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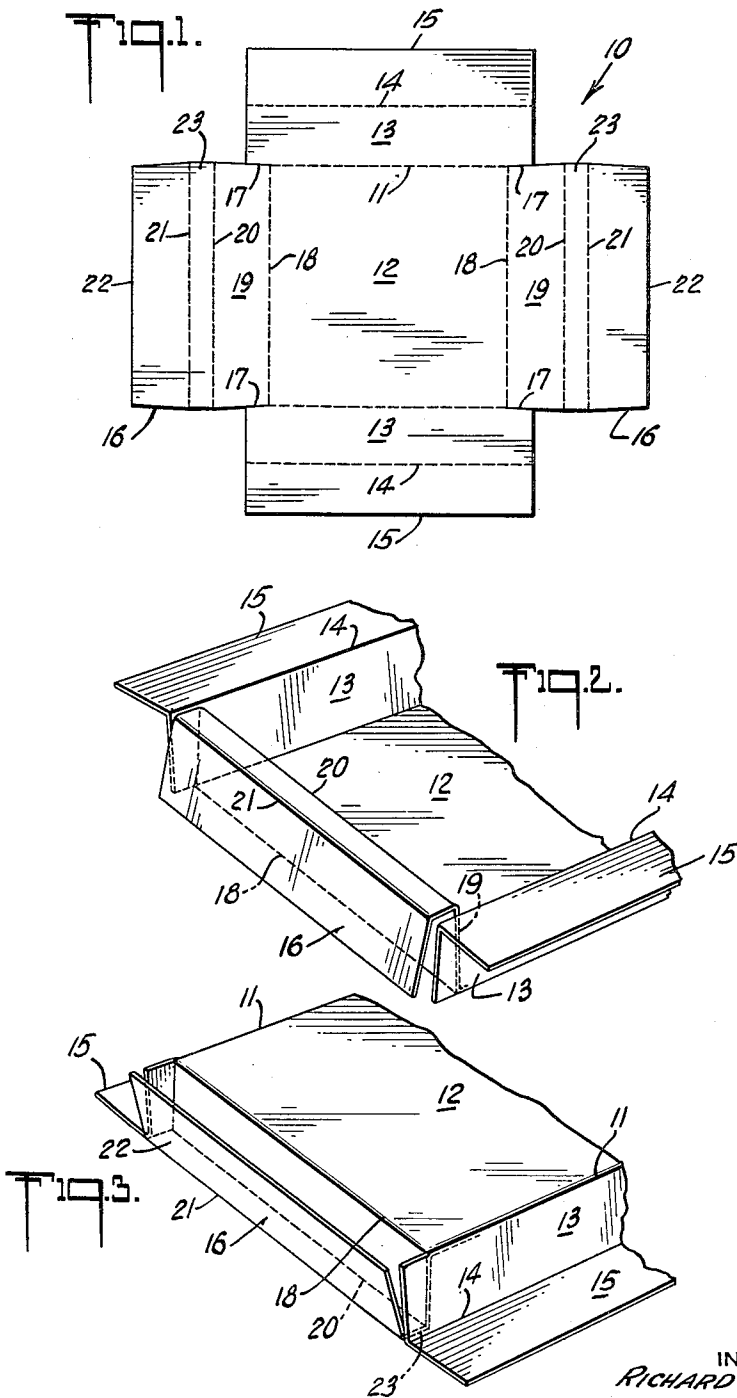
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3,082,928

