Nov. 18, 1969 P. MEISNER 3,478,489

CUP FILLING MACHINE AND ELEMENTS

Filed Feb. 15, 1967 10 Sheets-Sheet 1

FIG. 1

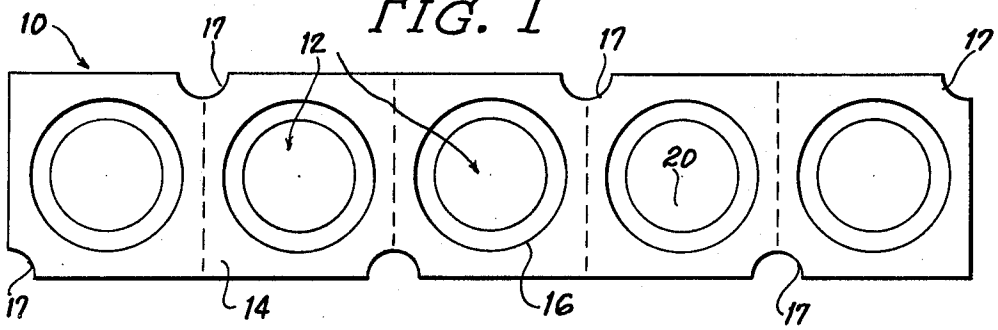


FIG. 2

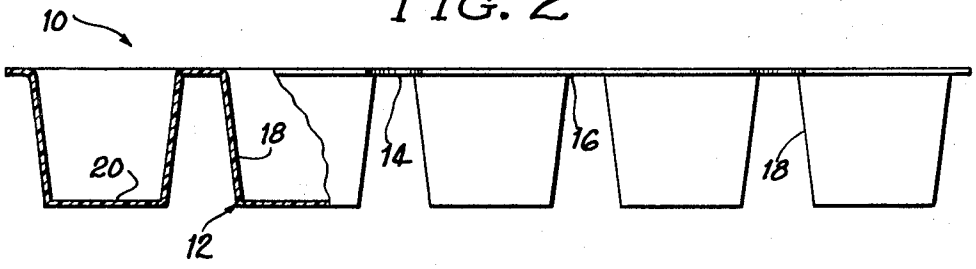
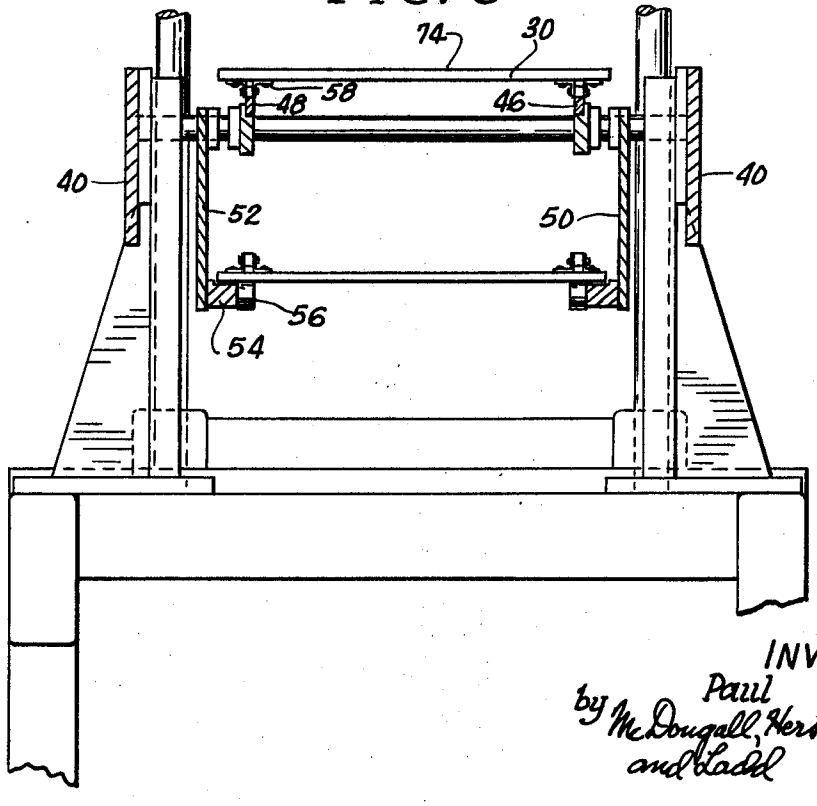


