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Lane et al.

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[45] **Sept. 18, 1973**

[54] **PACKAGE SEPARATOR AND CORNER CUTTING DIE FOR INDIVIDUAL PORTIONS, AND METHOD**

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[73] Assignee: **Filper Corporation,** San Ramon, Calif.

[22] Filed: **May 22, 1972**

[21] Appl. No.: **255,754**

[52] **U.S. Cl.** ..... **83/24,** 83/47, 83/100, 83/105, 83/165, 83/255, 83/408, 83/620, 83/923, 83/925 R

[51] **Int. Cl.** **B65b 61/08**

[58] **Field of Search** ..... 83/24, 27, 47, 100, 83/105, 165, 175, 212.1, 255, 408, 925 R, 620, 923

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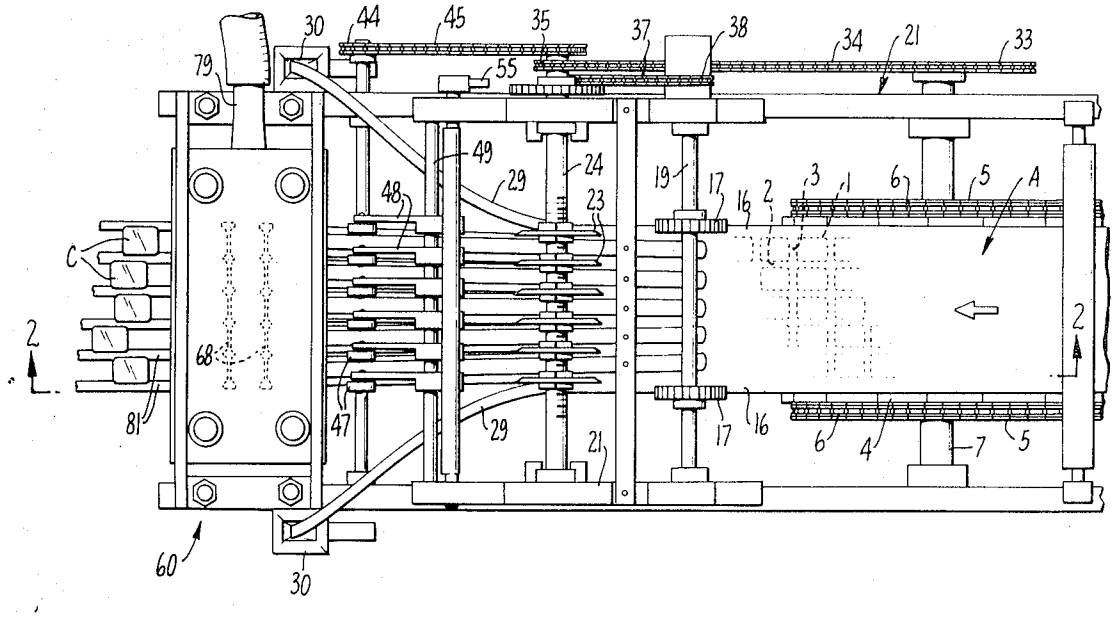
Primary Examiner—J. M. Meister

Attorney—Mark Mohler et al.

[57] **ABSTRACT**

Apparatus for separating filled and covered cavities that are formed in alignment in spaced transverse and longitudinally extending rows in a sheet of plastic with planar webs of said sheet and cover extending around and connecting said cavities and for also rounding the corners of the webs. The apparatus is a combination of knives for bisecting the webs connecting said cavities in a direction longitudinally of said rows without removing material of the longitudinally extending webs and bisecting the webs that extend between the transversely aligned rows by die cutting a thin strip between adjacent transversely extending rows and also the portions at the intersections between transversely extending rows and transversely extending webs to form the rounded corners on the webs of the individual portions.

14 Claims, 11 Drawing Figures



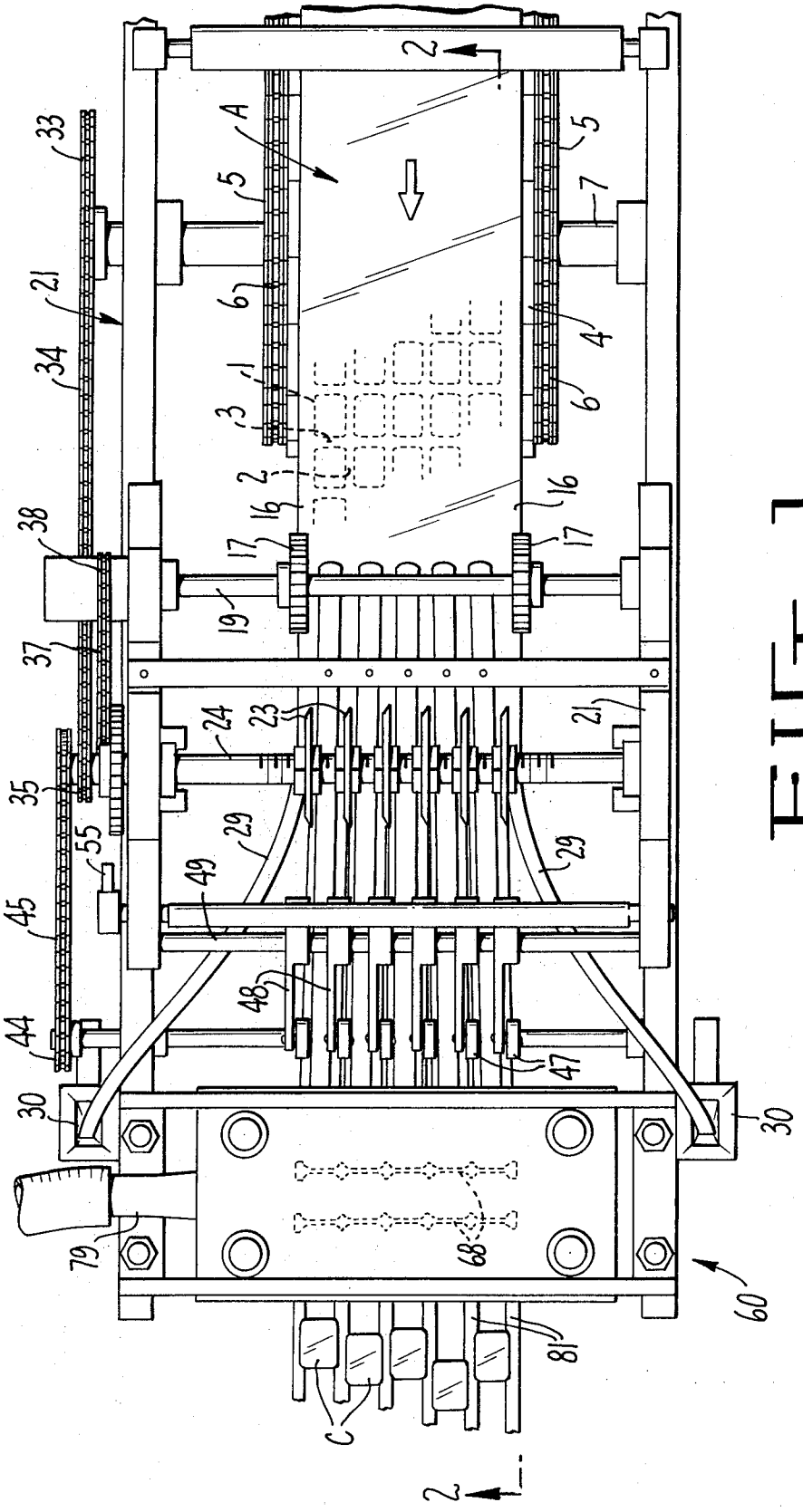


FIG. 1.