FABRICATED DEVICE AND METHOD OF FABRICATION

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4 Sheets-Sheet 1



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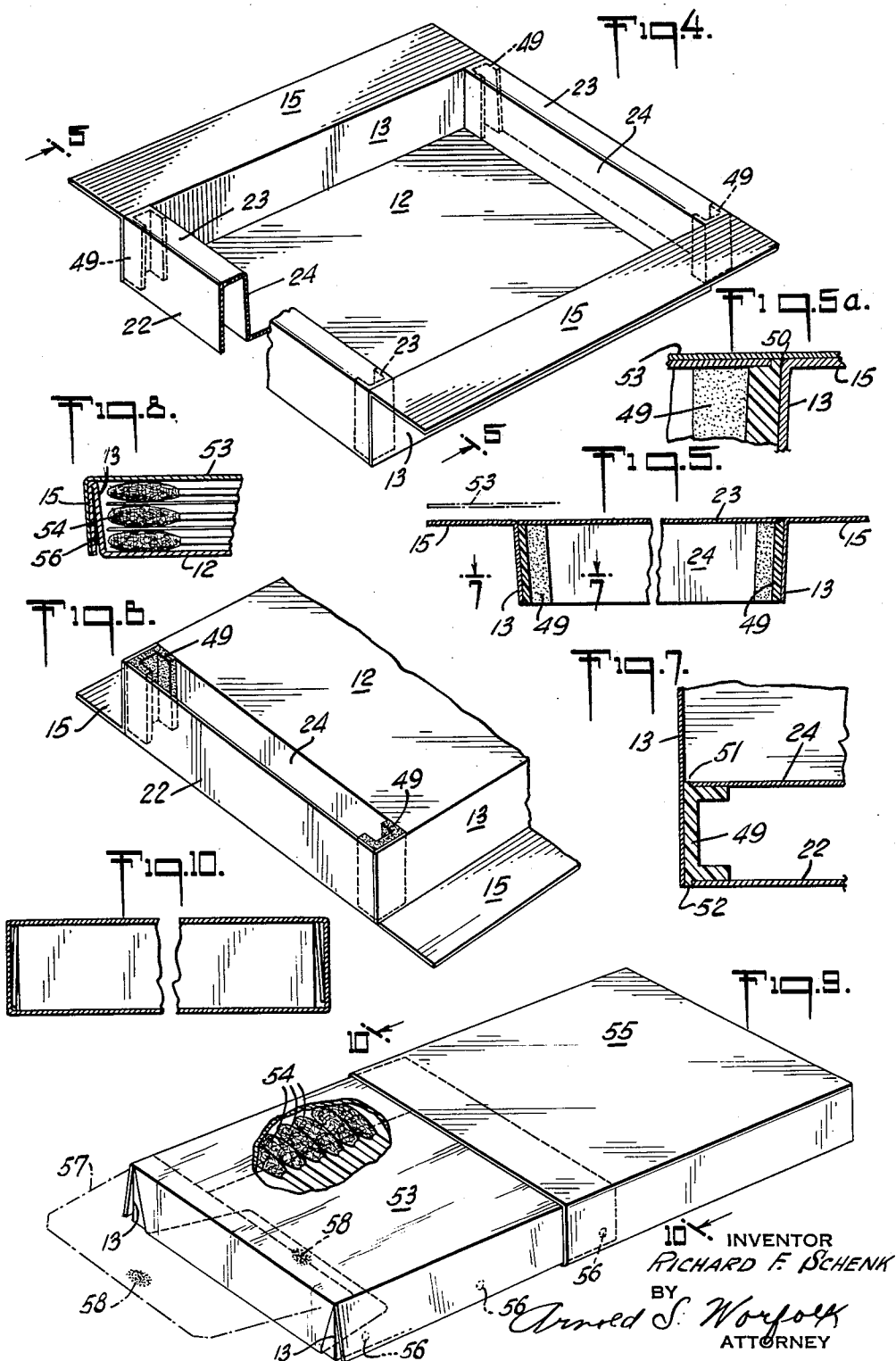
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FABRICATED DEVICE AND METHOD OF FABRICATION

