

June 28, 1966

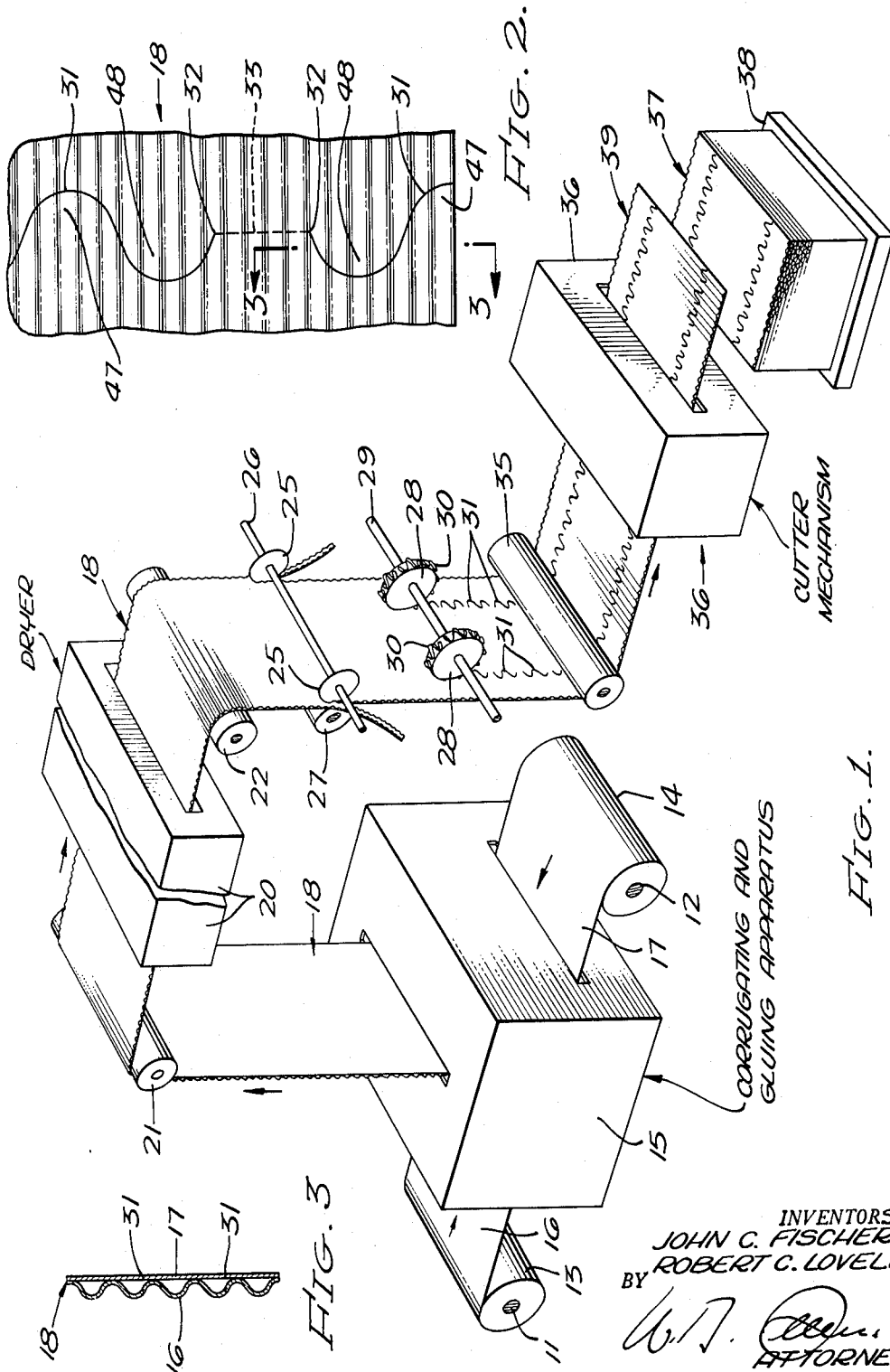
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3,258,380