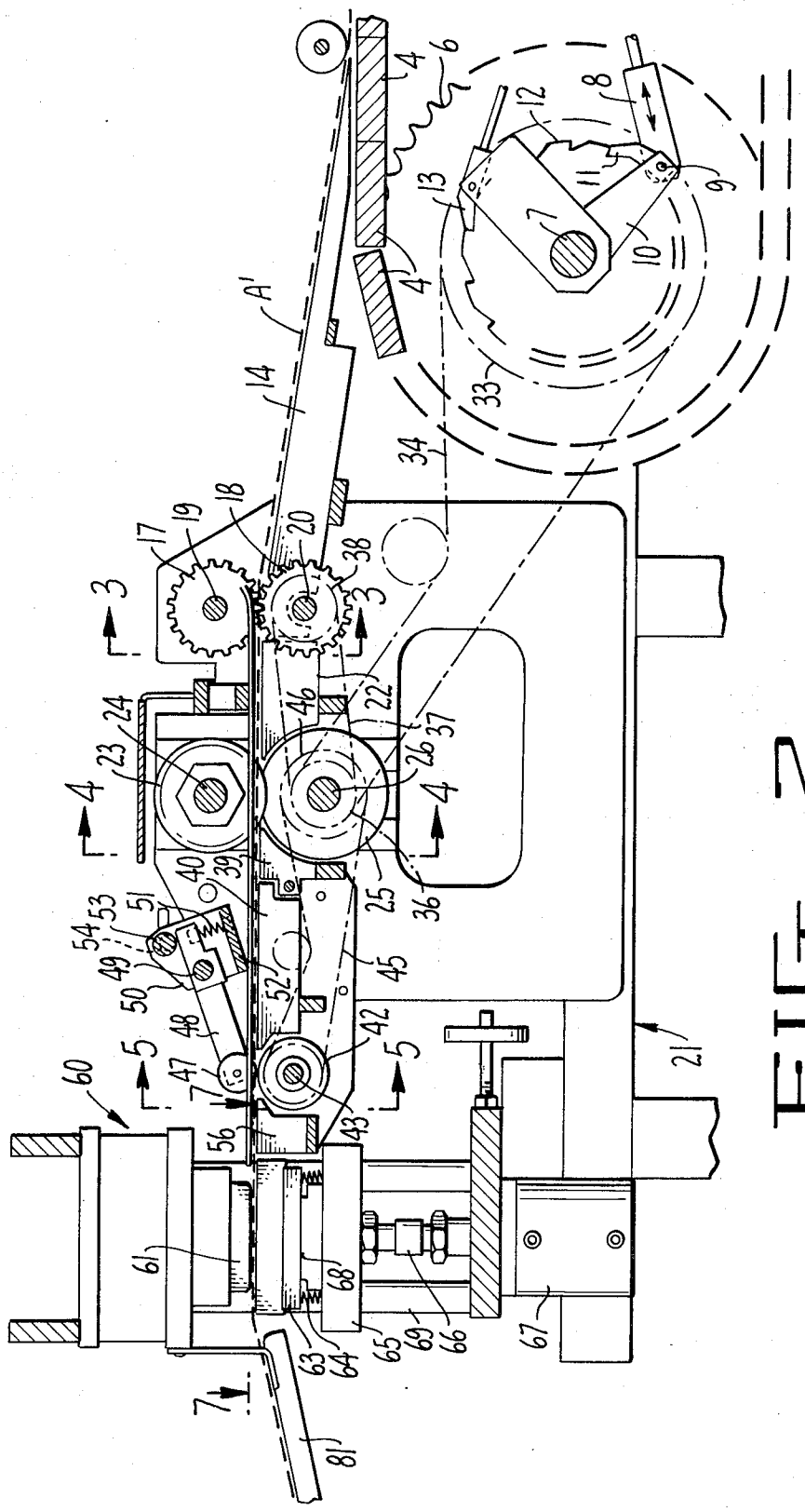


FIG. 2.

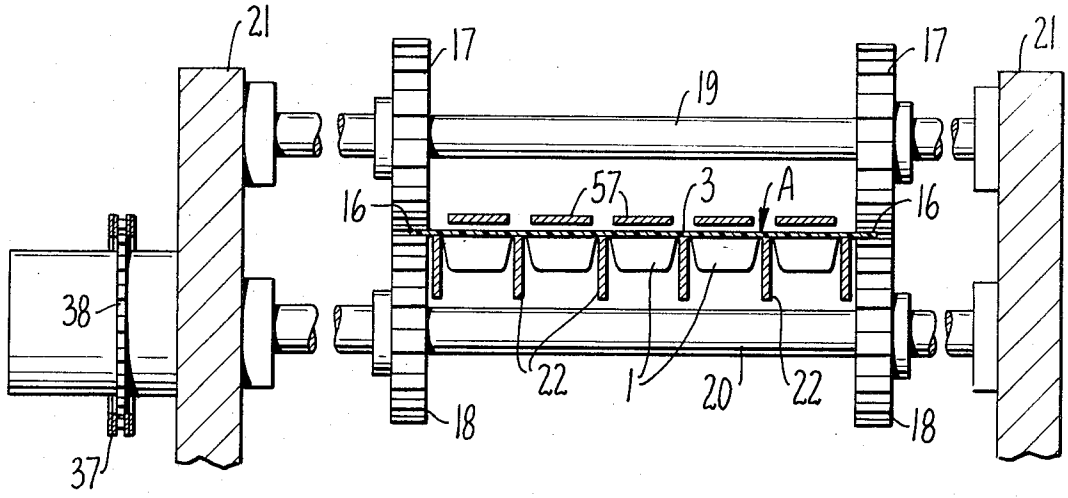

21
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17
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57
3
A
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38
22
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22
18
18
37

FIG. 3.

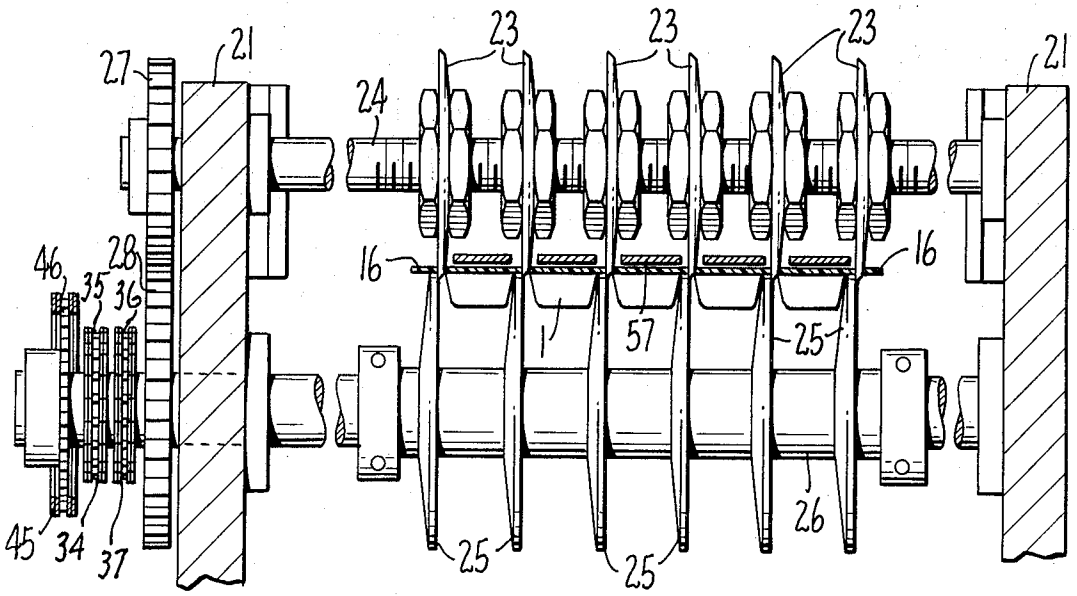

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FIG. 4.