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4 Sheets-Sheet 2



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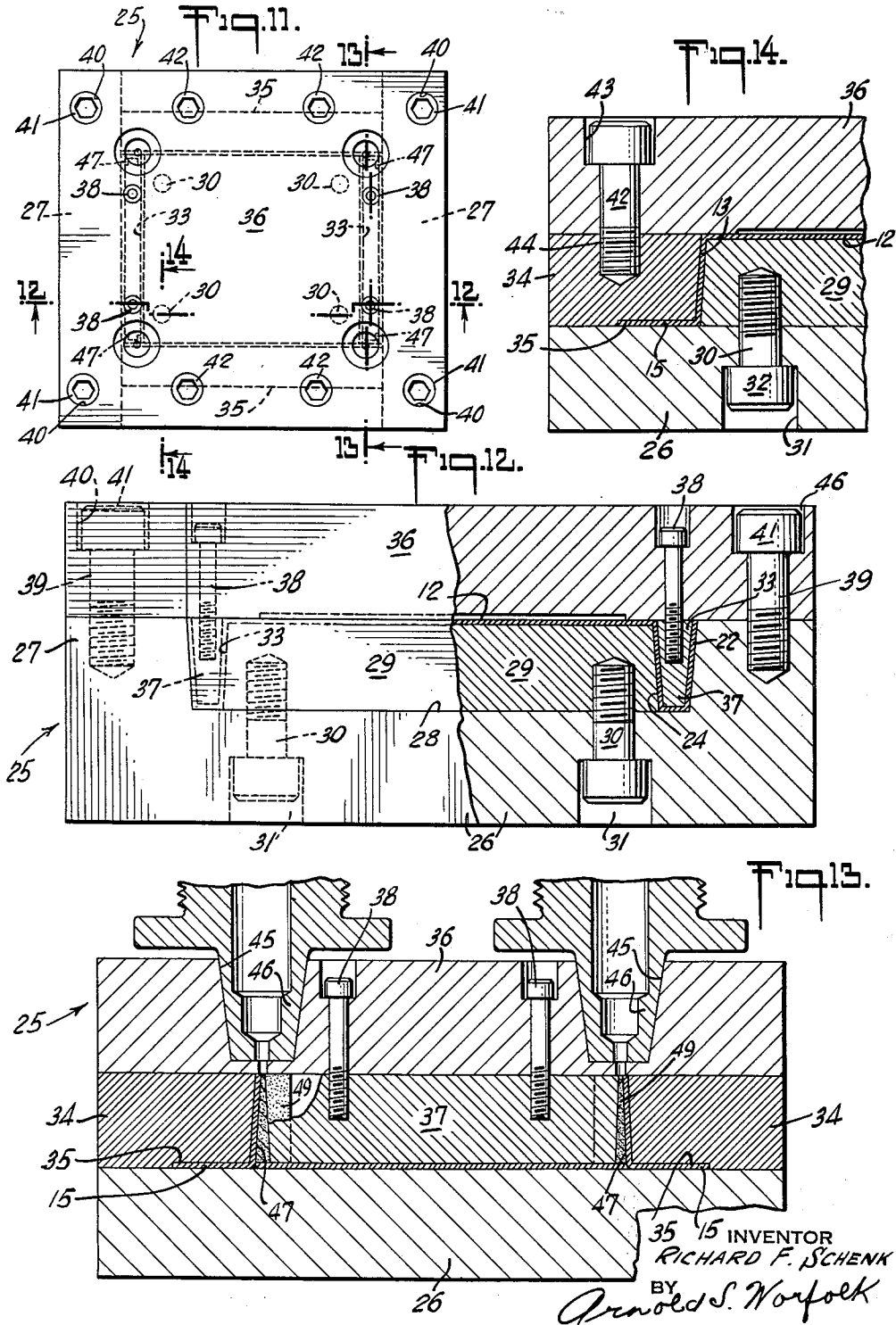
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FABRICATED DEVICE AND METHOD OF FABRICATION