METHOD AND APPARATUS FOR MAKING LUG LINER

Original Filed Dec. 22, 1958

3 Sheets-Sheet 1



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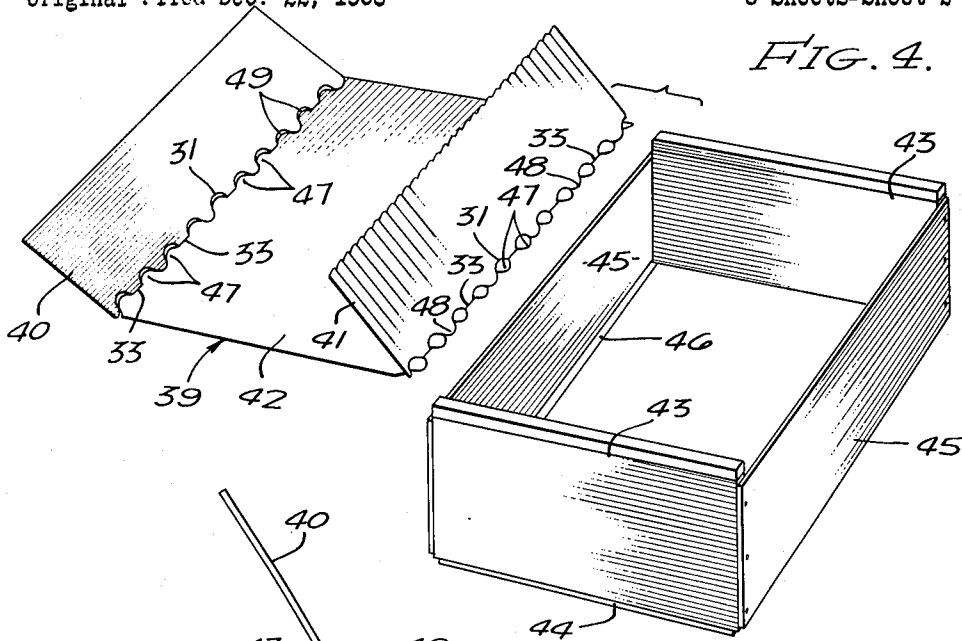


FIG. 4.

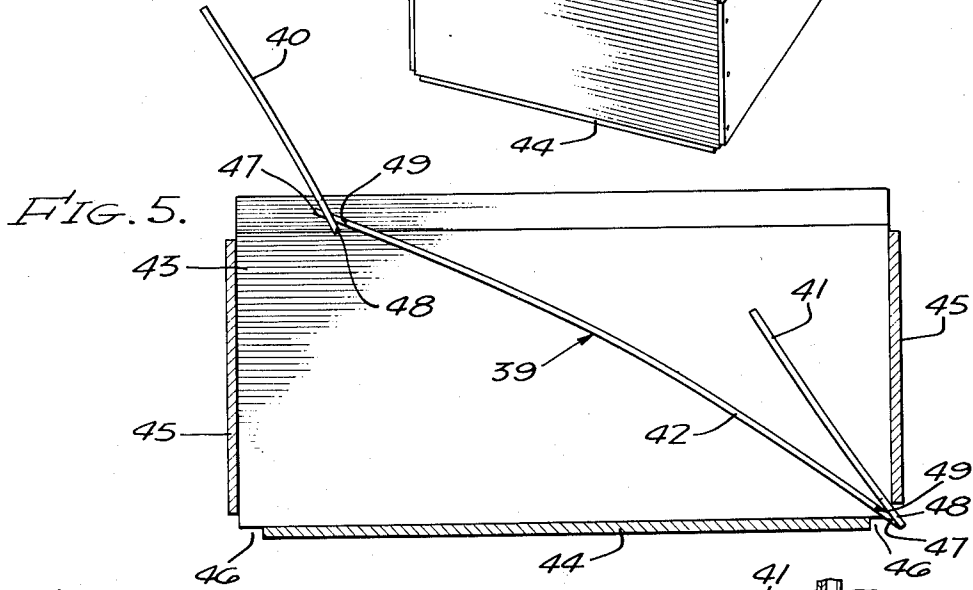


FIG. 5.

