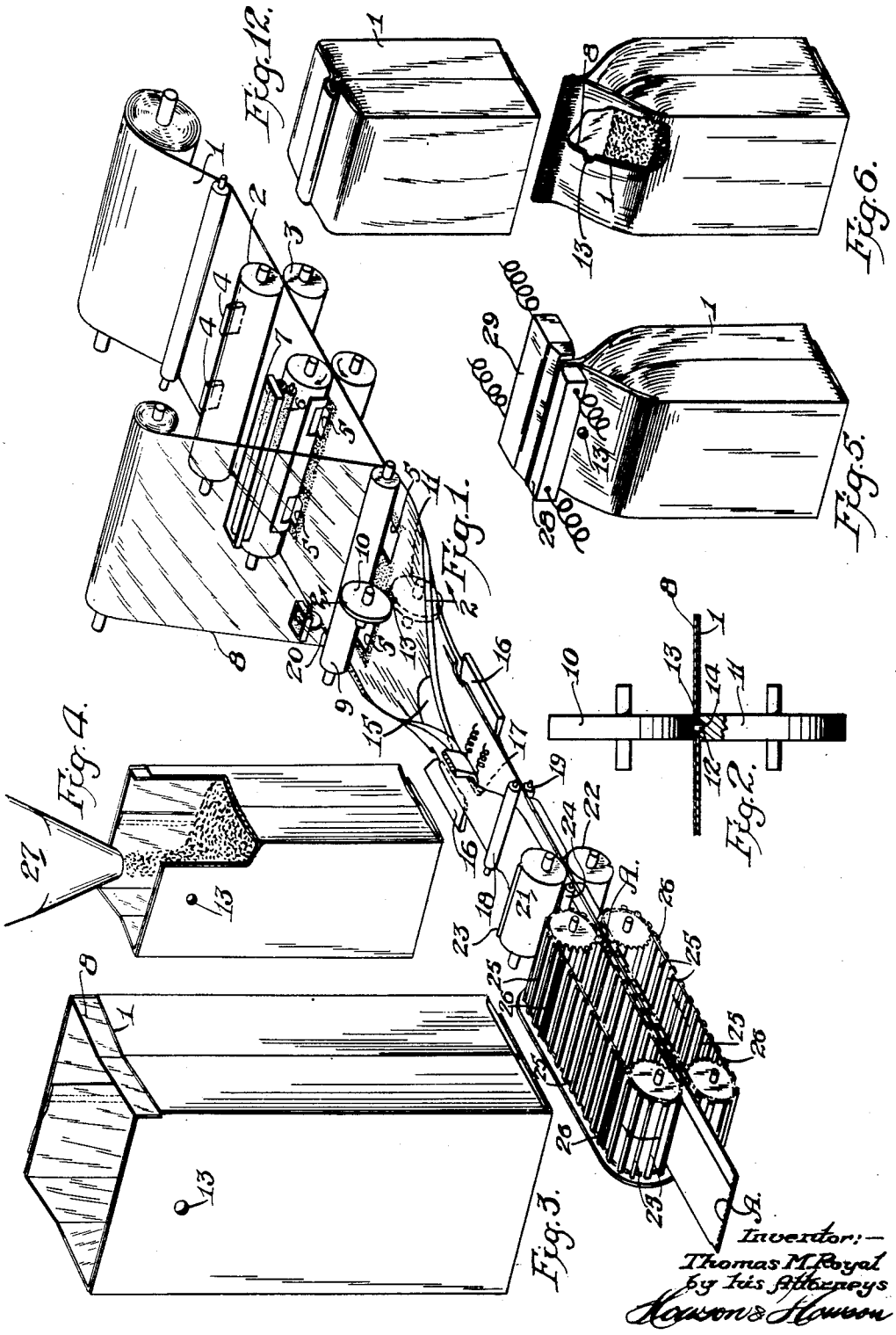
OR 2,292,295 1T
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Aug. 4, 1942. T. M. ROYAL 2,292,295

METHOD OF FILLING AND SEALING RECEPTACLES

Filed March 7, 1940 5 Sheets-Sheet 1



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POUCHES, RECEPTACLES, ETC.
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Search Room