FIG. 6



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and Ladd
Attys

CUP FILLING MACHINE AND ELEMENTS

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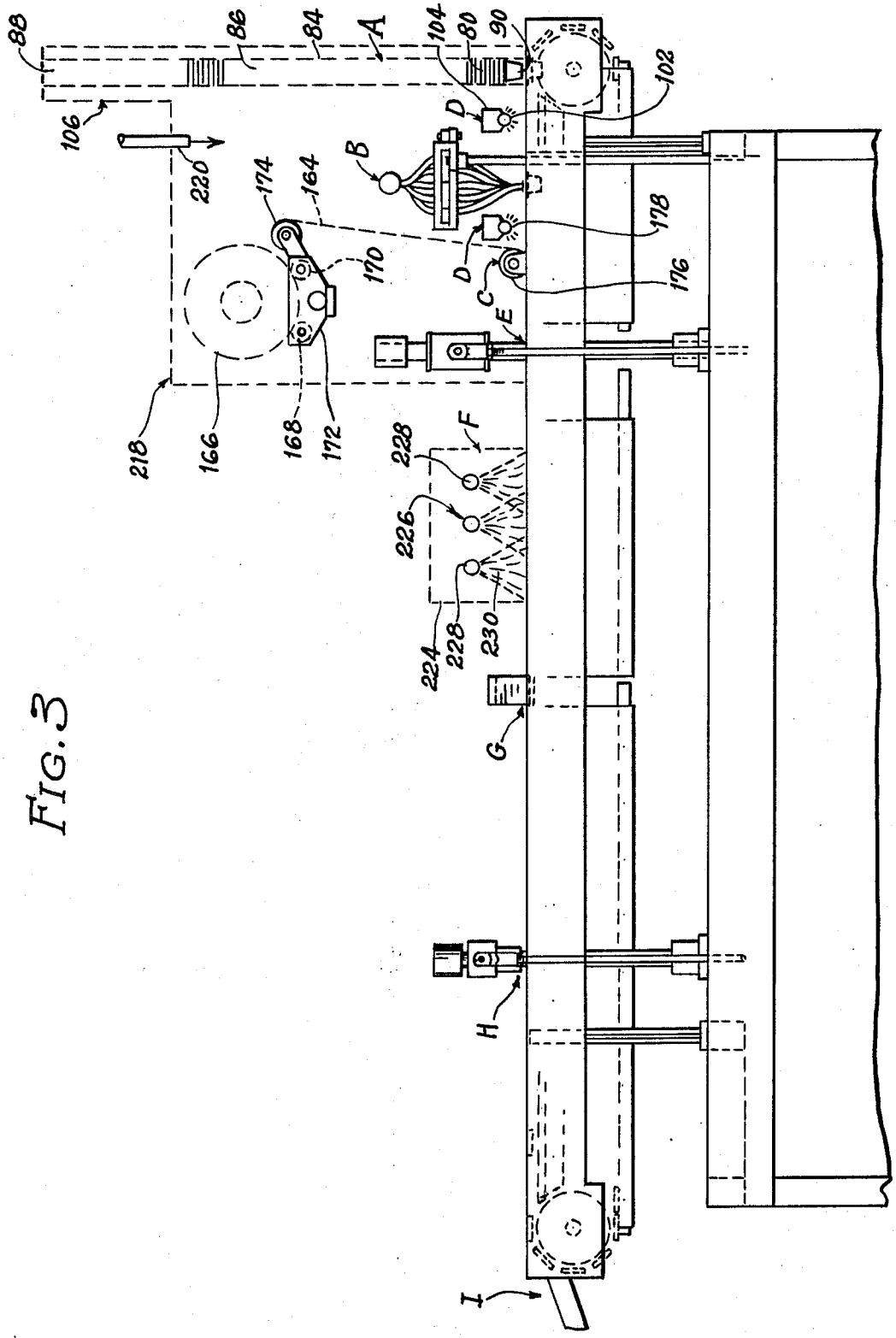


FIG. 3

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CUP FILLING MACHINE AND ELEMENTS

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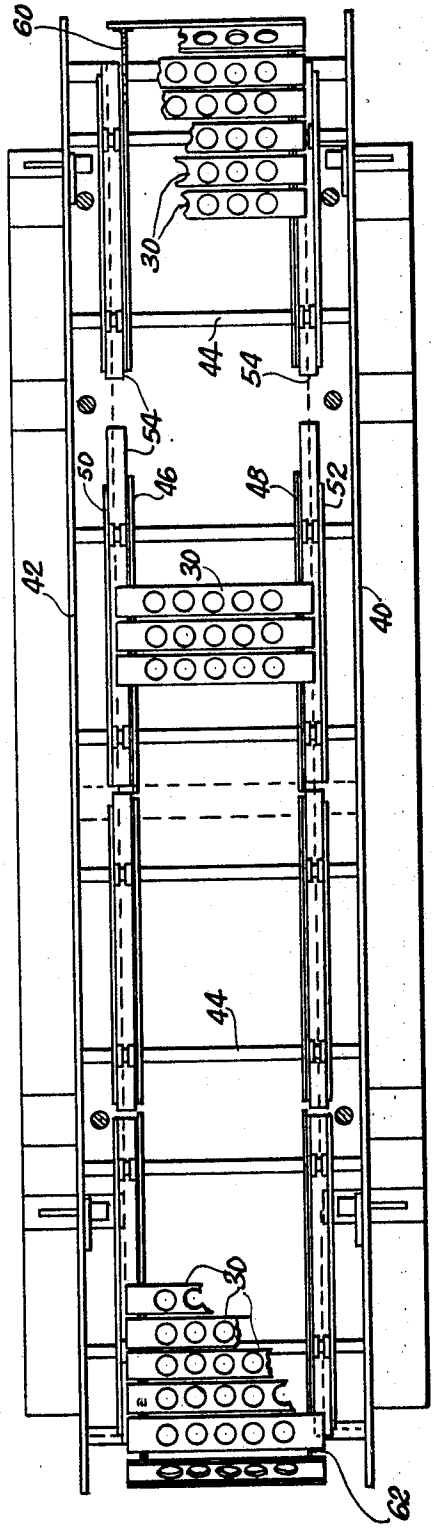