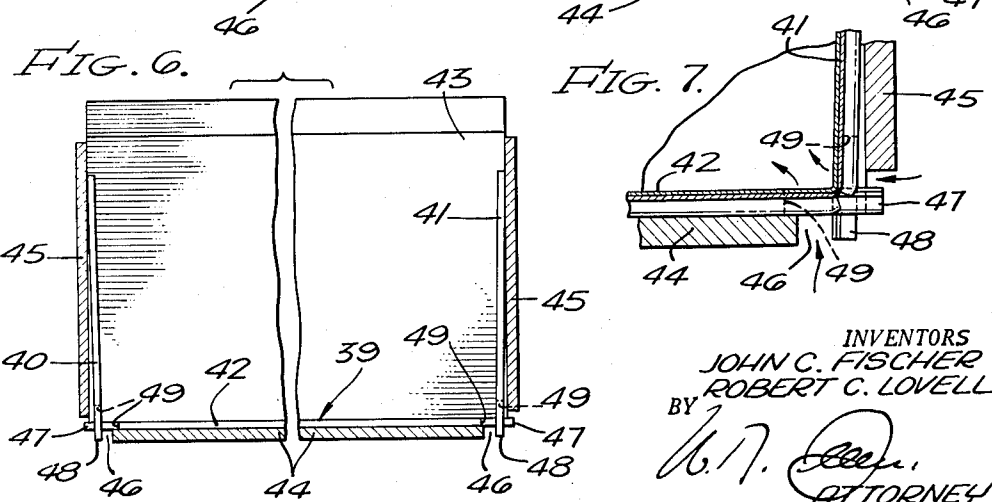
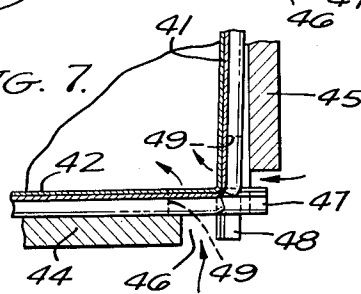


FIG. 6.

FIG. 7.



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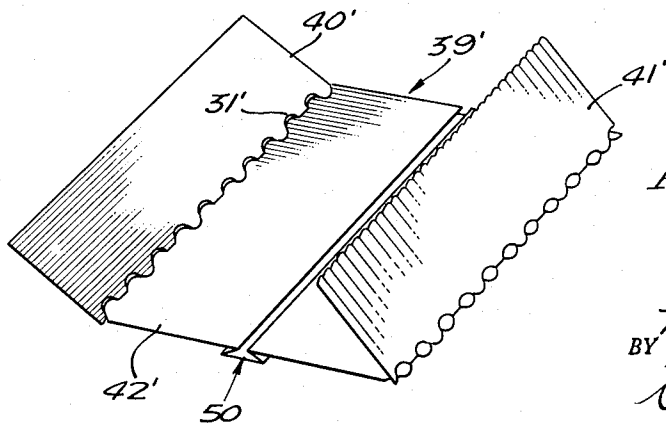
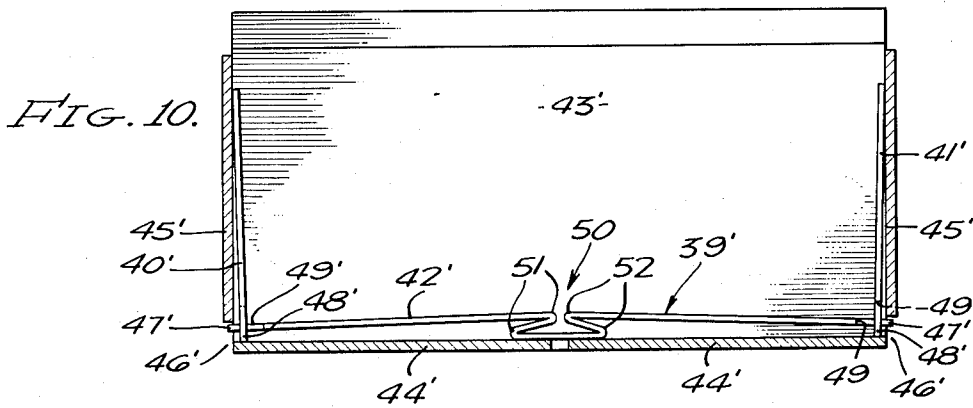
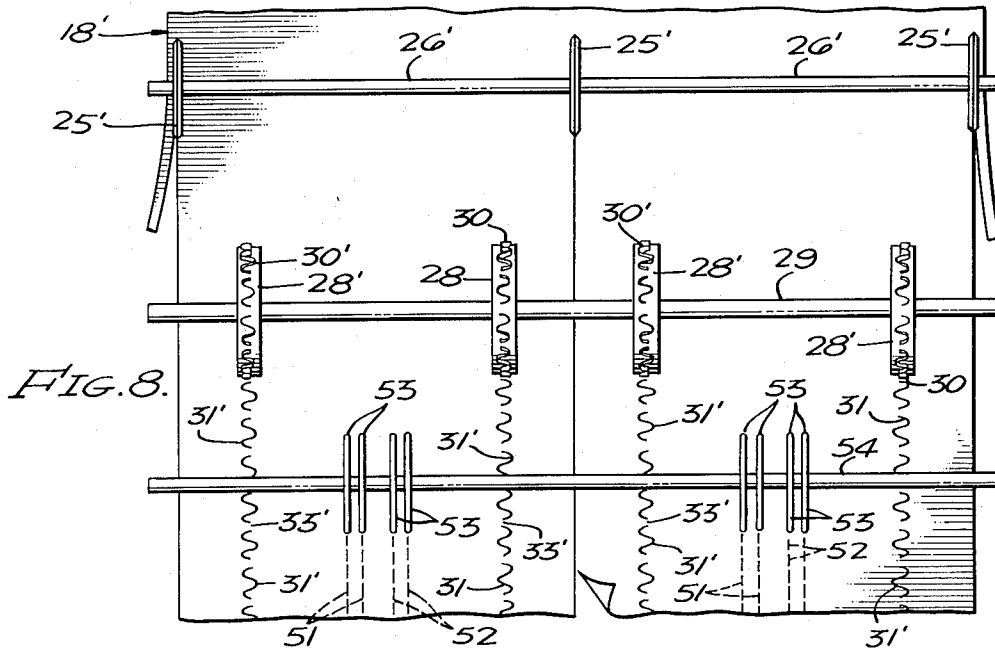
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METHOD AND APPARATUS FOR MAKING LUG LINER