Aug. 4, 1942. T. M. ROYAL 2,292,295

METHOD OF FILLING AND SEALING RECEPTACLES

Filed March 7, 1940 5 Sheets-Sheet 2

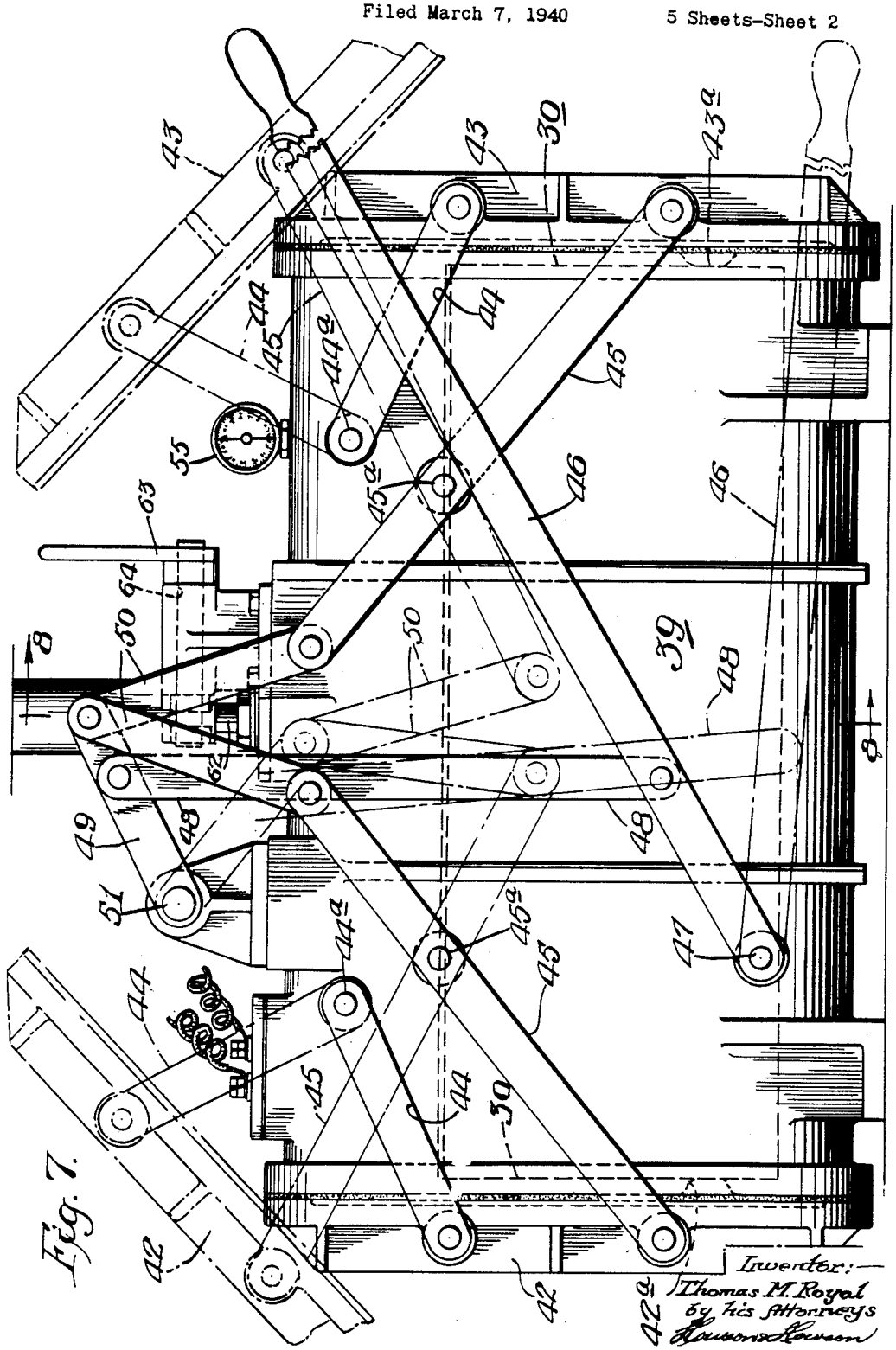


Fig. 7.

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METHOD OF FILLING AND SEALING RECEPTACLES

Filed March 7, 1940 5 Sheets-Sheet 3

Fig. 8.