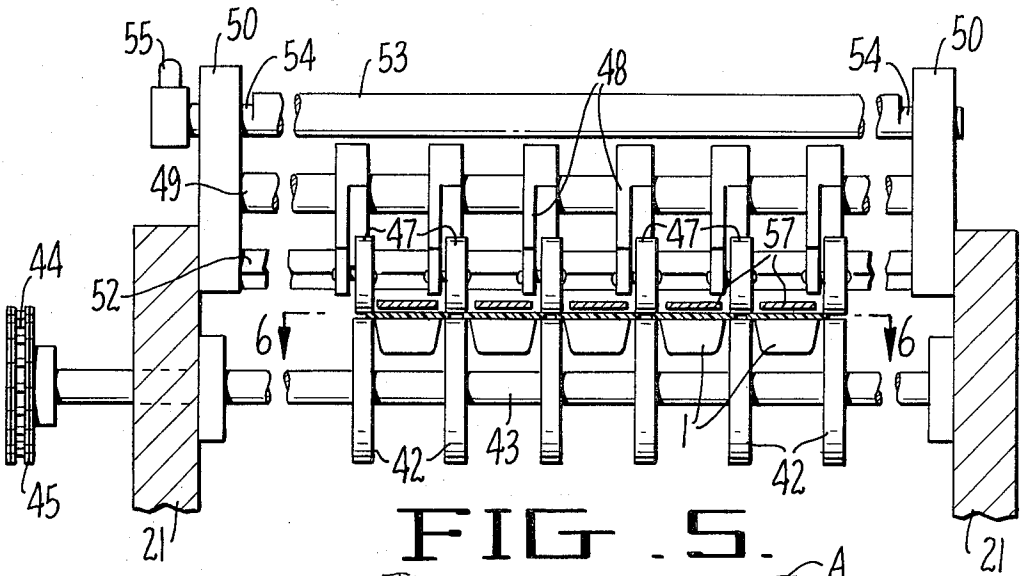

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FIG. 5.

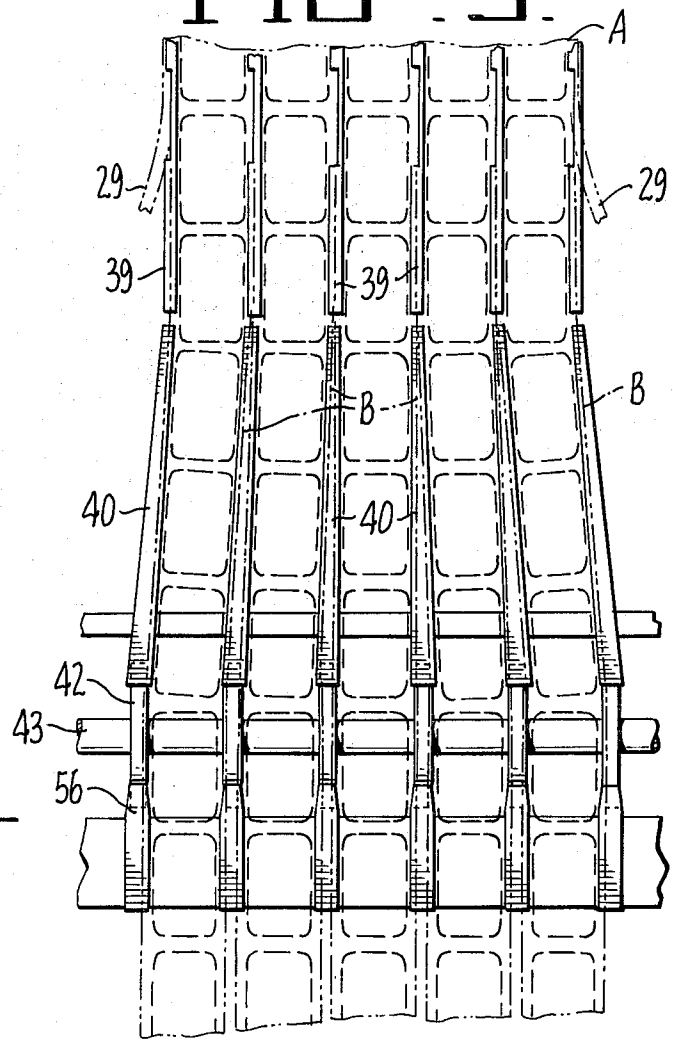

A
29
29
39
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B
B
40
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42
43
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FIG. 6.

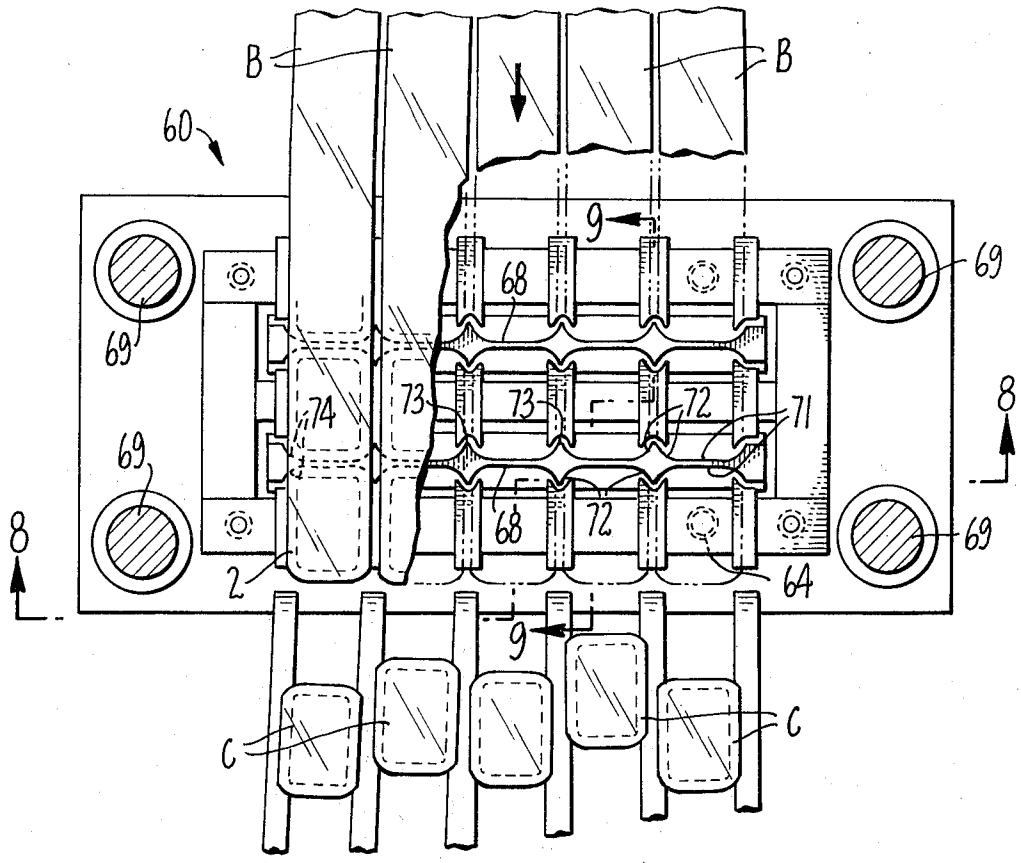

B
B
60
9
68
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72
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2
64
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C
C

FIG. 7.