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METHOD AND APPARATUS FOR MAKING LUG LINER

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 Original application Dec. 22, 1958, Ser. No. 781,998, now Patent No. 3,014,631, dated Dec. 26, 1961. Divided and this application Oct. 9, 1961, Ser. No. 143,824
 4 Claims. (Cl. 156-207)

This invention relates to the packaging of delicate fruits in shipping lugs and more particularly in the provision of an improved method and apparatus for the manufacture of a combined one-piece liner and resilient cushion for installation in such lugs by a continuous automatic process requiring no labor other than general supervisory attention.

This application is a division of our copending application for United States Letters Patent Serial No. 781,998, filed December 22, 1958, now Patent No. 3,014,631, entitled Fruit Lug Liner and Method of Making Same.

Any of the more delicate fruits such as cherries, peaches, apricots, tomatoes and the like having thin, easily severed skins are packaged and transported in shallow wooden lugs having thick end walls and their bottoms and sides formed by slats nailed to the end walls. Customarily there is a long narrow ventilating gap between the opposite side walls and the bottom; one or more similar narrow gaps may also be provided in the bottom of the lug. These gaps are particularly important when the lugs are closely stacked in transit or in storage for the purpose of permitting a relatively free flow of ventilating air. Such air flow serves to reduce spoilage as well as to prevent overheating, as well as to permit quick chilling after the fruit has been placed in storage or in refrigerator cars for shipment to the point of use.

The described lugs are customarily formed from rough sawn wood which easily severs the skin of delicate fruits. To avoid such damage as well as to protect the fruit against contact with the lug and additionally to provide desirable cushioning for the fruit during handling and shipment, it has been common to provide an inexpensive throw-away liner. Various designs of such liners have been proposed heretofore but all are subject to certain disadvantages and shortcomings sought to be obviated by the present invention. A particularly desirable type is formed from corrugated paper because such paper not only adds resiliency and protection to the fruit from shock, vibration and the like, but because the corrugated structure of the liner facilitates the passage of essential ventilating air. However, to make proper use of such ventilating capabilities it has been necessary to provide the liner with cutouts through which the air may pass to the interior of the lug.