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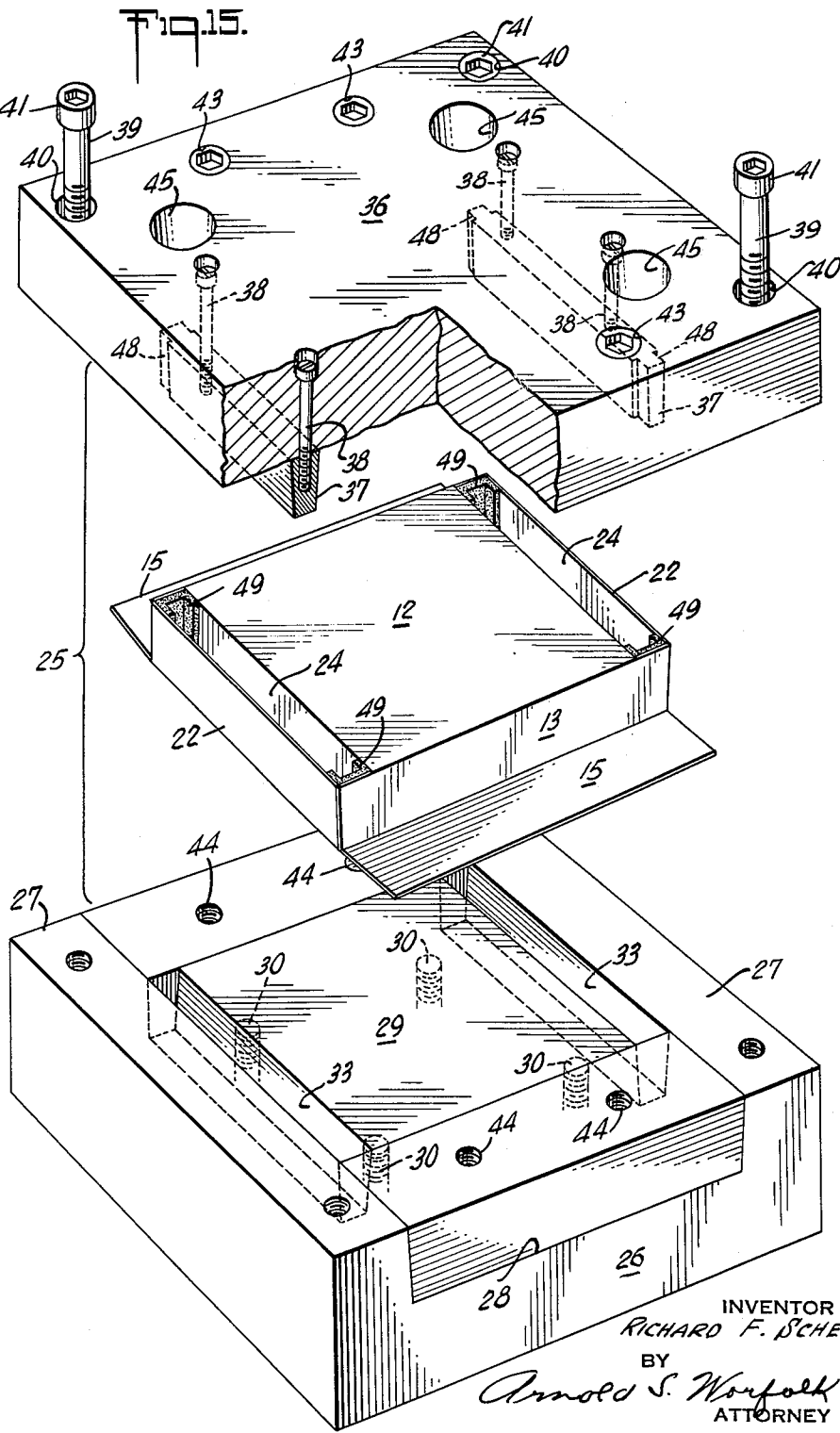
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FABRICATED DEVICE AND METHOD OF FABRICATION

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4 Sheets-Sheet 4



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1

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FABRICATED DEVICE AND METHOD OF FABRICATION

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This invention relates to a tray for a container having a sleeve in which the tray is slidably disposed, and to the method of making it. More particularly it relates to such a container which is economical to manufacture and capable when the desired product is packed therein to be sealed, sterilized and its sterility maintained over long periods or until the seal is broken preparatory to use of the product contained.