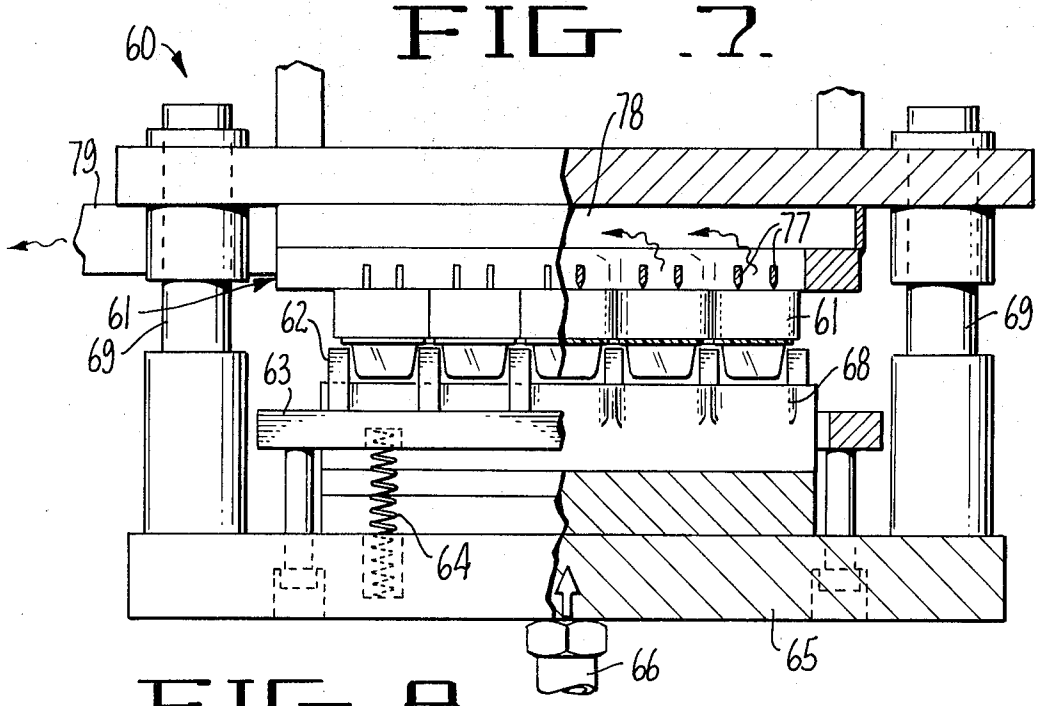

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FIG. 8.

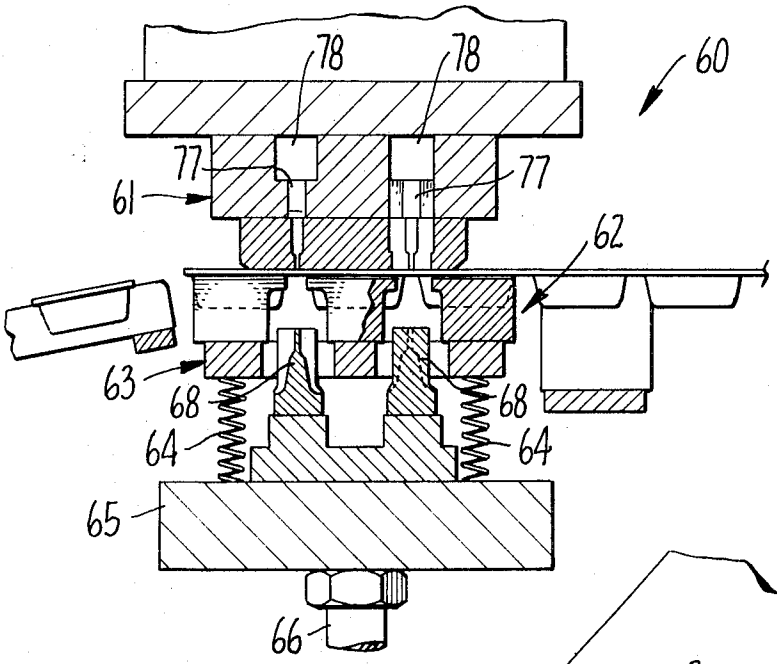


FIG. 9

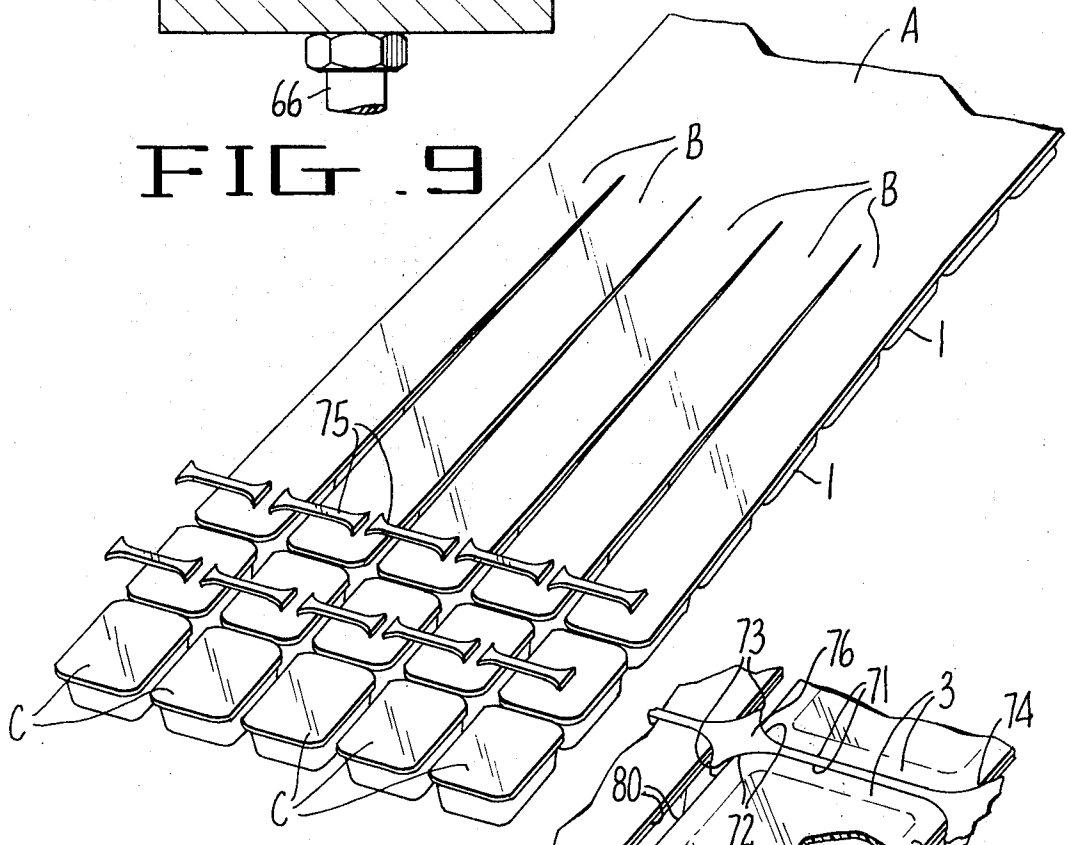


FIG. 10.