The provision of such cutouts is attended by several serious problems, and this is especially true of resilient type liners. One of these problems arises from the likelihood of the sharp edges of the air passages cutting the tender skin of the fruit. Once the skin is broken, fruit juices escape soiling the liner and the lug. But of more serious consequence is the fact that such skin rupture leads to rapid decay and provides a rich culture for the rapid development of mold. These serious consequences can be minimized by making the cutouts very small, but this expedient so reduces the air port area as to defeat the purposes of the ports.

Another and more serious aspect of providing ventilating openings in corrugated sheet stock is related to the resilient nature of corrugated paper thereby making it very difficult to blank the cutouts at high speed. The blanking dies normally employed comprise sharp edge blades ar-

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ranged to cut through the corrugated paper and remove the cutouts as the die retracts. However, such a high percentage of the cutouts tend to remain in the stock it is necessary to stack the blanks and to use manually manipulated jigs having plungers operable to dislodge the cutouts forcibly. This manual operation is both time-consuming and costly. Nevertheless, it has been mandatory in the provision of commercially saleable liners.

By the present invention there is provided an improved resilient liner formed at high speed from corrugated sheet stock in a continuous process obviating the shortcomings and disadvantages of prior liners and of the methods of manufacturing the same. Preferably the corrugated sheet stock is formed as part of the continuous manufacturing procedure, one sheet being corrugated transversely and the crest on one exterior surface being coated with adhesive as these crests are pressed against a second flowing web of flat stock as this two-ply laminate is held assembled until the adhesive takes a set. The corrugated stock is then fed past a slitter station where irregularly-shaped slits are formed in properly spaced relation to provide a hinge in association with rows of large area ventilating passages opening into the lug only at the opposite lateral corners of the lug bottom. These slits are so arranged and contoured that folding of the liner therealong automatically forms the ventilating openings without need for blanking any material from the body of the liner.

Furthermore, the material displaced to form the air passages is utilized to lock the liner assembled to the lug and for other purposes to be described hereinafter. The final processing operation comprises severing the advancing web into blanks of the proper width for insertion into the lug and guiding the liners so severed into a stack for wrapping and packaging. No hand operations or manual labor of any kind is required from the time the paper stock leaves the supply rolls until a sufficient number of liners have been stacked and packaged for removal to a place of storage.

Accordingly it is a primary object of this invention to provide an improved high-speed method and apparatus for making shipping lug liners without need for hand operations of any character.

Another object of the invention is the provision of a method for continuously forming resilient lug liners featuring a pair of hinge lines crosswise of the individual liners which open to provide rows of ventilation passages as an incident to the assembly of the liner into a shipping lug.

Another object of the invention is the provision of a method of making lug liners in a continuous process wherein substantially all portions of the paper stock are blanked into individual similar liners without waste or salvage beyond that possibly required in trimming the lateral edges of the web stock to size.

Another object of the invention is the provision of an improved method and apparatus for the high speed manufacture of a resilient lug liner having ample provision for the flow of ventilating air through openings restricted to the inner lateral corners of the lug in alignment with the slat openings in the lug corners and of such size as not to provide cutting hazard to the tender skin of delicate fruits.

Another object of the invention is the provision of a lug liner adapted to be packaged flat and provided with parallel spaced hinging sections arranged, when assembled in a lug, to form a resilient central support underlying the bottom of the liner and featuring in addition a plurality of ventilating air inlets along the opposite lower corners of the lug.

Another object of the invention is the provision of a lug liner adapted to be packaged and shipped flat, and

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formed with hinge lines crosswise of the corrugated stock forming the liner in a manner providing a pair of hinge sections including large area ventilating openings and associated outwardly projecting lugs operable to support the lateral bottom portions of the liner out of contact with the lug bottom as well as additional tangs engageable with the lug sides to lock the liner in assembled position therein.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which preferred embodiments of the invention are illustrated.

FIGURE 1 is a diagrammatic representation in perspective of the liner manufacturing process;

FIGURE 2 is a fragmentary plan view on an enlarged scale taken from the corrugated face of the stock and showing one preferred type of slit employed in forming the hinge as well as the ventilating openings;

FIGURE 3 is a fragmentary cross-sectional view taken along line 3—3 on FIGURE 2;

FIGURE 4 is a perspective view of a typical shipping lug, a liner therefor being folded in readiness for insertion into the lug;

FIGURE 5 is a cross-sectional view through the lug on an enlarged scale and showing one lateral corner of the liner being inserted and the other lateral corner in readiness to be lowered into the assembly position of the liner;

FIGURE 6 is a view similar to FIGURE 5 on a slightly smaller scale showing the liner in fully assembled position;

FIGURE 7 is an enlarged fragmentary view through one lower corner of the lug after assembly of the liner;

FIGURE 8 is a fragmentary top plan view of apparatus employed in forming a slightly modified liner construction;

FIGURE 9 is a perspective view of the modified liner construction, the liner being partially folded and in readiness for insertion into a lug; and

FIGURE 10 is a transverse sectional view through a lug with the modified liner in its fully installed position.