FIG. 4

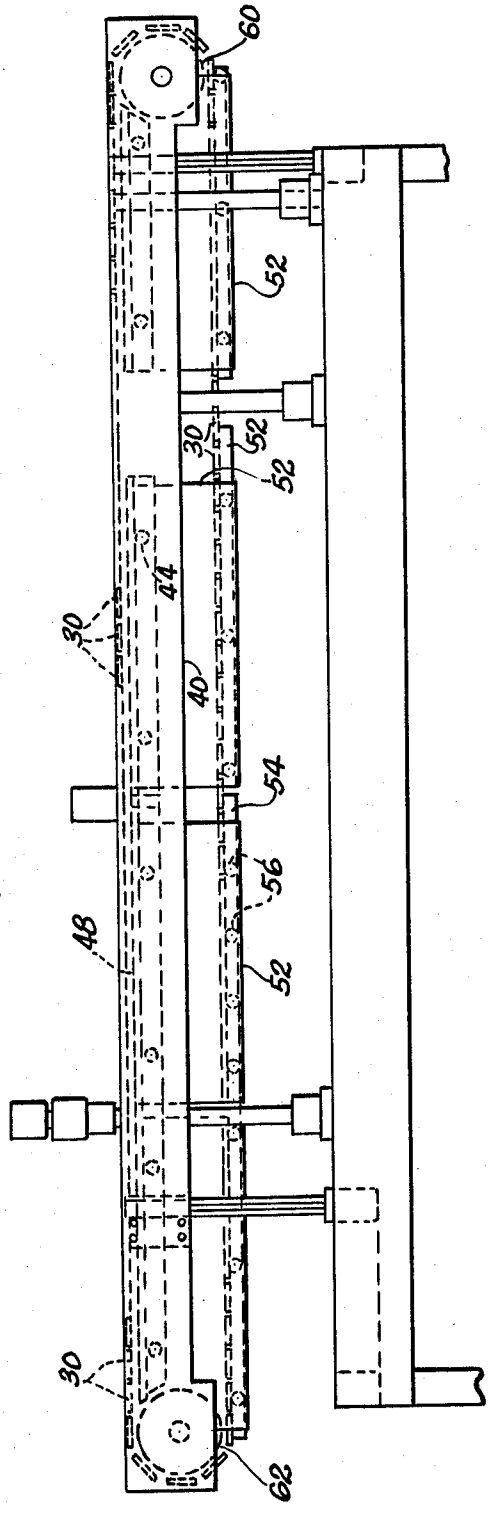


FIG. 5

CUP FILLING MACHINE AND ELEMENTS

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FIG. 7

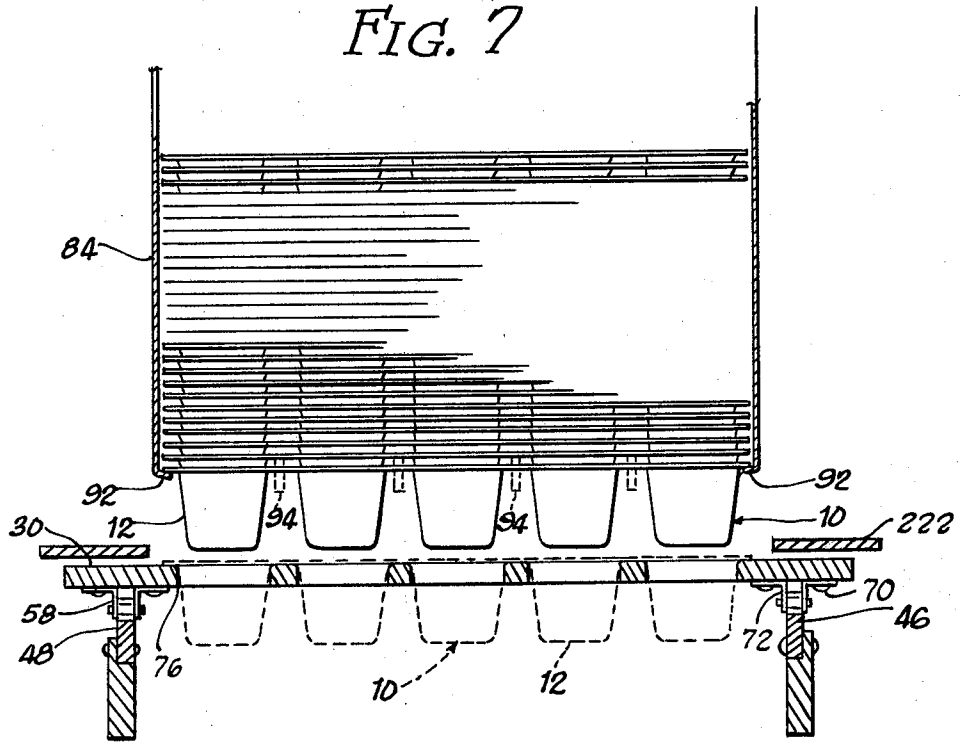


FIG. 8

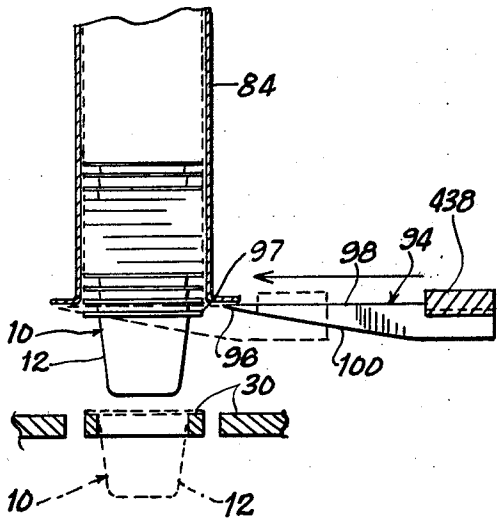
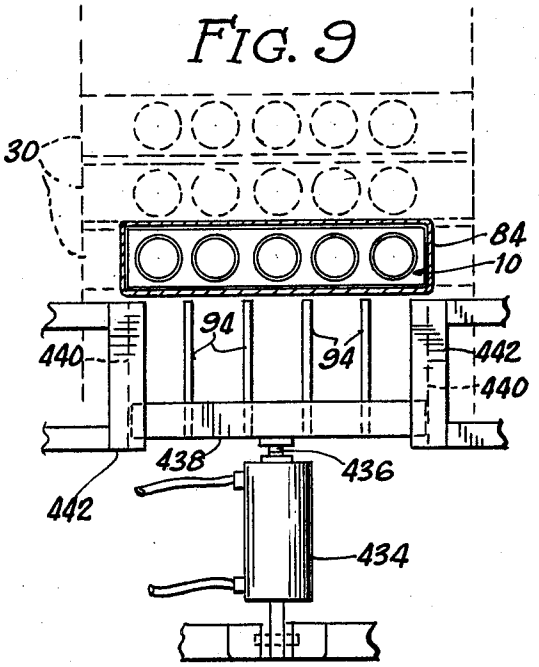