FIG. 11.

PACKAGE SEPARATOR AND CORNER CUTTING DIE FOR INDIVIDUAL PORTIONS, AND METHOD

SUMMARY

In U.S. Letters Pat. Ser. No. 208,178 filed Dec. 15, 1971, by Konrad E. Meissner, et al., individual filled and covered substantially rectangular packages were formed which packages were stamped from an elongated, continuous sheet of plastic material. The dies for stamping out the individual packages were rectangular in outline, and each individual package was one of a plurality of parallel spaced rows of cavities extending longitudinally of the sheet with the cavities of the rows in alignment at right angles to length of the sheet providing transversely extending rows. The cutting dies stamped out rectangular portions of the webs substantially equally spaced around the cavities with rounded corners on the webs. The waste or scrap resembled a lattice-work sheet with rectangular openings, that were elongated longitudinally of the sheet, as the cavities were elongated in a direction lengthwise of the sheet.

The dies for stamping out the individual packages were relatively difficult to make and were costly, and webs between the cavities were relatively wide both longitudinally and transversely of the sheet to provide sufficient material to leave planar web portions of adequate width for providing a secure sealing surface for the cover of the packages.

Attempts to save material of the sheet and to simplify the cutting by use of cutting knives for bisecting the longitudinally and transversely extending webs along lines extending longitudinally of the longitudinally extending webs and at right angles thereto along the transverse webs resulted in individual packages with sharp corners, which was found to be highly objectionable.

In the present method, the continuous, elongated package-sheet having the filled and covered rectangular cavities with the planar longitudinally and transversely extending webs, is intermittently moved in one direction longitudinally of the sheet, and of the longitudinally extending webs, and the latter are bisected longitudinally thereof during said movement by circular cutting knives at a cutting station, to form longitudinally extending strips of packages. Each of these will be designated a "package strip" to distinguish from the uncut "package-sheet". The cuts made by the knives are along single lines, hence no material is removed. The cavities in each of the package strips are connected by the transversely extending webs, and said package strips remain integrally united with the package sheet.

Following the cutting by said knives, the package strips are progressively moved apart to space them from each other, and thereafter a narrow strip is punched out of the transversely extending webs by elongated dies having divergent arcuately extending cutting edges extending into the spaces between the package strips for forming the curved corners of the webs at the junctures between the longitudinally and transversely extending webs that are continuous around each of the cavities. Each die separates each transversely extending row of packages, or cavities, and at its opposite ends, each die has divergent arcuate cutting edges that extend beyond the outermost marginal along the outermost package strips so that all of the webs around the cavities of the outermost strips will have rounded corners.

One of the objects of the invention is the provision of an improved method and apparatus for forming separated, individual, substantially rectangular, filled, plastic packages from a multiple thereof that are integrally united by planar webs of said plastic, with minimum waste, and which individual packages when separated each have planar web portions projecting therefrom and extending therearound with rounded corners at the corners of each package.

Another object of the invention is the provision of apparatus for more economically forming individual, rectangular packages from a continuous, elongated sheet having rows of filled and covered cavities in parallel rows extending longitudinally of said sheet and connected by longitudinally extending planar webs, and which individual packages when separated include continuous parts of said web around each cavity with said web portions rounded at the corners of the cavities with substantially no loss of web material from said longitudinally extending webs.

A still further object of the invention is the provision of a machine and method for forming individual rectangular packages from integrally connected packages in a sheet of plastic in a more economical and accurate manner, than heretofore, including the forming of rounded corners on coplanar continuous webs extending around and integral with each rectangular package.

Other objects and advantages will appear in the description and drawings.

DESCRIPTION OF DRAWINGS

In the drawings, FIG. 1 is a top plan view of the apparatus, with certain hidden structure indicated in broken lines.

FIG. 2 is a cross-sectional view along line 2—2 of FIG. 1.

FIG. 3 is an enlarged cross-sectional view along line 3—3 of FIG. 2.

FIG. 4 is an enlarged cross-sectional view along line 4—4 of FIG. 2.

FIG. 5 is an enlarged cross-sectional view along line 5—5 of FIG. 2.

FIG. 6 is a fragmentary top plan view of the supporting rails for the package sheet and for the package-strips, the sheet and strips including the cavities therein being indicated in broken lines.

FIG. 7 is a fragmentary view approximately along line 7—7 of FIG. 2 in which the package-strips are broken away from a portion to show the punch elements and strippers in elevation.

FIG. 8 is a part sectional, part elevational view along line 8—8 of FIG. 7.

FIG. 9 is an enlarged cross-sectional view along line 9—9 of FIG. 7 at different points through the die and punch.

FIG. 10 is an isometric semi-diagrammatic view of the package-strips and package sheet showing the transversely extending pieces cut out to separate the package strips into individual packages having rounded corners.

FIG. 11 is an enlarged isometric view of an individual package showing the cutting edges of the punch elements for separating the packages from the package-strip.

DETAILED DESCRIPTION

The term "package sheet" refers to the continuous, elongated film sheet A having filled cavities 1 formed therein including a continuous, elongated planar cover sheet extending over the contents within the cavities and adhered to the coplanar web portions around and extending between the covered open sides of the cavities (FIG. 1).

Cavities 1 are in a plurality of rows extending longitudinally of the package sheet, and the cavities in said rows are in alignment in rows extending transversely of the sheet. The web portions between the longitudinally extending rows of cavities are designated 2, and the web portions extending between the cavities of the transversely extending rows are designated 3. The cavities themselves are rectangular in outline and of the same size, and the web portions are coplanar and continuous around and between the adjacent corners of the cavities.

In U.S. application for Letters Pat., Ser. No. 208,178, filed Dec. 15, 1971 by Konrad E. Meissner et al., apparatus is shown and described for making the above-described package sheet, which is also shown and described.

In FIG. 1 is indicated mold forms 4 connected with sprocket chains 5 (FIG. 1) that extend around sprockets 6 on a shaft 7. The package sheet is carried by the mold forms 4, and said sheet is intermittently advanced by reciprocation of a rod 8 (FIG. 2) that is connected at one end with a crank on a power driven shaft (not shown).

The other end of the rod 8 is pivotally connected by a pivot 9 with the outer end of an arm 10, the inner end of which is rotatable on shaft 7. A pawl 11 supported on pivot 9 at its inner end and the outer ratchet engaging end is yieldably urged into engagement with a tooth on a ratchet wheel 12. Ratchet wheel 12 is secured on shaft 7 and upon reciprocation of rod 9 in one direction the sprocket wheels 6 will be rotated to move the mold forms 4 and the package sheet to the left as seen in FIG. 2. A holding pawl 13 holds the ratchet wheel advanced during return of pawl 11 to engage the next tooth. Each mold form normally has two adjacent transverse rows of openings in which cavities 1 are formed, although there may be more, or less. The length of each driving stroke of pawl 11 is sufficient to drive the package sheet forwardly a distance equal to portion of the package sheet having the number of transverse rows in each mold form.