According to the invention, the improved tray preferably includes a bottom panel, side wall panels connected to the bottom panel and end members likewise connected to the bottom panel and which span the distance between the side wall panels to close the tray at its ends. The end members may include each a plurality of substantially parallel wall panels spaced apart in the direction the tray slides into and out of its sleeve and connected together in such spaced relation at their upper edges by a panel which presents a substantial flat surface area in the plane determined by the top of the tray and to which a membrane may be sealed as by a suitable adhesive. The relative locations of the bottom panel, the side wall panels and the end members, as well as the spaced wall parts forming the end members, are maintained by a plastic material molded in situ. Such is the preferred construction that the interior of the tray is devoid of any element of structure which might, if present, render unavailable some of the packing space contained in the tray. Such also is the preferred construction that the exterior of the tray is devoid of any element of structure which might, if present, interfere with the sliding of the tray into and out of its sleeve.

Also, in accordance with the invention, the improved tray has longitudinally extending marginal flaps attached to the side wall panels of the tray at their upper edges. When these panels are disposed at right angles to the side walls, they lie in a plane coincident with the plane of the panels at the top of the end walls so that a membrane adhered throughout to these flaps and to such panels will effectively seal the contents of the tray against outside contaminants. This is particularly true since any capillary passageways or ducts that otherwise might be located beneath the membrane in the region between the end member top panels and the side walls and which would provide ingress for contamination of any kind, are effectively sealed closed by the plastic material as it is injected in place. Thus a substantial economic saving is accomplished because maintenance of content sterility, in a sleeve type tray, was heretofore obtainable only by completely enclosing the tray in a suitable wrapper. The marginal flaps are folded down into contact with the side walls to facilitate insertion of the tray into the sleeve and even though the flaps may be adhesively tacked to the side walls at intervals along their length, nevertheless, they will exert sufficient friction against the inner lateral opposed walls of the sleeve as to prevent inadvertent relative displacement between the tray and sleeve.

A better understanding of the invention may be had from the following description read in conjunction with the accompanying drawings, of which:

FIG. 1 is a tray blank whose contour is shown in solid lines and whose lines of fold are shown in dotted lines;

FIG. 2 is a partial perspective view of the tray blank

2

with its various parts folded substantially to their final position but before being anchored in place;

FIG. 3 is a partial perspective view of the improved tray blank folded as in FIG. 2 but looking at the parts from the bottom;

FIG. 4 is a perspective view of the improved tray completed but partly broken away to show details of construction;

FIG. 5 is a transverse sectional view on line 5-5 of FIG. 4;

FIG. 5a is an enlarged view of that portion of FIG. 5 which is encircled;

FIG. 6 is a perspective view of a part of the tray shown in FIG. 4 but with bottom up;

FIG. 7 is a partial sectional view on an enlarged scale at line 7-7 of FIG. 5;

FIG. 8 is a partial transverse sectional view showing the tray packed, the cover diaphragm in place, and the side flaps anchored down;

FIG. 9 is a perspective view of the improved tray filled with a commodity, closing membrane in place, and partly disposed in its associated sleeve;

FIG. 10 is a sectional view on line 10-10 of FIG. 9;

FIG. 11 is a top plan view of mold in which the tray is formed;

FIG. 12 is a side view partly in section of the mold shown in FIG. 11, the section being taken on line 12-12 of FIG. 11;

FIGS. 13 and 14 are sectional views on lines 13-13 and 14-14, respectively, of FIG. 11; and

FIG. 15 is a perspective view of a mold suitable for use in practicing the invention, exploded to show the relationship between mold parts and molded tray.