Referring more particularly to FIGURE 1, there is shown one preferred mode of manufacturing, by a continuous process, resilient lug liners incorporating the present invention. Suitable apparatus for practicing the invention comprises a pair of shafts 11 and 12 supporting supply rolls of paper stock 13 and 14 passing into a corrugating and gluing apparatus of conventional design and shown enclosed by a housing 15. The details of the corrugating and gluing equipment are not shown but will be understood as comprising the usual steam-heated corrugating roll effective to form transverse corrugations in a web 16 of stock advancing from supply roll 13. The corrugation crests on the lower side of web 16 are coated with a narrow band of adhesive by known technique before being pressed into contact with the under-surface of a flat noncorrugated web 17 advancing from supply roll 14. The resulting web of Z-ply corrugated paper 18 is then fed into an elongated oven 20 by the aid of suitable guide rolls 21, 22 supported in any suitable manner to maintain the web 18 taut and properly centered between steam heaters or other suitable drying chambers within oven 20.

As shown in FIGURE 1, the finished corrugated laminate issuing from the dryer has its corrugated side facing upwardly and its flat surface facing downwardly. However, it is pointed out that these relative positions of the plies may be reversed. Usually the lateral edges of web 18 are irregular and slightly oversize. Trimming of these edges and the accurate dimensioning of the finished web is assured by the use of trimmer knives 25, 25 carried on a shaft 26 preferably operating in conjunction with a back-up roll 27 effective to hold the web in firm contact with the trimmer knives.

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Web 18 next passes past a pair of slitter rolls 28, 28 appropriately spaced on a supporting shaft 29. The peripheral edge of slitter rolls 28 carry irregularly contoured slitter knives 30, 30 here shown as being of serpentine shape and understood as operating in conjunction with resilient back-up rolls on the rear side of the web and not visible in FIGURE 1. Although slits 31 may take numerous shapes, a particularly desirable shape comprises a 270 degree length of a medium amplitude sine wave, each such slit being indicated at 31 and shown on a greatly enlarged scale in FIGURE 2. Each 270 degree slit includes three crests. An important feature of the slit is that the adjacent ends 32, 32 of consecutive slits 31 are spaced apart a sufficient distance to form a hinge axis represented by dotted line 33 in FIGURE 2. It is to be noted that terminal ends 32, 32 of adjacent slits are not only in axial alignment but are positioned intermediate parallel lines drawn through the crests of these slits. Preferably, but not necessarily, the hinge axis is midway between the described lines through the crests of the slits. It will be understood that slits 31 extend entirely through corrugated web 18.

After passing through slitters 30, 30 web 18 may pass about a guide roll 35 and into a combined feed roll and cutter mechanism generally designated 36. This mechanism preferably includes feed rolls pressed against the opposite sides of web 18 and mating therewith in a manner effective to pull the web past the various processing stations. Also included in mechanism 36 is a knife roll for severing web 18 into individual liners 39 of uniform size with the width corresponding to the interior length of a lug into which the liner is to be installed. The finished liners are shown stacked at 37 on a pallet 38 in readiness for wrapping and packaging.

Referring now to FIGURE 4, one of the completed liners 39 is shown with its side panels 40, 41 folded upwardly toward one another along hinge axis 33 interconnecting the adjacent ends of each row of slits 31. Note that side panel 41 is folded past its upright position to a position closely adjacent central panel 42 of the liner, whereas side panel 40 is folded somewhat short of its upright position.