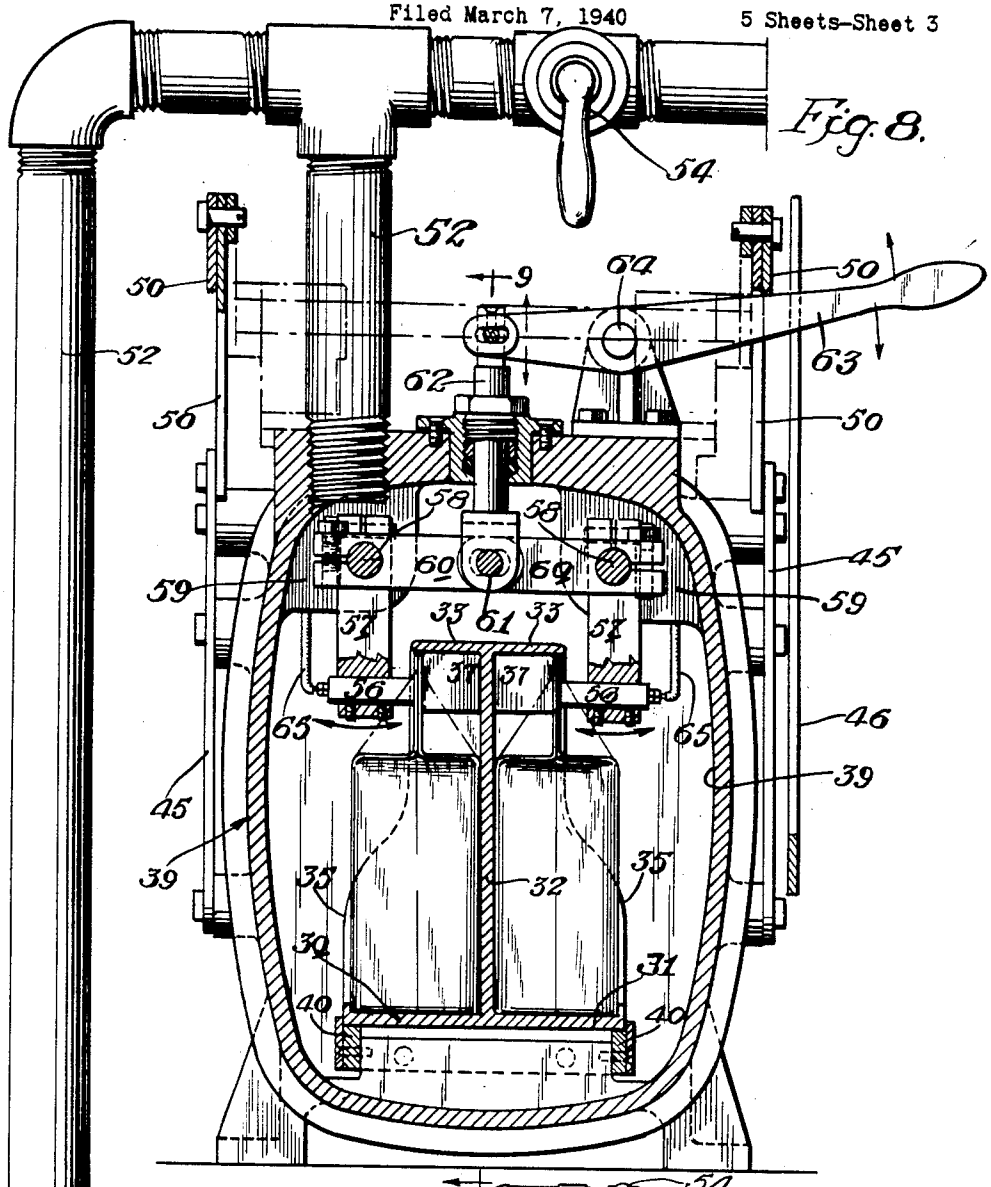


Fig. 10.

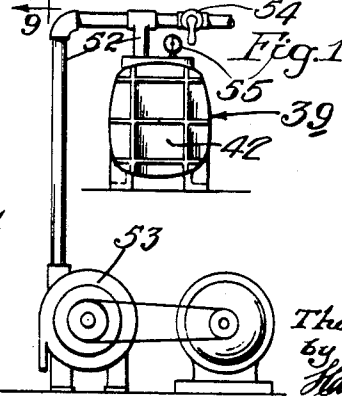
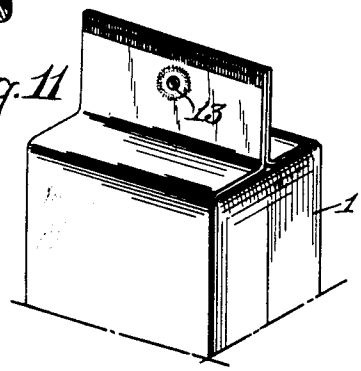