In accordance with the invention, a blank is provided of suitable package forming material with parallel score lines 11 indicating lines of fold between a bottom panel member 12 and marginal side wall panels 13 which, when folded up at right angles to the bottom panel, provide the side wall members of the tray (FIG. 1). A pair of score lines 14 parallel to and spaced outwardly from those defining the lateral edges of the bottom panel provide lines of fold for a pair of marginal flaps 15 adapted initially to extend outwardly at substantially right angles to the side wall members of the tray (FIGS. 1, 2, and 3).

The blank has a pair of end sections 16 extending outwardly from the bottom panel 12 and whose linear dimension widthwise of the box is the same as the width of said bottom panel. At each corner, the blank is cut inwardly for a short distance along the score lines 17 between the bottom panel and the side wall member. These cuts are joined by score line 18 to facilitate turning the end sections upwardly at right angles to the bottom panel to provide end wall panels 19 defining the inner faces of the end wall members of the container. Each end section of the blank is further provided with a pair of score lines 20, 21 parallel to each other and to the score lines defining the end boundaries of the bottom panel 12. Each end section 16 is folded along inner score lines 20 to a position at right angles to the inner end wall panels of the container and then downwardly along outer score lines 21 to provide a flap 22 which ultimately will have a fixed position substantially parallel with that portion of the end section defining the inner end wall panel 19 of the container. Those portions of the end sections between the two score lines 20, 21 will in the ultimate tray present platforms 23 whose top surfaces lie in a common plane. The marginal flaps will also be located in the same plane after the tray has been fabricated.

When the elements constituting each end of the tray are folded to their ultimate positions they will, looking

3

at the bottom of the package, present a trough 24 open at such bottom (FIG. 3) but closable at the ends by portions of the opposite side wall panels 13 which extend outwardly beyond the panels 19 constituting the inner end wall panels of the tray.

The blank as thus folded is placed in a mold 25 in which fabrication of the package is completed by injection molding of the parts in situ. The mold includes a base portion 26 with raised spaced support end rails 27 presenting a channel 28 between them extending from one side face of the mold to the other (FIGS. 11, 12, and 15). A male mold section 29 having the shape of the container cavity is fixed in this channel by four screws 30 located one near each corner of the section into which they are threaded after passing up through holes 31 in the base portion 26. The screws are provided with heads 32 which are recessed into enlarged portions of the holes 31 through which the screws pass.

The opposite ends of the mold section 29 are spaced from their adjacent mold end rails 27 to form recesses 33 at such ends to receive the end wall members of the folded blank. When the folded blank is thus positioned on the male mold section, the side flaps 15 of the blank will rest upon the floor of the channel 28 in the base portion of the mold. These flaps are held in this position by filler pieces 34 which are fixed in position during the molding process in manner hereinafter described.

When the filler pieces are fixed in position, their inner side walls abut firmly against the outer side walls 13 of the folded blank to hold them firmly in position against the side walls of the mold section 29. Their bottom faces are formed with shallow recesses 35 along their length to accommodate the flaps 15 and hold them in extended position during the molding operation.

The mold is closed at the top by a member 36 having a pair of spaced mold inserts 37 fixed on the under surface of the member and which enter the troughs 24 formed in the ends of the container blank. Machine screws 38 pass downwardly through holes in the mold closing member and threaded into the mold inserts 37 at the top, thus to fix the mold inserts in place on the mold closing member (FIGS. 11, 12, 13, and 15). The mold closing member 36 itself is held in place ready for the molding operation by machine screws 39 located one at each corner of the mold. The screws pass downwardly through holes 40 in the mold closing member, and have heads 41 which are recessed into enlarged portions of such holes. The filler pieces 34 are held in position during the molding operation by screws 42, similar to the screws 39, which likewise pass through holes 43 in the mold closing member but which thread into holes 44 that are located in the filler pieces. The screws 39, at their lower ends, thread into the end rail sections 27 of the mold base.