FIG. 9



CUP FILLING MACHINE AND ELEMENTS

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FIG. 10

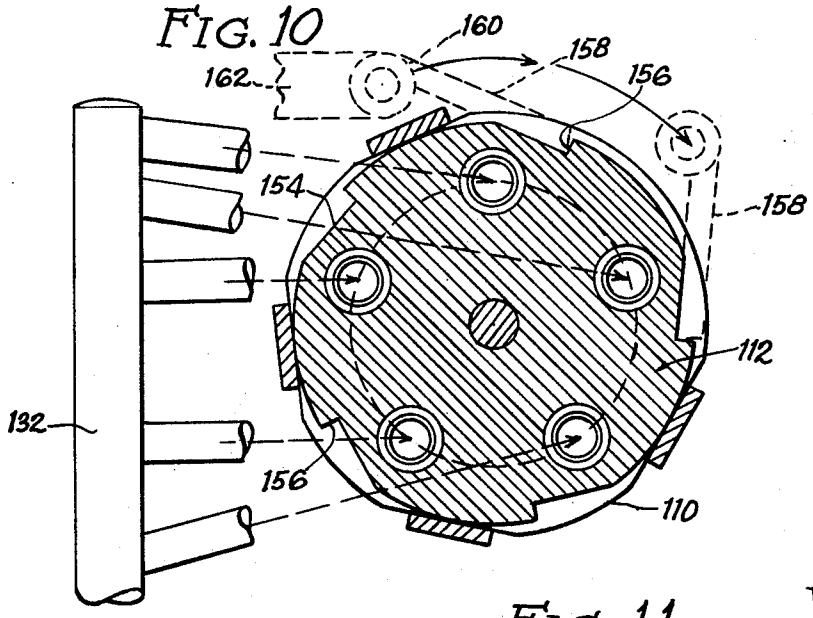


FIG. 12

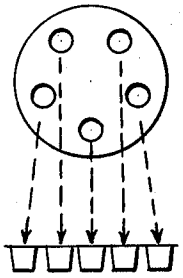


FIG. 11

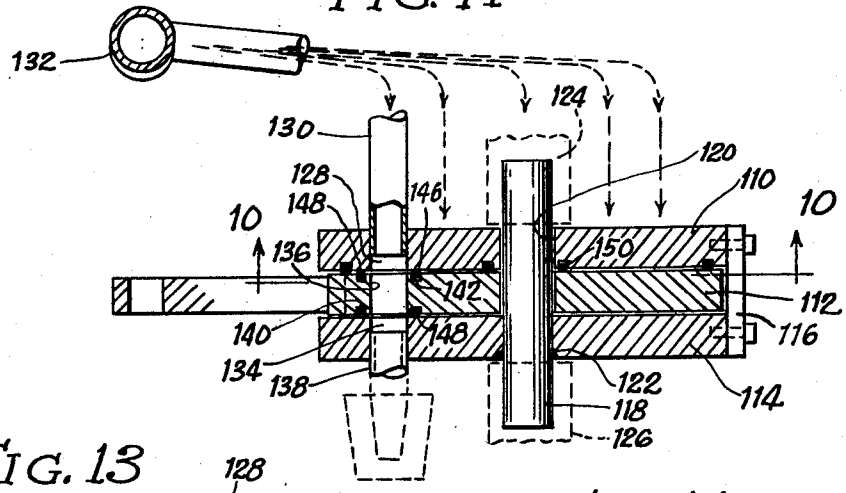


FIG. 13

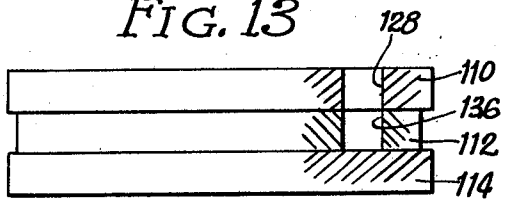
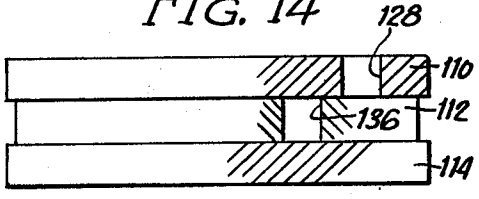