Fig. 11



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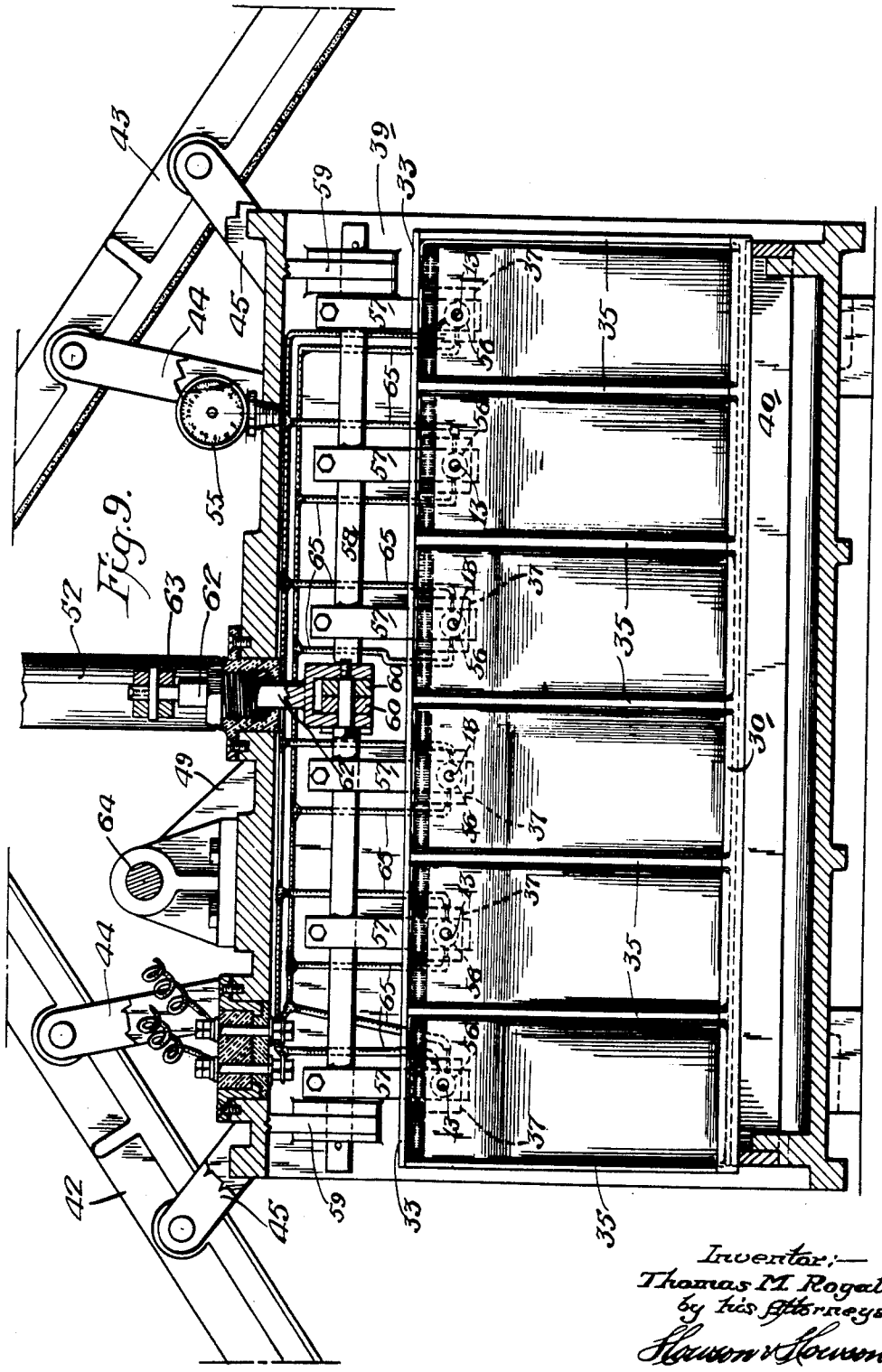
PORTABLE RECEPTACLES

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Aug. 4, 1942. T. M. ROYAL 2,292,295

METHOD OF FILLING AND SEALING RECEPTACLES

Filed March 7, 1940 5 Sheets-Sheet 4



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PORTABLE RECEPTACLES.

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Aug. 4, 1942. T. M. ROYAL 2,292,295

METHOD OF FILLING AND SEALING RECEPTACLES

Filed March 7, 1940 5 Sheets-Sheet 5

Fig. 13.

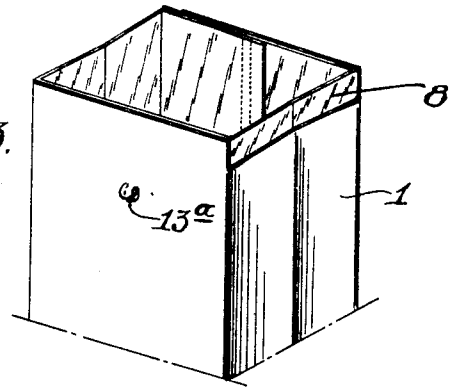


Fig. 14.

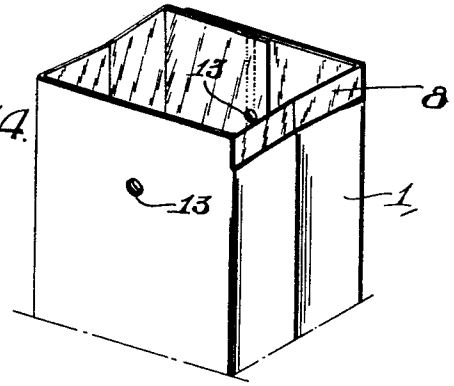
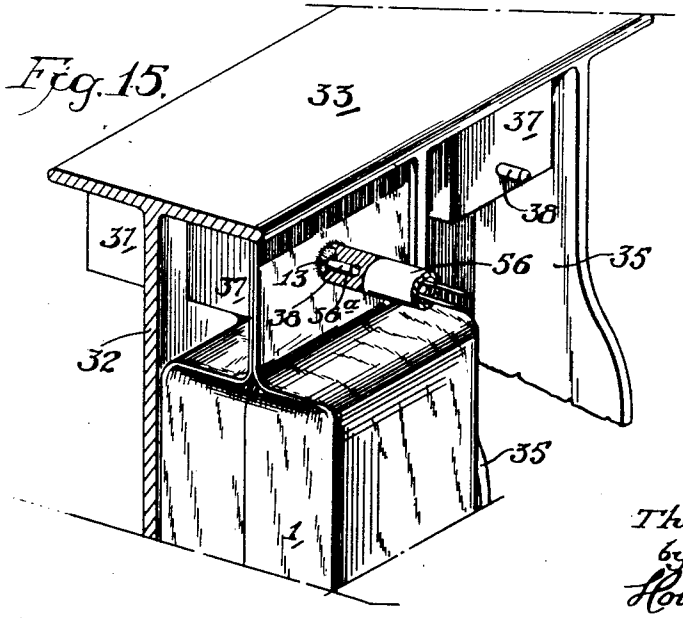