The mold closing member 36 is further provided with four ports 45 located one above each corner of the tray or, to be more precise, one above each end of the troughs 24 whose ends are closed by the side wall panels of the tray. The ports are designed to receive a nozzle 46 or an injection molding machine (not shown) capable of injecting a suitable thermoplastic material into the mold.

When the blank 10 has been appropriately folded, inserted in the mold, and the mold closed, a recess or mold cavity 47 is presented at each corner of the mold, where the troughs on the under side of the tray are closed at their ends by the side wall members of the blank.

The mold cavity is formed by terminating the mold inserts 37 just short of the end walls of the mold recesses 33 that receive the end wall members of the tray, and by forming the side walls of such mold inserts with recesses 48 adjacent such ends. By thus shortening and recessing the mold inserts there is formed, in conjunction with the adjacent wall portions of the mold recesses, mold cavities, U-shaped in horizontal cross-section and of a height corresponding to the depth of the troughs

4

24. A suitable thermoplastic material (polyethylene or polypropylene, by way of example) is injected under substantial pressure into these cavities and, when the thermoplastic material has cooled, it will be found to have firmly adhered to those portions of the surface of the blank with which it comes in contact. The hardened thermoplastic forms a stiff, rigid supporting element 49 at each corner of the container, a supporting element which imparts definite contour to the end wall sections of the tray (FIGS. 4, 5, 6, and 15).

In making a tray in manner described, every crevice that otherwise might exist between the side wall members 13 and the end edges of the end wall panels 22, 23, and 24, is entirely filled up with the thermoplastic material (FIGS. 5, 5a and 7) as at 50, 51, and 52. Consequently when a tray has been filled and closed by the application of a membrane 53 to the side wall flaps and to the top of the end wall panels 23, there will be total absence of any passageways that otherwise might exist between the end edges of the end wall panels and the faces of the adjacent side wall panels. When the membrane 53 is sealed to the end and side wall members all around the top of the tray, the contents of the tray are sealed against contamination that otherwise might gain access through such passageways as could exist in the absence of the thermoplastic filler material.

When the contents, shown in this case as buds 54, i.e., cotton applied to the ends of wooden sticks, are appropriately located in the tray and the membrane adhesively sealed all around the top edges thereof, the tray is inserted in a sleeve 55. To perform this operation, the marginal flaps 15 to which the sealing membrane adheres, are folded down to facilitate insertion of the tray into the sleeve (FIG. 8). Preferably, for this purpose, a few spots of glue 56 are applied to the outer face of the side wall panels 13. The glue acts to hold the marginal flaps to the side wall panels when folded down into place (FIG. 10). Even though the marginal flaps 15 are tacked down in the manner described, the resilience of such members seeking to return to their normal outwardly extended positions will hold the tray in the sleeve by friction.

To facilitate opening the tray, membrane 53 is provided with an end tab extension 57 shown in dot and dash line in FIG. 9 which is folded down around the end of the tray and along the bottom where it is held in place by a drop of glue 58. The remainder of the tab extension, however, remains loose so that, to gain access to the tray's contents, it is necessary only to grasp the tab, move it from its position adjacent the bottom of the tray and around to the top thereof, and then pull back upon it lengthwise of the tray to strip the membrane off.

It is contemplated the tray with contents will be sterilized after the membrane is applied. A paper suitable for this purpose is available, but expensive. The present invention enables a substantial amount of this type of paper to be saved since heretofore in order to maintain sterility it was necessary completely to enclose the tray in a sealed wrapping of the membrane paper.

The invention has been described in connection with one of the embodiments thereof, but many modifications are included within its spirit. It is to be limited, therefore, only by the scope of the pending claims.