FIG. 14



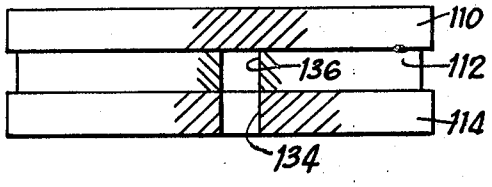


FIG. 15

CUP FILLING MACHINE AND ELEMENTS

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FIG. 18

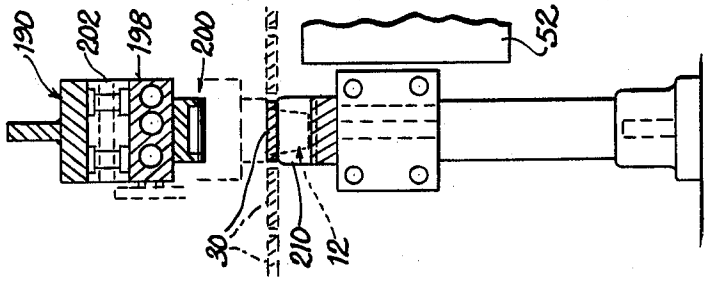


FIG. 17

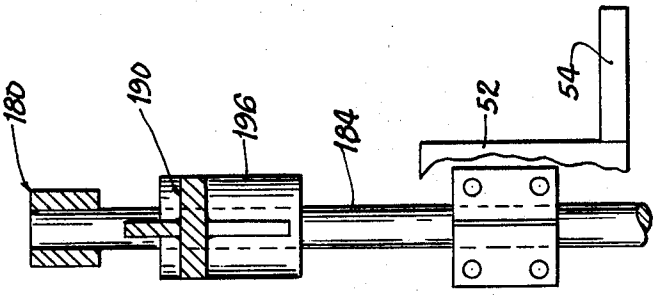
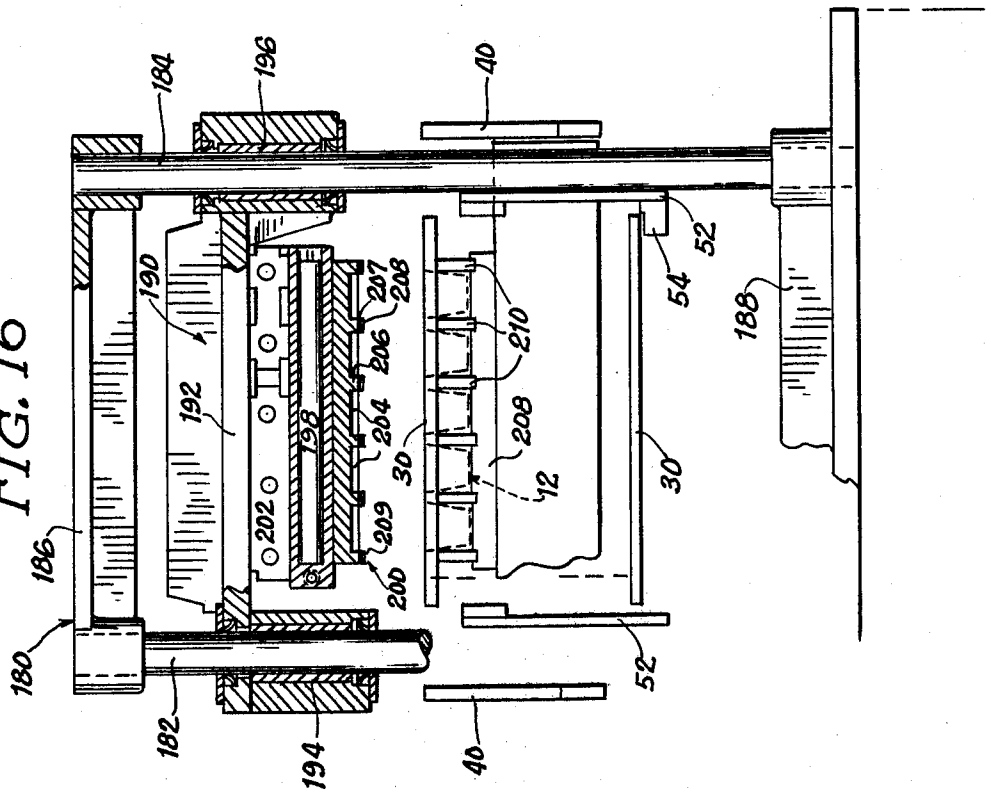


FIG. 16



CUP FILLING MACHINE AND ELEMENTS

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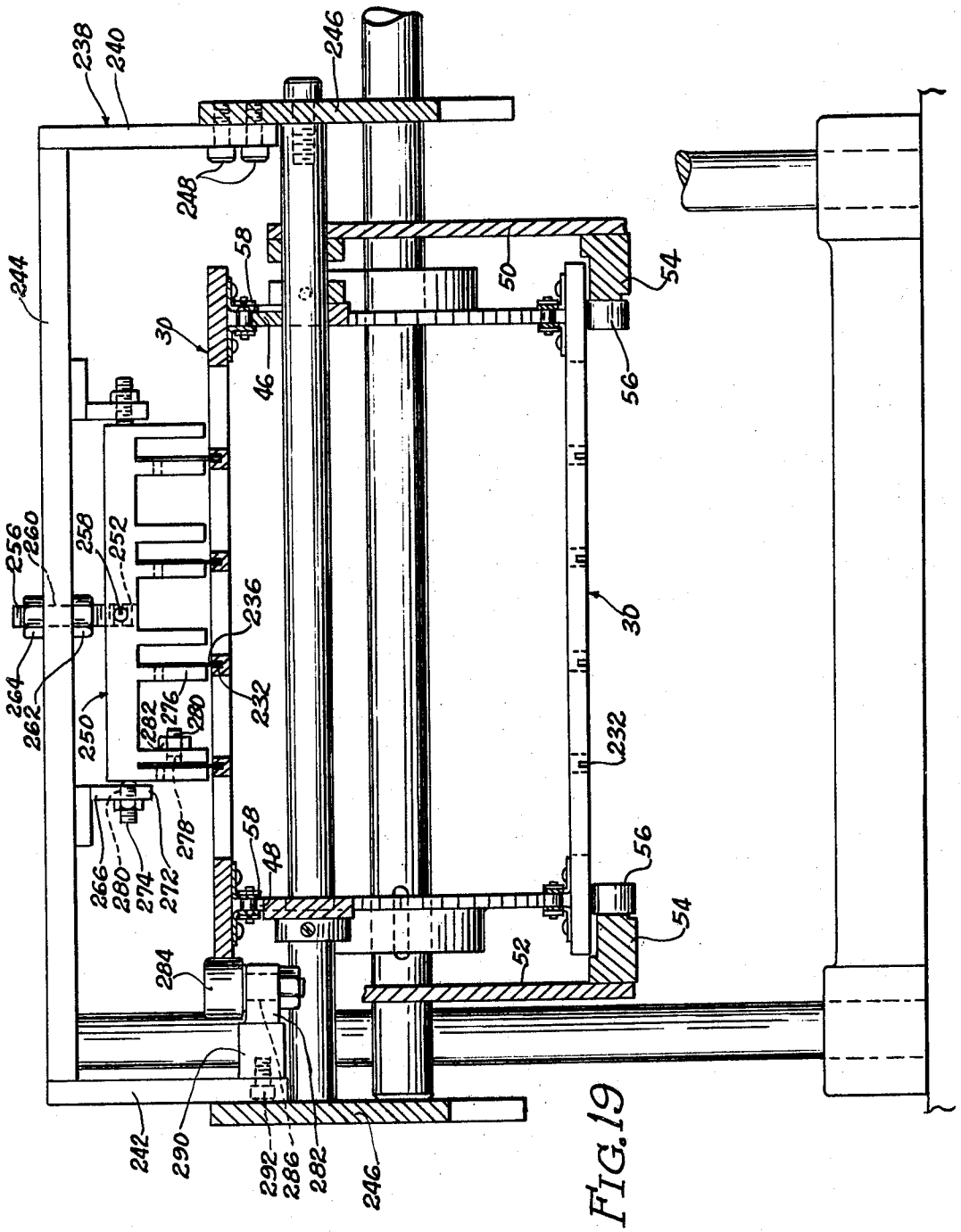
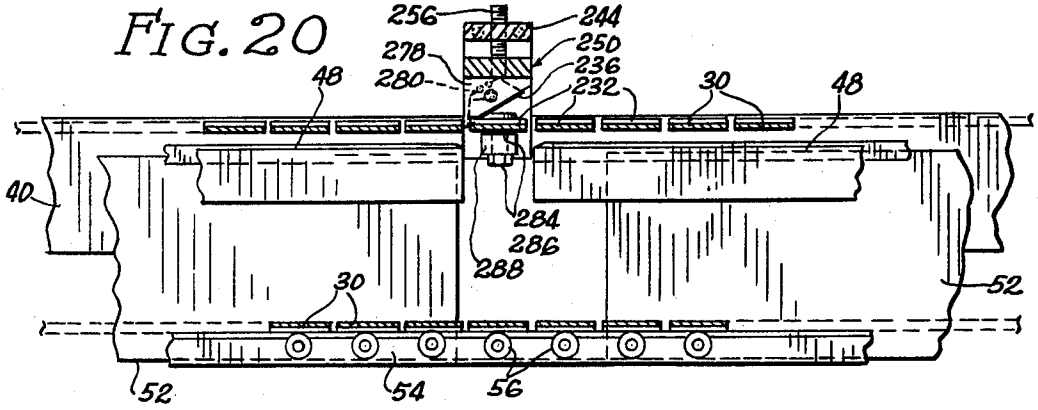