Fig. 15.



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Patented Aug. 4, 1942

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UNITED STATES PATENT OFFICE

2,292,295

METHOD OF FILLING AND SEALING RECEPTACLES

Thomas M. Royal, Philadelphia, Pa.

Application March 7, 1940, Serial No. 322,806

4 Claims. (Cl. 226—51)

This invention relates to new and useful improvements in methods for packaging materials in bags. More particularly the invention relates to new and useful improvements in methods for packing material in bags and packages and then sealing same under a vacuum.

The principal object of the present invention is to provide a novel method for packaging and preserving commodities in an air-tight package from which the atmosphere has been exhausted prior to final sealing or closing of the package.

Another object of the invention is to provide an tir-tight package produced by exhausting air through a valve provided in a filled, end or top-sealed package and then sealing said valve.

Another object of the invention is to provide a novel apparatus or mechanism for effecting the exhaustion of atmosphere from the packages for finally and hermetically sealing the same.

Still another object of the present invention is to provide a novel bag or package structure which is particularly adaptable to the aforesaid packaging method or process; and

A further object is to provide a novel method or process for producing such bags or packages.

These and other objects of the invention and the various features and details of arrangement and steps therein are hereinafter fully set forth and shown in the accompanying drawings, in which:

Figure 1 is a diagrammatic view in perspective of one method and apparatus for producing bags or containers in accordance with this invention.

Figure 2 is an enlarged fragmentary view in section taken on line 2—2, Figure 1.

Figure 3 is a view in perspective of an open-mouthed bag or container made according to and embodying the present invention.

Figure 4 is a view in perspective partially in section showing the said bag or container being filled with a commodity.

Figure 5 is a view in perspective showing the manner in which the open end of the bag may be hermetically sealed after said bag has been filled to the desired extent.

Figure 6 is a view in perspective, partially in section, illustrating the filled bag with its upper end sealed and closed.

Figure 7 is a view in side elevation of a form of vacuum chamber contemplated by the present invention.

Figure 8 is a view in section taken on line 8—8, Figure 7.

Figure 9 is a view in section taken on line 9—9, Figure 8.

Figure 10 is a diagrammatic view illustrating the vacuum chamber and associated pump.

Figure 11 is a fragmentary perspective view of a package sealed in accordance with the present invention.

Figure 12 is a view in perspective of the package shown in Figure 11 with the top portion thereof folded down and secured for delivery to a customer; and

Figures 13, 14 and 15 are respectively fragmentary perspective views illustrating certain modifications of the invention.

Referring now more particularly to Figure 1 of the drawings, the bag or container contemplated by the present invention may be made by drawing a web of paper or other flexible material 1 from a supply roll and between a pair of opposed rolls 2 and 3, the upper roll 2 of which is provided with suitably located cutting or punching dies 4 arranged to cut or punch pairs of openings 5 in said web 1 at predetermined intervals therealong.

It is important to point out at this time that the pairs of openings 5 are formed in the web 1 and spaced therealong so that the transverse axes of adjacent pairs of said openings 5 are spaced apart a distance longitudinally of the web 1 equal to the length of the bag desired. It is further pointed out that the transverse width of the openings 5 of each pair is equal to twice the depth of the reentrant folds provided by the bellows side walls to be formed and these openings 5 of each pair are spaced relative to each other and the web 1 transversely thereof so that when the bellows-folded bag tube is later formed none of the material of the web 1 resides at the bellws-folded reentrant portions in the region of the bottom or top end closure area of the bag to be formed.

After the formation of the openings 5 as above described, adhesive is applied to the surface of the web 1 surrounding said openings 5, for example, by a roll 6 from a paste box 7, and a web 8 of heat-fusible or thermoplastic material, such as "Pliofilm," or the like, of width corresponding to that of the web 1 is drawn from a second supply roll, the two webs 1 and 8 then passing beneath a roll 9 and duplexed in relatively offset relation with respect to each other according to any one of several methods commonly employed in the bag industry.