A typical lug into which the liner is adapted to be inserted is shown in FIGURE 4 as comprising a wooden box having end walls 43, 43, a bottom panel 44, and a pair of side panels 45. Each of these panels is somewhat narrower than the width of the end walls to which they are attached, as by nails or other suitable fasteners. Bottom panel 44 and side panels 45 cooperate to provide long narrow slots 46, 46 at the opposite lower corners of the lug through which a plentiful supply of ventilating air may pass. Also the top edges of side panels 45 preferably terminate below the top of end walls 43 to provide free outlets for air, particularly in cases where the lugs are stacked one on top of the other as they commonly are while in storage or in transit.

The assembly of the flat liners 39 is accomplished in the manner made clear by FIGURES 4, 5 and 6. Thus, the operator grasps a liner 39 by taking hold of the mid-length of each side panel 40, 41 and folding the smooth-surfaced side of these panels toward one another about hinges axes 33. Side panel 41 is folded past the upright position to that shown in FIGURE 4 after which the hinge portion thereof is inserted through the right-hand slot 46 of the lug as viewed in FIGURE 5. When so positioned, the opposite edge of bottom panel 42 may be pressed downwardly past the inner surface of the adjacent side wall 45 and against the interior bottom of the lug as side panel 40 is folded to its upright position to lie flush against lug side panel 45.

In the fully installed position of liner 39, tangs 47 integral with bottom panel 42 project beyond the inner surfaces of side walls 45 to underlie the lower edge of these walls and thereby lock the liner assembled to the lug. Likewise, tangs 48 integral with side panels 40 and

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41 lie in the same plane as side panels 40 and 41 and project downwardly into slots 46 of the lug.

The described displacement of tangs 47, 48 forms large half-circular ventilating air passages 49, 49 providing free and unobstructed air flow through slot 46 upwardly into the interior of the lug. Moreover, it is pointed out that the edges of passages 49 are spaced so closely to the lower lateral corners of the lug it is difficult or impossible for the fruit contents of the lug to contact these edges with sufficient pressure to sever the skin. Furthermore, substantially all corrugations of the liner are provided intermediate their opposite ends with openings in communication with slot 46 of the lug so that other portions of the ventilating air are free to circulate between the inner face of the liner and the inner walls of the lug. Cooling and ventilating of the lug are thereby facilitated and assured.

Referring now to FIGURES 8 to 10, there is shown a modified embodiment of the invention wherein the same or similar parts are designated by the same reference characters as in the first described form but distinguished therefrom by the addition of a prime. This embodiment differs in several important respects. In the first place, it will be observed that web 18' is sufficiently wide to form more than one row of liners at the outlet end of the processing machine. Furthermore, each row of liners is of sufficient breadth lengthwise of the corrugations as to permit formation of a foldable midsection centrally of the bottom panel when the liner is assembled in a lug.

The foldable central section will be best understood by reference to FIGURES 9 and 10 showing the bottom 42' of liner 39' formed with a C-shaped fold 50 centrally of its bottom. The formation of fold 50 is facilitated by the provision of two pairs of parallel score lines 51, 52 crosswise of the corrugations of each liner, these score lines being formed by crowned rolls 53 bearing against the advancing web. Rollers 53 are suitably mounted on a shaft 54. Score lines 51, 52 are so positioned that in the assembled folded position of the liner, its bottom portion 42' is resiliently supported in spaced relation to lug bottom 44' in the manner best illustrated in FIGURE 10.

As will be observed from FIGURE 8, the processing equipment includes slitter rolls 28' provided in its peripheral edge with serpentine slitting knives 30' for forming slits 31'. The machine also includes trimming knives 25' to cut away salvage from the opposite edges of web 18' as well as a central knife 25' operating to divide the web into two identical strips from which the liners are severed as they pass through the liner cutter mechanism, not shown, but similar in construction and function to mechanism 36 of the first described embodiment.

Liners 39' are assembled to shipping lugs differing from the lugs shown in FIGURES 5 and 6 primarily in that bottom 44' is formed in two separated halves with their remote outer edges terminating generally opposite the inner faces of side walls 45'. The purpose of this lug assembly is to enable lug bottom 44' to underlie and support the downwardly extending tangs 48', 48' of liner side panels 40', 41'. Accordingly, it will be clear, as is shown in FIGURE 10, that all portions of liner bottom 42' are supported in closely spaced relation to the lug bottom, this support being provided in part by tangs 48' and, in part by C-shape fold 50 centrally of liner bottom 42'. Thus tangs 48' cooperate with the C-fold 50 to provide additional protection and vibration-absorbing resiliency for delicate fruits during shipment and handling.