What is claimed is:

1. A sealed tray type package comprising a bottom panel, side wall panels disposed at an angle with and connected to the bottom panel, an end member connected to the bottom panel at each end thereof spanning the distance between said side wall panels and disposed entirely within the longitudinal confines of said side wall panels, said end members comprising each a plurality of wall panels spaced apart in a direction perpendicular to such end members and connected together at their upper edges by a panel presenting substantial surface area

5

at the top of such end member, plastic means molded in situ for preserving the structural relationship of the panels comprising the end members and for interconnecting airtightly the end members with the side wall panels, marginal flaps coextensive in length with the said side wall panels connected to said panels at the top edges thereof and being locatable with their top surfaces in a plane coincident with the plane of the surfaces presented at the top of said end members, and a tray closing membrane sealed over the entire periphery of said tray to said marginal flaps and to the top surfaces presented by said end members and to the interconnecting plastic means therebetween whereby the contents of the tray are preserved against ingress of contamination.

2. A sealed tray type package comprising a bottom panel, side wall panels disposed at an angle with and connected to the bottom panel, an end member connected to the bottom panel at each end thereof spanning the distance between said side wall panels and disposed entirely within the longitudinal confines of said side wall panels, said end members comprising each a plurality of wall panels spaced apart in a direction perpendicular to such end members and connected together at their upper edges by a panel presenting substantial surface area at the top of such end member, plastic means molded in situ for preserving the structural relationship of the panels comprising the end members and for interconnecting airtightly the end members with the side wall panels, marginal flaps coextensive in length with the side wall panels connected to said panels at the top edges thereof and being locatable with their top surfaces in a plane coincident with the plane of the surfaces presented at the top of said end members, and a tray closing membrane sealed over the entire periphery of said tray to said marginal flaps and to the top surfaces presented by said end members and to the interconnecting plastic means therebetween whereby the contents of the tray are preserved against ingress of contamination, said membrane having a portion extending beyond one end of the tray to facilitate peeling off the membrane to expose the tray's contents.

3. A container comprising a tray and an enclosing sleeve in which the tray is slidably disposed, said tray including a bottom panel, side wall panels disposed at an angle with and connected to the bottom panel, an end member connected to the bottom panel at each end thereof spanning the distance between said side wall panels and disposed entirely within the longitudinal confines of said side wall panels, said end members comprising each a plurality of wall panels spaced apart in a direction perpendicular to such end members and connected together at their upper edges by a panel presenting substantial surface area at the top of such end member, plastic means

6

molded in situ for preserving the structural relationship of the panels comprising the end members and for interconnecting airtightly the end members with the side wall panels, marginal flaps coextensive in length with the side wall panels connected to said panels at the top edges thereof and being locatable with their top surfaces in a plane coincident with the plane of the surfaces presented at the top of said end members, and a tray closing membrane sealed over the entire periphery of said tray to said marginal flaps and to the top surfaces presented by said end members and to the interconnecting plastic means therebetween whereby the contents of the tray are preserved against ingress of contamination, said marginal flaps with the membrane sealed thereto being folded downwardly along the side walls of the tray for accommodation in the enclosing sleeve.

4. A container comprising a tray and an enclosing sleeve in which the tray is slidably disposed, said tray including a bottom panel, side wall panels disposed at an angle with and connected to the bottom panel, an end member connected to the bottom panel at each end thereof spanning the distance between said side wall panels and disposed entirely within the longitudinal confines of said side wall panels, said end members comprising each a plurality of wall panels spaced apart in a direction perpendicular to such end members and connected together at their upper edges by a panel presenting substantial surface area at the top of such end member, plastic means molded in situ for preserving the structural relationship of the panels comprising the end members and for interconnecting airtightly the end members with the side wall panels, marginal flaps coextensive in length with the side wall panels connected to said panels at the top edges thereof and being locatable with their top surfaces in a plane coincident with the plane of the surfaces presented at the top of said end members, and a tray closing membrane sealed over the entire periphery of said tray to said marginal flaps and to the top surfaces presented by said end members and to the interconnecting plastic means therebetween whereby the contents of the tray are preserved against ingress of contamination, said marginal flaps with the membrane sealed thereto being folded downwardly along the side walls of the tray and frictionally holding the tray in the sleeve.

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