After duplexing as aforesaid the composite or duplex web then passes between a pair of opposed rollers 10 and 11, the upper of which has a projection or punch 12 on its periphery ar-

ranged to penetrate or die out a relatively small valve aperture or opening 13 through the duplexed webs 1 and 8. On the other hand, the lower roller 11 has in its periphery a recess 14 arranged to register with and receive the projection or punch 12 as it penetrates the webs. This construction and arrangement is best illustrated in Figure 2 of the drawings.

At this time it should be pointed out that the location of the rollers 10 and 11, as well as their diameter, is such that one valve opening 13 will be formed in each bag at a point substantially centrally transversely of the front face thereof and adjacent though well spaced from its upper or open end of the bag, for example, as in the bag shown in Figure 3.

In lieu of the punched valve opening 13 and in order to eliminate the necessity for disposing of the material punched out by the punch 12, the valve may be formed by cutting the web to produce what might be called a "flap" valve therein such as indicated at 13a in Figure 13 of the drawings.

The duplex web is now brought over or around a forming plate 15 of conventional form having the usual tuckers 16 and arranged to form a tube having reentrant or bellows-folded side walls with the opposite edge portions of the web 8 in overlapping relation along the upper side or face of said tube. During this phase of the formation of the tube the edge portions of the outer web 1 are held apart or out of lapped relation by a heated sealing element 17 which is interposed between said edge portions of the outer web 1 so as to afford direct contact of said sealing element 17 with the lapped edge seam portions of the inner heat-fusible web 8 to thereby effectively and permanently seal said lapped seam portions.

The tube with its longitudinally sealed inner web 8 next passes between a pair of rolls 18 and 19 which operate to now bring the edge portion of the outer web 1 into lapped relation in which relation they are secured by means of adhesive previously applied to the inner surface of the overlapping edge portion of said web 1 as indicated at 20.

The thus longitudinally sealed tube next passes between a pair of rolls 21 and 22, the roll 21 of which carries a cutting knife or blade 23 arranged and operable to sever sections from the tube along lines coincident with the transverse axes of each pair of the now covered openings 5 previously described. These tube sections then pass successively beneath one or more rolls 24 and into a bottom end sealing mechanism which is arranged so as to grip or clamp each tube section as it is severed from the tube.

This bottom end sealing mechanism comprises a number of grips or clamps 25 which move through the end sealing mechanism in opposing engagement with each of the tube sections and in addition to these grips or clamps 25 several transverse heated sealing elements 26 are associated therewith, said elements being arranged with respect to said grips or clamps 25 and the tube sections so as to engage the rear edge portion of each thereof during travel through this mechanism with the result that the heat from said elements 26 penetrates the several layers of material of the sections to effect a permanent fusion of the adjacent surfaces of the underlying portions of the inner ply 8 of heat-fusible or thermoplastic material as indicated at A in Figure 1 of the drawings.

By forming the openings 5 in the web 1 in the manner and at the locations previously described none of the material of said web 1 is introduced between the reentrant folds and surfaces of the heat-fusible or thermoplastic web material 8 at the bottom end of the tube or bag thus making it possible to obtain and secure a tight end joint at the bag bottom. The particular arrangement of the openings 5 in the web 1 also removes the material of that web from the reentrant folds and surfaces of the heat-fusible web 8 at the top open end of the bag, as indicated in Figure 3 of the drawings, so that after the bag has been filled it likewise may be tightly closed and sealed at the top end by heat fusion of the adjacent surfaces of the web 8.

After fusion of the bottom end of the bag according to the foregoing description it is discharged from the bottom sealing mechanism at which time the bottom end portion may be folded over and secured by means of adhesive flat against the face of the bag.

From the foregoing it will be seen that by the provision of the openings 5 in the web 1, whereby portions of said outer ply of backing material are removed from the region or area of the reentrant bellows folds at the top and bottom ends of the bag, none of said backing material is introduced between opposite surfaces of the thermoplastic ply 8 at those points and a tight bottom and top end fusion of the surfaces of the inner thermoplastic ply or web is made possible, with the result that the occurrence of gaps or holes at the inner edges of the reentrant bellows folds is eliminated.

It will be obvious, of course, that in lieu of cutting sections from the tube prior to fusing the bottom end seam A, said seams A may be fused prior to severing sections of the tube if desired, in which event all that is required to be done is the positioning of the cut-off rolls 21 and 22 after, instead of ahead of, the bottom end sealing mechanism.

In addition, it will be entirely clear that, in lieu of forming the valve in the web during manufacture of the bags as above described, the valve may be formed after the bags have been manufactured either by forming a suitably located valve 13 or 13a through either one or both faces of the bags as shown in Figure 14 of the drawings. Formation of the valve after manufacture of the bags, of course, adds an additional independent step to the process of the invention but a better centering of the valve in the faces of the finished bags is afforded and the formation of valve openings through both faces of said bags has a definite advantage which is described in detail hereinafter.