In FIG. 1 the package sheet A is shown, and in FIG. 2 the coplanar web portion with which this invention is particularly concerned is indicated at A'.

Package sheet A is supported for upward movement out of mold forms 4 on parallel rails 14 of a transversely extending row thereof that are below, and engaged by the undersides of webs 2.

The foregoing arrangement and structure is all shown in the U. S. application hereinbefore mentioned.

The words "forward," "forwardly," "rear," and "rearwardly" and words of similar connotation are used with respect to the direction of movement of the package sheet, which is from right to left as viewed in FIG. 1, 2.

At the upper end of the row of rails 14 and outwardly of the end rails, the longitudinally extending marginal portions 16 (FIG. 1) of the package sheet A extend between the teeth of superposed pairs of gears 17, 18, the gears 17 being uppermost in each pair. The teeth of gears 17, 18 partially intermesh whereby marginal portions 14 will be tightly gripped between the gears (FIG. 3).

Gears 17 are secured on a shaft 19 and gears 18 are secured on a shaft 20. Bearings on a stationary frame 21 support said shafts for rotation.

Rail sections 22 (FIG. 2) extend horizontally forwardly of the upper ends of rails 14, and webs 2 of the package sheet A are supported on said rails after leaving gears 17, 18. These rails are between the longitudinally extending rows of cavities 1 and are supported on cross members of frame 21.

Adjacent the forward ends of the rail sections 22, and above the package sheet A, is a horizontally extending row of spaced circular cutting knives 23 (FIGS. 2, 4) on a horizontal shaft 24 that is supported at its ends on bearings on frame 21. The lower edges of knives 23 extend vertically across the path of travel of the longitudinally extending webs 2 of the package sheet A substantially centrally between the longitudinally extending rows of filled cavities 1, except for the end knives of the row. The end knives are spaced outwardly of the longitudinally extending end rows for trimming the marginal portions 16 of the package strip to leave web portions along the outer rows of cavities equal to those left after bisecting web portions 2 longitudinally thereof.

The knives 23 are bevelled on one of their corresponding sides around their outer peripheries (FIG. 4) and the flat sides opposite the bevels below the webs 2 are in lapping, face-to-face engagement with one of the flat lateral sides of circular discs 25. The discs 25 are in a row parallel with knives 23 and supported on a shaft 26 that is spaced below said package strip A. Shaft 26 is rotatably supported in bearings on frame 21. The webs 2 and marginal portions 16 of the package strips are supported on upper outer peripheries of discs 25.

Gears 27, 28 (FIG. 4) respectively on shafts 24, 26 have their teeth in meshing relation connecting the knives 23 and discs 25 for rotation and movement of their lapping portions in a forward direction. The gear 28 is the driven gear and is of larger diameter than gear 27, hence the knives rotate at a relatively higher rate than discs 25.

From the foregoing it is seen that the knives 23 bisect the web portions 2 longitudinally of the package sheet and trim the marginal portions 16 with a shearing action, and the package sheet is accordingly cut into a plurality of package-strips B. The trimmed off marginal portions 29 (FIG. 1) are deflected laterally away from the outer strips B and are conducted into receptacles 30 where they are collected.

Power driven shaft 7 has a sprocket wheel 33 thereon that is connected by a chain 34 (FIGS. 1, 2) with a sprocket wheel 35 on shaft 26 (FIG. 1) driving discs 25.

A sprocket wheel 36 on shaft 26 is connected by a chain 37 (FIG. 2) with a sprocket wheel 38 on shaft 20 driving the lowermost gears 18 of the margin engaging gears 17, 18.

Forwardly of, and adjacent discs 25, is a row of relatively short web supporting rails 39 that are in longitudinal alignment with rail sections 22.

Forwardly of rail sections 39 are rail sections 40 that are progressively wider and extend divergently forwardly from rail sections 39. As the separated package

strips B are driven forwardly, the web portions 2 that have been bisected by knives 23, are progressively moved apart (FIG. 6). Said web portions on each package-strip still ride on rails 40, including the end rails, which are outermost of the outer strips, and they support and guide the said web portions over the flat, radially outwardly facing relatively wide, outer peripheral surfaces of draw rollers 42 (FIGS. 2, 5). Draw rollers 42 are on a shaft 43, and a sprocket wheel 44 on the same shaft (FIGS. 1, 2) is connected by a chain 45 with a sprocket wheel 46 on shaft 26.

Positioned over the draw rollers 42 are hold-down rollers 47 respectively supported for rotation on the forward ends of arms 48 that, in turn, are rotatably supported adjacent their rear ends on a transversely extending shaft 49. The ends of shaft 49 are supported on members 50 that are rigid on frame 21.

An expansion spring 51 reacts between the rearwardly projecting end of each arm 48 and a transversely extending plate 52 that is rigid with stationary members 50 to yieldably urge rollers 47 toward the draw rollers 42 for frictionally gripping the web 2 between the hold down rollers and the draw rollers 42.

The draw rollers 42 are power rotated at a faster rate than strips B are driven by gears 17, 18 hence the frictional engagement between rollers 42 and the webs 2 of the package strips B maintains a tension on the portions of said strips and the package sheet that is between the draw rollers and gears 17, 18.

A rod 53 extends across the rearwardly projecting ends of arms 48, and the ends of said rods eccentrically supported at 54 (FIG. 2) on members 50. A handle 55 on one of the eccentrically supported ends of rod 53 provides means for rotating the rod to lower the same to effect lowering of said rearwardly projecting ends of arms 48 and elevating of the hold down rollers 47 off the webs 2 to enable threading the webs past the draw rollers or to release the webs.

Rails 40 terminate at their forward ends adjacent the draw rollers 42. Short rail sections 56 are supported on a cross member rigid on frame 21 in positions extending between the draw rollers 42 and the cutting station 60, strips 57 extend over the cavities 1 from the driving gears 17, 18 to the cutting station.

With each forward movement of the package sheet A and package-strips B, the latter will be moved longitudinally thereof to positions between an upper stationary die member 61 that is rigid on frame 21 and a lower stripper member 62. And in this position the strips B are spaced apart by rails 40, 56 that are between the adjacent longitudinally extending rows of cavities 1 depending from the web portions 2 on the package strips (FIGS. 8, 9).

The lower stripper member 62 includes a horizontally disposed frame 63 rigid therewith, which frame is yieldably supported in an elevated position on springs 64. Springs 64, in turn, are supported on a vertically reciprocable punch carrying plate 65. Plate 65 is connected with the upper end of a plunger 66 extending upwardly from a hydraulic cylinder 67 (FIG. 2) for effecting reciprocable vertical movement of the punch plate and punchers thereon.

Upwardly projecting punch elements 68 (FIGS. 1, 7–9) extend parallel with and below the web portions 3 of the package strips B when the package strips are between the die member 61 and the punch elements 68. The female portion of the die member 61 faces the punch elements 68 and are of complementary outline whereupon upward movement of the punch elements upon actuation of the cylinder 67 will result in cutting strips out of the web 3 conforming to the contours of punch elements 68. Said plate 65 that carries elements 68 is supported on vertical posts 69 (FIGS. 2, 8) for vertical reciprocable movement.