FIG. 19

CUP FILLING MACHINE AND ELEMENTS

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FIG. 20



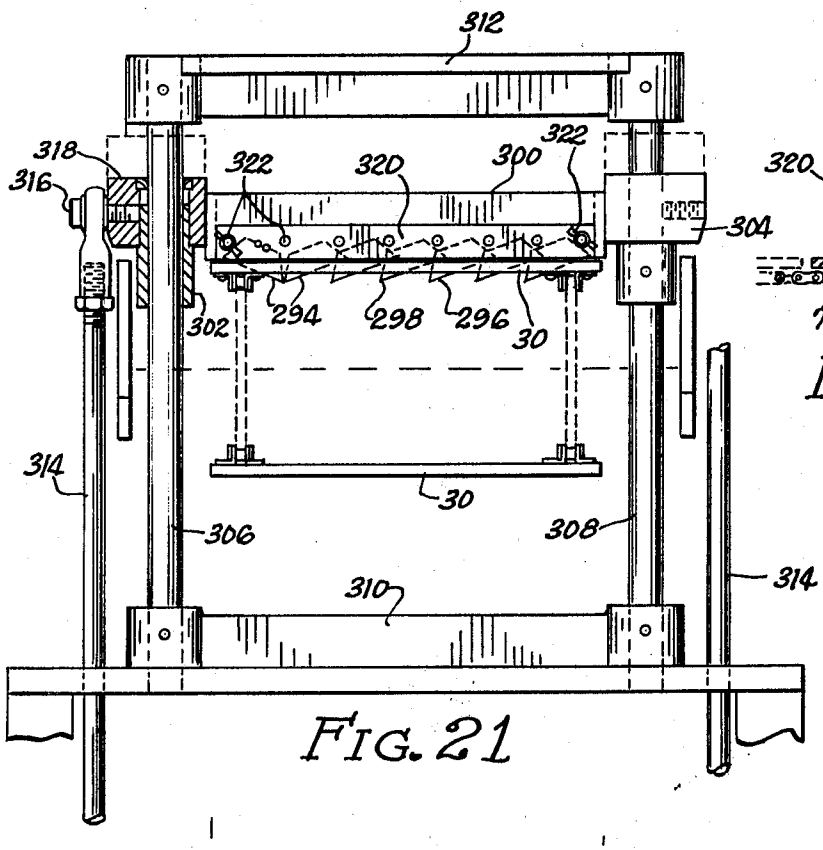


FIG. 21

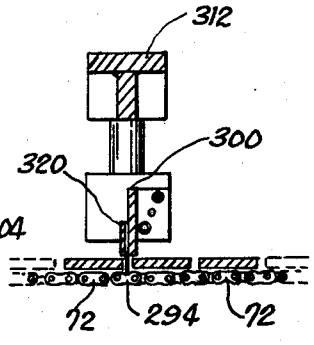