Since a bag produced according to the foregoing is of the conventional bellows-folded side wall type said bag may be expanded and its bottom formed in the usual way to produce a bag or container of the form shown in Figure 3 of the drawings. This form of bag can be placed in a vertical standing position such as that shown and an upper end opening of comparatively large area is afforded for easy filling of the bag.

In accordance with the present invention the bags or packages are filled with the desired commodity to a depth or height a substantial distance below the upper open end thereof and at least below the exhaust valve or opening 13 or 13a provided through one or both faces of said bags. The bags may, of course, be filled in any desired manner, such as from a supply hopper 27 (Fig-

Search Room

ure 4) which, if desired, may be provided with a measured batch discharge arrangement to insure uniform filling of said bags to the desired weight.

After the bags are filled with a commodity, the upper end or mouth of the bag is collapsed with the bellows side wall portions tucked inwardly, and the upper ends of said bags are then hermetically sealed, for example, as illustrated in Figure 5 of the drawings, by bringing a pair of heated sealing elements 28 and 29 into opposing contact or engagement with opposite sides of the upper end edge portion of the filled bag or container.

These elements 28 and 29 may be heated, as in the case of the elements 17 and 26, by any suitable means such as by electricity, and the elimination of the outer web 1 at the sides of the upper end afforded by the cut-outs 5 enables the formation of an upper end seal closure which is free from pin holes as previously described.

The bag now has the general appearance shown in Figure 6 of the drawings with the valve 13 or 13a opening to the space between the upper end closure of said bag and the surface level of the commodity therein.

A plurality of these bags are now arranged in a rack or supporting structure 30 (see Figure 8) having a base portion 31 and a longitudinally extending central partition 32, the upper end of which is provided with laterally extending flange portions 33. Extending laterally from opposite sides of said partition 32 are transverse vertical partitions 35 each adjacent pair of which together with the partition 32 defines a recess or stall adapted to receive or support one of the aforementioned packages in an upstanding position.

In each of these bag receiving pockets a boss or like portion 37 projects laterally from the upper edge portion of the partition 32, and the filled bags are placed in the several recesses or stalls of the rack 30 with valve opening 13 or 13a facing outwardly as shown in Figure 9 of the drawings, the bosses 37 acting as a backing or support for the bags at and adjacent the valve area.

After a filled top-sealed bag has been thus placed in each recess or stall of the rack 30, said rack is moved into a chamber 39 upon track members 40 provided for that purpose lengthwise of the bottom thereof. The chamber 39 may, if desired, be provided with one or more windows of suitable thickness through which the operator may observe the various operations carried out therein. The chamber is now closed at both ends to the atmosphere by means of doors 42 and 43 which may, for example, be pivotally connected to the exterior of said chamber by pairs of links 44 and 45 best shown in Figure 7 of the drawings. These links 44 and 45 are pivoted to opposite sides of the chamber at 44a and 45a, respectively, and opening and closing of the doors 42 and 43, for example, may be accomplished by a lever 46 pivotally connected as at 47 to an exterior side of the chamber 39 and operable to raise or lower said doors through pivotally connected links 48 and 49 and a pair of links 50, the link 49 being pivotally connected or mounted upon the chamber as indicated at 51, and the pair of links 50 connecting between said link 49 and links 45 as shown. With the exception of lever 46 the system of links for operating the doors is the same on both sides of the chamber 39. Other means either manually or automatically controlled can, of course, be employed as desired for opening and closing the doors of the chamber.

From the foregoing it will be seen that the downward movement of the lever 46 will open the doors 42 and 43 whereas an upward movement of said lever 46 actuates the said doors into the solid line position shown in Figure 7, and in order to insure proper centering of the rack 30 lengthwise of the chamber 39 and with respect to the valve sealing mechanism hereinafter described the said doors are preferably provided with inwardly projecting lugs 42a and 43a which engage and properly center said rack 30 upon closing of the doors.

When the rack 30 is properly positioned within the chamber 39 and the doors 42 and 43 have been closed, all as above set forth, a vacuum is created within the chamber 39 and the filled bags therein by exhausting the air from said chamber and from the bags through the valve openings 13 in the latter. For this purpose a pipe 52 has one end thereof connected to the interior of the chamber 39 and its other end connected to the suction side of a suitable vacuum pump or compressor 53 as shown, for example, in Figure 10 of the drawings. Of course, during this time the relief valve 54 is closed and a suitable gauge 55 is preferably provided for visibly indicating to the operator the vacuum created within the chamber 39 and the filled bags as the air is exhausted therefrom.

When the desired vacuum within the chamber and bags has been attained the valve openings 13 in the latter are sealed or closed-off. This is accomplished by means of two series of heated elements 56 which are adjustably mounted in arms 57 secured upon a pair of longitudinally extending shafts 58 and these shafts 58 are rotatably mounted in bearings 59 adjacent the top of the chamber 39. These shafts 58 each have secured thereon a link 60 the inner end of each of which is pivotally connected as at 61 to a vertically reciprocable shaft 62 extending into the chamber 39 and actuable by means of a handle 63 pivoted upon the exterior of the chamber 39 as at 64.