In the present instance, as best seen in FIG. 9, there are two punch elements 68. These are horizontally elongated and extend at right angles to the direction of movement of the package strips. Said punch elements are parallel to each other and are spaced apart the distance from a point centrally of transverse web 3 at one side of a transverse row of cavities 1 to a point centrally between the web 3 at the opposite side of said row. The outline defined by the cutting edges of each punch, in top plan view is shown in FIGS. 7, 11 and the outline of the cutting edges of the overhead die as seen in broken lines in FIG. 1, is the same. At 71 (FIG. 11) said cutting edges are in spaced, parallel, side-by-side relation where they extend across the web 3 between adjacent pairs of cavities 1 up to point spaced from the longitudinally extending edges of the webs 2 of the package strips B. At said points the cutting edges extend arcuately oppositely outwardly at 72 meet approximately midway of the space between the webs 2 of the adjacent package strips as at 73. The end portion of each punch element has arcuately outwardly extending cutting edges 74 (FIG. 11) that extend beyond the outer webs 2.

The arcuately extending edges 72, 73 of the punch elements and die will both separate the longitudinally extending package strips B into separate packages C and will form the curved corners on the webs of the packages. The waste strips 75 (FIG. 10) will be cut from the package strips and will be forced upwardly into and through the die 61 against the cutting edges of the cutting blades 77 (FIG. 8) that extend across the strips 75 at points adjacent the projections 76 on said strips.

The cutting blades 77 will thus cut each strip 75 into three pieces, which are moved into a suction chamber 78 (FIGS. 8, 9) from which they are withdrawn through a suction line 79 (FIG. 8) opening into said chamber.

Strippers 62 on frame 63 yieldably engage the web portions 2 of the package strips B to hold the separated packages against retraction with the punch elements, and to strip them from the strips 75.

Referring again to FIG. 11, it is seen that the arcuately extending cutting edges 72 of the punch elements extend into space 80 between the web portions 2 on package strips B. Any attempt to make perfectly radius corners without extending the cutting edges 72 into the space, would result in a sharp spur being left on the webs at one side or the other of each of the longitudinal cuts dividing the package sheet A into the package strips B in the event the strips B were offset laterally relative to the dies to the slightest degree. However, by spacing the strips A and extending the arcuately extending cutting edges into the space, the positions of the package strips B relative to the arcuate cutting edges 72 is readily controlled so the spurless arcuate or curved corners are formed within a permissable degree of offset.

The individual packages C, after being separated by the corner cutting dies and moved forwardly by the next forward movement of the package strips B, will be

supported on downwardly inclined rails 81 for movement to a remote point for packing and for storage or shipment. The rails 81 are below the web portions 2 of the individual packages C (FIG. 1).

From the foregoing description it is seen that none of the material of webs 2 is removed, except the negligible portions at the corners of the packages, hence the cavities 1 may be closer together, leaving the same width of webs 2 on the individual packages C as previously.

Also the making of the punch elements and the die complementary thereto is simplified and the removed strips 75 and marginal portions 29 are readily carried away, where heretofore a separate cutting mechanism was required for cutting up the scrap, after the individual portions or packages were completed, in the present instance, the scrap is cut up and carried away by the time the individual packages have been discharged from the die cutter that separates the package strip into separate packages.

We claim:

1. In the method of separating into separate, individual packages a continuous, elongated package sheet having parallel, spaced rows of filled and covered cavities arranged longitudinally of said package sheet in side-by-side relation with said cavities comprising packages equally spaced apart and in alignment at right angles to said rows providing transversely extending rows and which sheet includes longitudinally extending and transversely extending continuous, planar webs extending around the open sides of said cavities and a planar cover sheet extending across said open sides and sealed to said webs comprising the steps of:

a. supporting said package sheet for movement thereof longitudinally thereof in one direction successively to and past a web-bisecting station and a package-separating station and so moving said package sheet;

b. bisecting each of said longitudinally extending webs at said bisecting station along a single line during said movement to form separate adjacent pairs of package strips each having a longitudinally extending row of filled and covered cavities connected by said transversely extending webs;

c. progressively spacing said package strips apart in the plane of said webs during movement of said package sheet and package strips in said one direction;

d. separating the packages of said package strips from each other at said package separating station by cutting out narrow strips of said transversely extending webs centrally positioned between adjacent pairs of cavities in each of said package strips along spaced lines extending normal to the lengths of said package strips and curved divergently away from each other at their end portions forming rounded corners on the web around each cavity at each corner of each cavity.

2. The method as defined in claim 1, that includes the steps of:

e. cutting at said package separating station each of the strips removed from said transversely extending webs into several smaller pieces simultaneously with the removal of subsequent strips from subsequent webs moved to said package separating station; and

f. conducting said several pieces along an enclosed path to a discharge point away from said cutting station upon each of said strips being cut into several pieces.

3. The method as defined in claim 1, in which said package sheet includes marginal portions along its longitudinally extending edges that are coplanar with and wider than the webs between the cavities of said rows:

e. cutting each of said marginal portions at said cutting station to a reduced width equal to substantially one half the width of said longitudinally extending webs simultaneously with bisecting said longitudinally extending webs; and

f. conducting the portions removed from said marginal portions oppositely outwardly from said package sheet to spaced collecting points, and collecting said removed portions at said points.

4. The method as defined in claim 1 that includes the steps of:

e. positively gripping said package sheet between opposed driving surfaces adjacent to but spaced from said cutting station before said sheet reaches said cutting station and at the same time frictionally gripping said package strips between friction surfaces permitting slippage of said surfaces relative to said package strips upon moving said friction surfaces in said one direction at a faster rate than said strips are moved by said driving surfaces; and

f. simultaneously driving said opposed driving surfaces and said friction surfaces in said one direction at their points of engagement with said package sheet and package strips with said friction surfaces moving at a greater speed than said driving surfaces at their said respective points of engagement whereby movement of said package strips from said gripping surfaces past said cutting station and to said separating station will be uniform and said package strips will be free from distortion.

5. In the method of separating into separate, individual packages a continuous, elongated package sheet having parallel, spaced rows of filled and covered cavities arranged longitudinally of said package sheet in side-by-side relation with said cavities comprising packages equally spaced apart and in alignment at right angles to said rows providing transversely extending rows and which sheet includes longitudinously extending and transversely extending continuous, planar webs extending around the open sides of said cavities and a planar cover sheet extending across said open sides and sealed to said webs, comprising the steps of:

a. supporting said package sheet for movement thereof longitudinally thereof in one direction successively to and past a web-bisecting station and a package-separating station and so moving said package sheet;

b. bisecting each of said longitudinally extending webs at said bisecting station along a single line during said movement to form separate adjacent pairs of package strips each having a longitudinally extending row of filled and covered cavities connected by said transversely extending webs;

c. separating the packages of said package strips from each other at said package-separating station by cutting out narrow strips of said transversely extending webs centrally positioned between adjacent pairs of cavities in each of said package strips along spaced lines extending normal to the lengths of said package strips and curved divergently away from each other at their end portions forming

rounded corners on the web around each cavity at each corner of each cavity;

d. positively gripping said package sheet between opposed driving surfaces adjacent to but spaced from said cutting station and at the same time frictionally gripping said package strips between friction surfaces permitting slippage of said surfaces relative to said package strips upon moving said friction surfaces in said one direction at a faster rate than said strips are moved by said driving surfaces; and

e. simultaneously driving said opposed driving surfaces and said friction surfaces in said one direction at their points of engagement with said package sheet and package strips with said friction surfaces moving at a greater speed than said driving surfaces at their said respective points of engagement whereby movement of said package strips from said gripping surfaces past said cutting station and to said separating station will be uniform and said package strips will be free from distortion.