Liner 39' is assembled within the lug in the same manner described above in connection with the first described embodiment. In the installed position of the liner, outwardly projecting tangs 47', 47' underlie the lower edges of side walls 45' thereby positively locking the liner assembled to the lug. Likewise, the opening of tangs 47', 48' away from the adjacent side walls of the liner provide passages 49' for admitting large volumes of air to the lug and to the space underlying the smooth-surfaced interior surface of the liner.

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While the particular method and apparatus for making a lug liner herein shown and disclosed in detail are fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that they are merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

We claim:

1. That continuous method of manufacturing a combined lug liner and cushion from flat paper stock which method comprises, corrugating a continuous strip of paper stock crosswise thereof as said strip is advanced from a supply roll, applying an adhesive to the crests of the advancing corrugated strip on one face thereof prior to pressing the coated crests into contact with a moving strip of noncorrugated paper, holding said strips in contact until said adhesive takes a set to form a web of laminate one layer only of which is corrugated, forming a plurality of slits in end-to-end relation and spaced from one another transversely of said advancing laminate and cooperable to form large area air inlet openings and hinge connections between adjacent portions of said laminate, said air inlet openings being adapted to communicate with the slits along the lower lateral corners of a fruit lug when said liner is installed in the lug, and cutting said advancing web of laminate into rectangular blanks as said web continues to advance, said cutting operation being performed transversely of the continuously advancing strip of laminate.

2. That method of manufacturing a combined lug liner and resilient cushion from continuous strips of sheet stock, said method comprising passing a freshly corrugated moving web of stock past an adhesive applicator and there applying adhesive to the crests of said corrugations on one side only of said web, pressing said adhesively coated crests against a second web of strip stock moving at the same rate as said adhesively coated corrugated strip of stock to form a single double-ply laminate, subjecting said laminate to heat while the adhesive takes a set, slitting said advancing laminate along a plurality of parallel rows, the individual slits in each row being of irregular shape and closely spaced to one another lengthwise of said laminate and adapted to form large area air openings in communication with the slits along the lower lateral corners of a conventional fruit lug when said liner is installed therein, and blanking said advancing laminate into identical rectangular plaques each having a pair of parallel hinges extending transversely thereof and formed by said rows of closely spaced slits.

3. That continuous method of manufacturing a combined lug liner and cushion for use in the handling of delicate fruits and which liners fold in a manner providing ventilating air openings in direct communication with the slits in the lower lateral corners of the lug as an incident to the assembly of the liner thereto, said method comprising passing a continuous strip of sheet cushioning material through a slitting operation wherein discontinuous irregularly shaped parallel rows of slits are formed in said strip, said rows of slits being spaced apart a distance corresponding to the interior width of a shipping lug, thereafter blanking said strip into rectangular plaques having a width at least as great as the interior length of a lug and a length sufficient to extend across the interior bottom and along the opposite side walls of the lug, said irregular slits and the nonslit portion of the web between ends of adjacent slits cooperating to form a pair of hinges between the central portion of each of said plaques and the opposite lateral edge portions bordering said central portion, and the irregular nature of said slits serving to provide air passages through said cushion when said cushion is assembled within a lug.

4. Apparatus for the manufacture of fruit lug liners from continuous strips of sheet material which comprises means feeding separate continuous strips of flat sheet material through a single face corrugator to form a con-

tinuous length of single-faced laminated corrugation stock, means for forming two parallel rows of irregularly shaped slits through said corrugated stock with the slits in each row being arranged in spaced-apart end-to-end relation and spaced inwardly from and parallel to one another and to the opposite lateral edges of said corrugated stock, and adapted to open as an incident to being installed in a fruit lug thereby to provide large-area air openings in communication with the slits along the lower lateral corners of a conventional fruit lug, said rows of slits extending transversely of the corrugations in said corrugated stock and being spaced apart by a distance corresponding generally to the interior width of the fruit lug bottom for which the completed liners are intended, and means for severing said continuous corrugated stock transversely thereof as said

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stock issues from said slitting means to form a plurality of identical liners sized to fit against the bottom and upwardly firmly against either opposite longer side wall of a conventional fruit lug.

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