The elements 56 may be heated in any suitable manner as, for example, by electricity supplied thereto by conductors 65, and in order properly to control the temperature of the heated sealing elements 56 the chamber is preferably provided with an externally visible thermometer as well as automatic thermostat control equipment for maintaining the temperature of said elements 56 substantially constant.

From the foregoing it will be seen that when the heated sealing elements 56 are actuated simultaneously into engagement with the outwardly facing package surfaces they contact the surface area adjacent or surrounding the valves therein with the result that the opposing wall surfaces of the heat-fusible inner ply of the package are fused together about the valves thus sealing the same from the interior of the package.

As hereinbefore stated a distinct advantage may be obtained by forming the valve opening through both faces of the bag or package. And, referring to Figure 15 of the drawings, if this is done, a pin or the link 38 may be provided upon each boss 37 and arranged to project through the valve openings as indicated, the heated sealing elements 56 in such case being of tubular form or recessed as at 56a to telescopically receive said pins 38 and thereby posi-

tively and accurately position the valve openings centrally in the path of the said sealing elements **56** to insure proper sealed closing of the valves.

After the valve openings have been sealed as above set forth the heated sealing elements **56** are withdrawn. The relief valve **54** is opened to admit air to the chamber **39** and the doors **42** and **43** are then opened so that the support or rack **30** with its packages may be removed from one end of said chamber to make way for the next rack and packages which is slid into the chamber from the other end thereof. When the succeeding rack and packages have been placed in the chamber **39** the doors **42** and **43** are again closed, the air exhausted and valve openings in the packages sealed as above described.

In order that the procedure may be relatively continuous in practical application, the capacity of the rack **30** may be calculated upon the basis of the time required for the evacuation and the valve sealing thereof within the chamber and the number of packages for the next batch that can be filled and their mouths sealed preferably at the packing machine during that period of time.

From the foregoing description it will be seen that the present invention affords a novel package and method and apparatus for producing same which is relatively simple, inexpensive and capable of adoption or application to existing package making, filling and closing processes and equipment.

The invention, of course, is applicable equally to bags or packages, such as, for example, flat, satchel-bottom, square-bottom and the like, other than those having bellows-folded side walls, and while various features of the invention have been illustrated and described in connection with particular forms of containers and machinery, it is not intended to limit said invention thereto and, to the contrary, it is contemplated that changes and modifications in both structure and methods may be embodied and incorporated therein within the scope of the annexed claims.

I claim:

1. In the method of filling and sealing an open mouthed receptacle of thermoplastic sheet material having a valve aperture in its body adjacent the mouth thereof, the steps which comprise filling said receptacle through said mouth to a height below said valve aperture, sealing the mouth of the receptacle by applying heat transversely thereof to fuse together the opposing wall surfaces of said sheet material, exhausting air from said receptacle through said valve aperture therein, and then sealing the valve aperture by heat fusing together the wall surfaces of the sheet material about the valve aperture while air is exhausted from the receptacle.

2. In the method of filling and sealing an open mouthed receptacle of thermoplastic sheet material having a valve aperture in its body adjacent the mouth thereof, the steps which comprise filling said receptacle through said mouth to a height below said valve aperture, sealing the mouth of the receptacle by applying heat transversely thereof to fuse together the opposing wall surfaces of said sheet material, placing said receptacle in a closed chamber and exhausting air from said chamber and the receptacle through said valve aperture therein, and then sealing the valve aperture by heat fusing together the wall surfaces of the sheet material about the valve aperture while the receptacle is in said chamber and air is exhausted therefrom.

3. In the method of filling and sealing an open mouthed plural ply bag having an integral inner ply of heat fusible material and a valve aperture adjacent said mouth, the steps which comprise filling said bag through its open mouth to a height below said valve aperture therein, sealing the open mouth of said bag by applying heat transversely of the bag to fuse together the opposing wall surfaces of said inner ply, exposing the interior and exterior of said bag to a vacuum to exhaust air from the bag through said valve aperture, and sealing-off the valve aperture from the interior of the bag by heat fusing together the opposing wall surfaces of the inner ply about said valve aperture while said bag is exposed to said vacuum.

4. In the method of filling and sealing an open mouthed plural ply bag having an integral inner ply of heat fusible material and a valve aperture adjacent said mouth, the steps which comprise filling said bag through its open mouth to a height below said valve aperture therein, sealing the open mouth of said bag by applying heat transversely of the bag to fuse together the opposing wall surfaces of said inner ply, placing said receptacle in a closed chamber and exhausting the air from said chamber and from said receptacle through the valve aperture therein, and sealing-off the valve aperture from the interior of the bag by heat fusing together the opposing wall surfaces of the inner ply about said valve apertures while said bag is in said chamber and the air exhausted therefrom.

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