6. In the method of separating into separate, individual packages a continuous, elongated package sheet having parallel, spaced rows of filled and covered cavities arranged longitudinally of said package sheet in side-by-side relation with said cavities comprising packages equally spaced apart and in alignment at right angles to said rows providing transversely extending rows and which sheet includes longitudinally extending and transversely extending continuous, planar webs extending around the open sides of said cavities and a planar cover sheet extending across said open sides and sealed to said webs, comprising the steps of:

a. supporting said package sheet for movement thereof longitudinally thereof in one direction successively to and past a web-bisecting station and a package-separating station and so moving said package sheet;

b. bisecting each of said longitudinally extending webs at said bisecting station along a single line during said movement to form separate adjacent pairs of package strips each having a longitudinally extending row of filled and covered cavities connected by said transversely extending webs;

c. separating the packages of said package strips from each other at said package-separating station by cutting out narrow strips of said transversely extending webs centrally positioned between adjacent pairs of cavities in each of said package strips along spaced lines extending normal to the lengths of said package strips and curved divergently away from each other at their end portions forming rounded corners on the web around each cavity at each corner of each cavity;

d. cutting at said package-separating station each of the strips removed from said transversely extending webs into several smaller pieces simultaneously with the removal of subsequent strips from subsequent webs moved to said package-separating station; and

e. conducting said several pieces along an enclosed path to a discharge point away from said cutting station upon each of said strips being cut into several pieces.

7. The method as defined in claim **6**, in which said package sheet includes marginal portions along its longitudinally extending edges that are coplanar with and wider than the webs between the cavities of said rows:

f. cutting each of said marginal portions at said cutting station to a reduced width equal to substantially one half the width of said longitudinally extending webs simultaneously with bisecting said longitudinally extending webs; and

g. conducting the portions removed from said marginal portions oppositely outwardly from said package sheet to spaced collecting points, and collecting said removed portions at said points.

8. Apparatus for separating into separate, individual packages a continuous, elongated package sheet having parallel, spaced rows of filled and covered cavities arranged longitudinally of said package sheet in side-by-side relation with said cavities comprising filled packages, equally spaced apart and in alignment at right angles to said rows providing transversely extending rows, and which sheet includes longitudinally extending and transversely extending, planar webs continuous at their junctures extending around the open sides of said cavities with a planar cover sheet extending across said open sides and the contents of said cavities and sealed to said webs:

a. supporting means for supporting said package sheet for movement longitudinally thereof in one direction along a path of travel;

b. moving means in engagement with said package sheet for so moving the latter along said path;

c. a row of spaced cutters extending transversely across path with each cutter supported in cutting engagement with said longitudinally extending webs at points spaced from the packages of said longitudinally extending rows thereof for separating said package sheet along single lines respectively at said cutters into longitudinally extending package strips upon said movement of said sheet in said one direction whereby a longitudinally extending row of said packages respectively connected with each other by a transversely extending web will be in each package strip after passing said cutters, with a portion of said longitudinally extending webs on each strip at opposite sides of the packages thereof;

d. cutting means extending transversely of said package strips spaced from said cutters in said one direction, actuatable for simultaneous movement into cutting engagement with the transversely extending webs of said package strip along lines spaced between adjacent pairs of packages of said package strip for separating the packages of said package strips into individual packages, and actuating means for so actuating said cutting means;

e. said cutting means including arcuately extending cutting edges for cutting rounded corners on the web portions extending around each of said packages at the juncture between said transversely extending web portions and said longitudinally extending web portions.

9. In apparatus as defined in claim **8**:

f. spacing means between said cutters and said cutting means for spacing said package strips apart at said cutting; and

g. said arcuately extending cutting edges of said cutting means extending into the spacer between said strips to insure cutting said rounded corners irrespective of slight displacement of said strips in the plane thereof relative to said cutting means.

10. In apparatus as defined in claim 8:

f. said cutting means comprising a die having pairs of straight, parallel cutting edges in side-by-side relation supported in positions for cutting a narrow strip of transverse web material from the transverse webs between the adjacent packages of said package strips to said juncture with said longitudinal web portions and said arcuate cutting edges being arcuate divergently extending continuations of said parallel straight cutting edges.

11. In apparatus as defined in claim 8:

f. said moving means including power driven web-gripping wheels positioned one above the other in vertically opposed relation at opposite sides of certain of said webs in anti-slipping gripping relation with the latter and supported for rotation about axes extending normal to the direction of movement of said package sheet; and

g. power means connected with said wheels for rotating them in a direction for so moving said package sheet at a predetermined rate of speed.

12. In apparatus as defined in claim 11:

h. said moving means further including friction wheels in pairs with one wheel of each pair above the other in vertically opposed relation at opposite sides of the web portions of said package strips in frictional engagement with said web portions, and supported for rotation about axes extending normal to the direction of movement of said package strips;

i. means for yieldably engaging one of the wheels of said pairs toward the other for application of pressure against the web portions between said pairs of wheels; and

j. power means connected with one of the wheels of said pairs for driving them in a direction for tending to drive said package strips in said one direction at a faster rate than the rate at which said package sheet and package strip is moved whereby the lengths of said package strips between said gripping wheels and said friction wheels will be held taut and free from distortion by said friction wheels.

13. Apparatus for separating into separate, individual packages a continuous, elongated package sheet having parallel, spaced rows of filled and covered cavities arranged longitudinally of said package sheet in side-by-side relation with said cavities comprising filled packages, equally spaced apart and in alignment at right angles to said rows providing transversely extending rows, and which sheet includes longitudinally extending and transversely extending, planar webs continuous at their junctures extending around the open sides of said cavities with a planar cover sheet extending across said open sides and the contents of said cavities and sealed to said webs:

a. supporting means for supporting said package sheet for movement longitudinally thereof in one direction along a path of travel;

b. moving means in engagement with said package sheet for so moving the latter along said path;

c. first cutting means supported at a point along said path and actuatable for approximately bisecting said longitudinally extending webs along straight parallel lines to form longitudinally extending separated package strips each including a longitudinally extending row of said cavities connected by said transversely extending webs and portions of said longitudinally extending webs along opposite sides of each longitudinal row of cavities;

d. second cutting means spaced from said first cutting means in said one direction simultaneously actuatable for approximately bisecting said transverse webs along parallel lines spaced between adjacent pairs of cavities in said package strips and arcuately divergent at their terminal ends across said portions of said longitudinally extending webs to thereby separate the package strips into individual packages each having a continuous web with straight edges with rounded corners; and

e. means for actuating said first cutting means and means for actuating said second cutting means for so cutting said longitudinally extending webs and said transverse webs.

14. In apparatus as defined in claim 13:

f. said moving means including positive web-gripping means in positive gripping relation with longitudinally extending webs of said package sheet, and driving means for actuating said web gripping means intermittently for intermittently moving said package sheet in said one direction past said first cutting means;

g. friction means in frictional engagement with longitudinally extending portions of the webs on said package strips between said first and said second cutting means and adjacent to the latter, said friction means being supported for movement in said one direction and driving means connected with said friction means for moving the latter in said one direction at an accelerated speed relative to said web-gripping means.

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