging commodities in containers formed of a flexible material comprising the steps of bringing two thicknesses of packaging material into opposed spaced apart relation, forming a continuous seal between the longitudinal edges of said opposed thicknesses sealing together transversely extending areas of said opposed thicknesses at spaced points along and of limited width in the longitudinal direction thereof so as to form successive, sealed, commodity containing spaces, depositing a commodity in each of said spaces during the interval between formation of the transverse seals bounding said space, and affixing a thread-like member to one of the longitudinal sealed edges of each of said commodity containing spaces substantially simultaneously with the sealing of said edge.

35. A method of packaging a commodity in a container of flexible material comprising the steps of forming a web of the packaging material into an envelope with the marginal areas of the web in opposed unsealed relation while continuously moving said web in its longitudinal direction, sealing the walls of said envelope together transversely of the web to close one end of the package, progressively sealing the mar-

ginal areas of the web together while maintaining the walls of said envelope in predetermined spaced apart relation independently of the commodity being packaged, sealing together the walls of the envelope at the opposite end of the package, depositing a commodity within said envelope during and prior to the completion of said sealing operations, and embedding at least a portion of a package opening member in the sealed area of said envelope.

36. A method of packaging a commodity in a container of flexible material comprising the steps of effecting a continuous seal between the marginal portions of opposed thicknesses of packaging material while continuously moving said material in a direction parallel to said marginal portions, sealing together at intervals transversely extending areas of said opposed thicknesses to form a series of sealed envelopes, filling each of said envelopes with commodities prior to the completion of the sealing thereof, and associating a thread-like member with one

of the sealed edges of each of said sealed envelopes by laying a portion of said member between said opposed thicknesses of the packaging material before the completion of the sealing of said envelope.

37. A packaging machine of the type adapted to form commodity containing envelopes from flexible packaging material, comprising means for effecting a continuous seal between the side marginal portions of opposed thicknesses of packaging material, means for sealing together at intervals transversely extending areas of said opposed thicknesses so as to form a series of sealed envelopes, means for filling each of said envelopes with commodities prior to the sealing thereof, and means for associating a thread or the like with one of the sealed edges of each of said envelopes including means for laying a portion of said thread between said opposed thicknesses of packaging material before completion of the sealing of said envelope.

JOHN H. STROOP.

CERTIFICATE OF CORRECTION.

Patent No. 2,248,471.

July 8, 1941.

JOHN H. STROOP.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 9, second column, line 18, claim 13, for the claim reference numeral "15" read --12--; 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 November, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.