FIG. 23

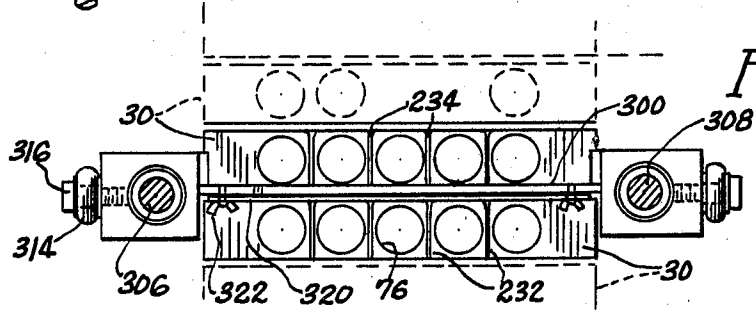


FIG. 22

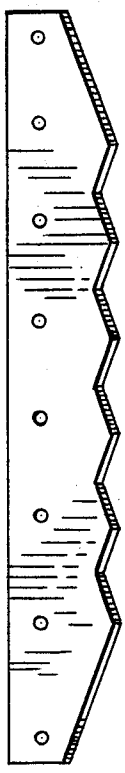


FIG. 24

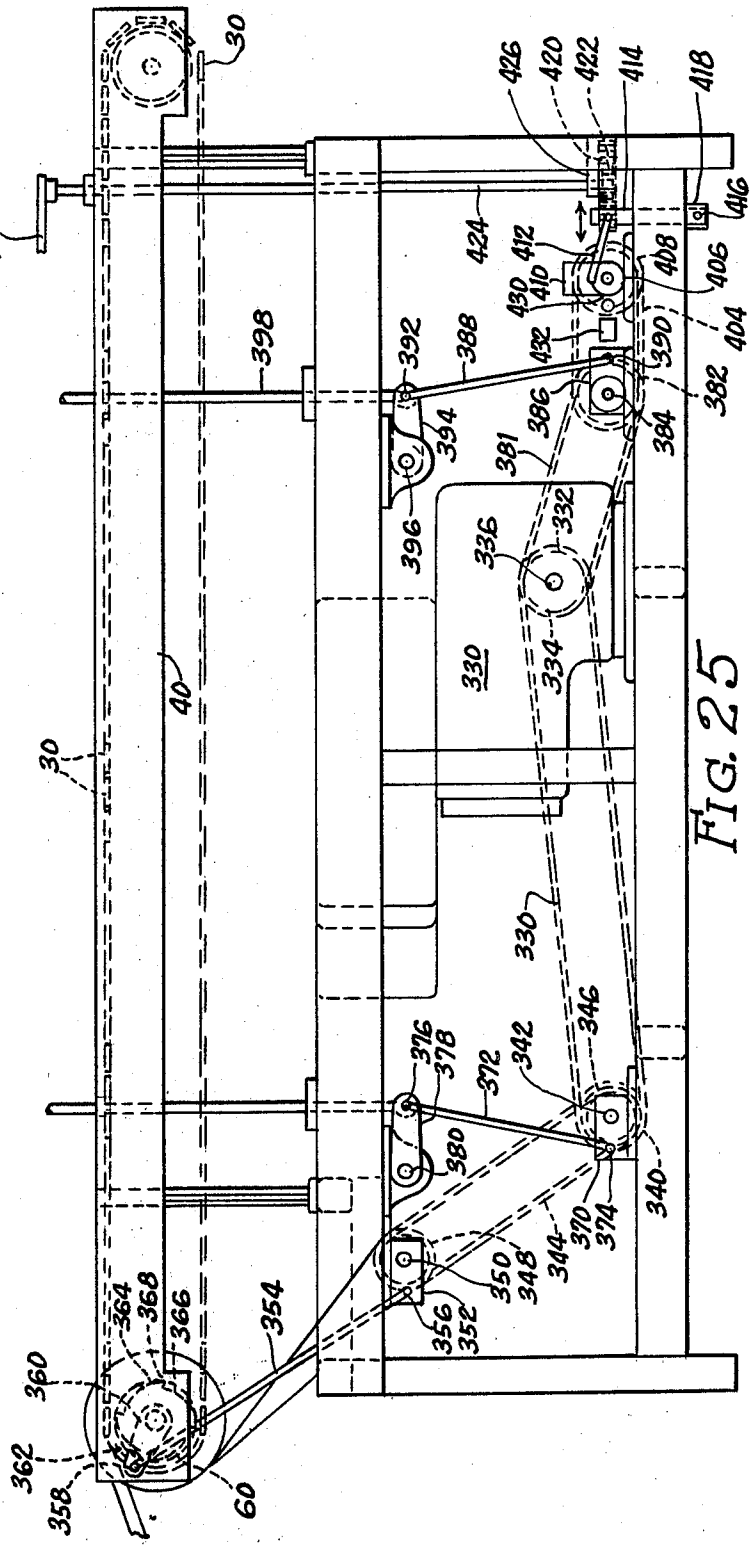
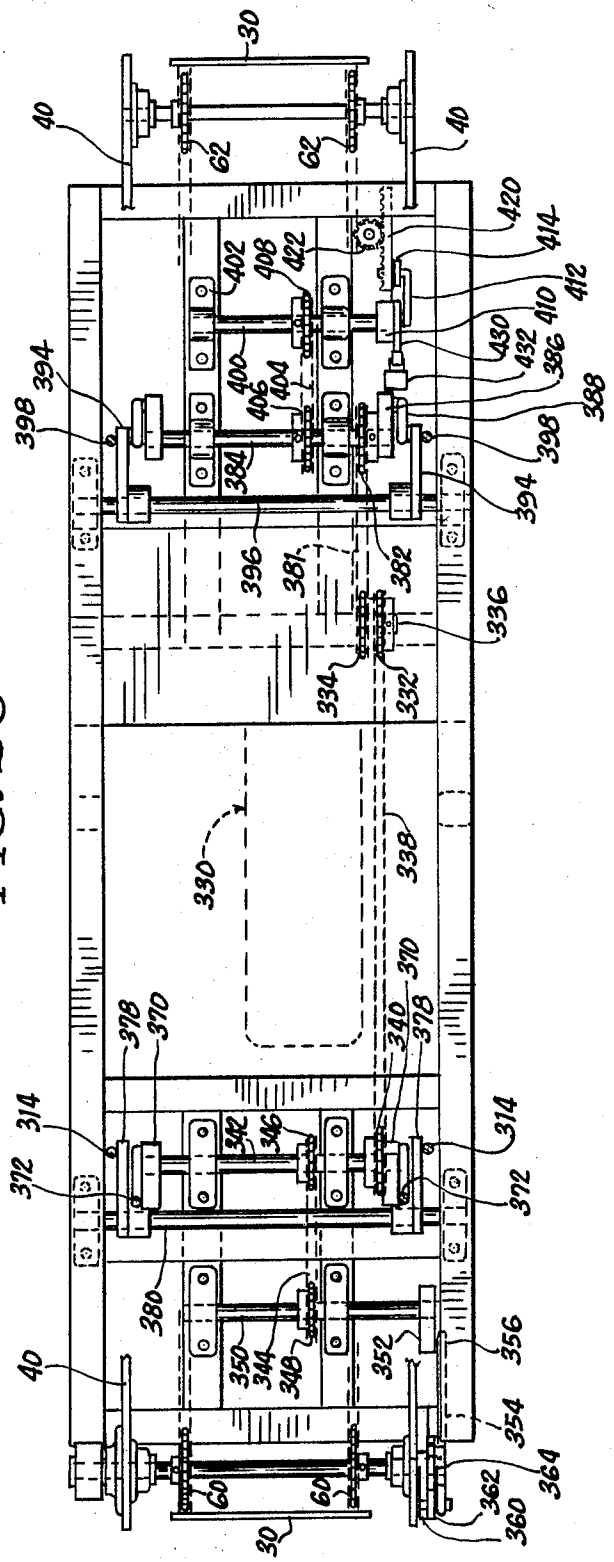

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FIG. 25

CUP FILLING MACHINE AND ELEMENTS

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FIG. 26



United States Patent Office 3,478,489 Patented Nov. 18, 1969

3,478,489

CUP FILLING MACHINE AND ELEMENTS

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Filed Feb. 15, 1967, Ser. No. 616,270
Int. Cl. B65b 3/06, 55/08, 61/06
U.S. Cl. 53—167 33 Claims

ABSTRACT OF THE DISCLOSURE

A machine capable of continuous operation for the filling of dished cup-shaped members with content material and for sealing the filled cups for distribution and use wherein the machine makes use of cup-shaped members in strips having a plurality of the cup-shaped members in laterally spaced apart relationship with means for feeding the strips onto supporting platens by which the strips are carried through a sequence of operations including sterilization, filling, covering with a sealing strip and sterilization of the filled cup and sealing strip, heat sealing the covering film onto the strip about the cup-shaped members to seal off the content material, cooling to set the bond between the covering film and strip, slitting lengthwise between the cups to separate the cup-shaped members in the strip while slitting the covering film into lengthwise strips and then shearing the covering film crosswise to produce the individual sealed containers of content material.

This invention relates to a machine and method for packaging pourable materials in cup-shaped containers and it relates more particularly to a machine and method capable of substantially continuous operation to fill cup-shaped containers with a flowable material and for sealing the filled containers to maintain sterilized conditions for long shelf life, storage and use, without contamination of the content material.

To the present, filling and sealing machines of the type described have been designed for operation with individual cups for filling and sealing. Such machines and techniques are expensive and difficult to operate by reason of the necessity accurately to feed and support the individual cups and to effect a desired sealing relationship of the filled cups. It is also difficult to maintain proper orientation of the separated cups and sealing film whereby inaccuracies are experienced in operation and jamming often occurs which interferes with the continuous operation of the machine for high yield. By the same token, the separate sealing film applied to separated cups required careful control and support, otherwise the package is faulty and machines making use of such techniques are subject to considerable down time for repair, adjustment and to relieve jams that often occur.

It is an object of this invention to produce a machine and method for packaging pourable content material in sealed cup-shaped containers and it is a related object to provide a machine and method of the type described which overcomes many of the deficiencies of cup filling and sealing meachines of the type heretofore employed; which is capable of continuous operation; which is capable of maintaining sterile and sanitary conditions during the filling and sealing of the containers to produce a sterile package; which operates simultaneously with a plurality of cup-shaped containers in crosswise alignment in interconnected relation; which enables better orientation during passage through the sterilizing, filling, sealing and cutting zones thereby to minimize misalignment, jamming or other interferences with the operation of the machine; in which the machine operates on strips formed

of a plurality of crosswise aligned interconnected cup-shaped containers to simplify processing and use during passage through the various operating zones thereby greatly to simplify the construction and operation of the machine and method; which provides more accurate location of the sealing film and elements aligned to operate thereon to effect a better and more effective seal and more accurate cutoff of film and cups, when in the assembled relation; which greatly simplifies the operation for slitting the film and cutting the cups for further simplification of the construction and operation of the machine and method; and which produces a filled cup-shaped container in sealed relation in a more efficient, simpler and effective manner.

These and other objects will hereinafter appear and for purposes of illustration, but not of limitation, embodiments of the invention are shown in the accompanying drawings, in which—

FIG. 1 is a top plan view of a strip of dished cup-shaped members employed in the practice of this invention;

FIG. 2 is an elevational view of the strip shown in FIG. 1;

FIG. 3 is a schematic view in elevation showing the sequence of operations in the machine embodying the features of this invention;

FIG. 4 is a top plan view of the conveyor mechanism including the supporting platens forming a part of the conveyor;

FIG. 5 is an elevational view of the conveyor mechanism shown in FIG. 4;

FIG. 6 is an end elevational view of the conveyor mechanism shown in FIGS. 4 and 5;

FIG. 7 is an elevational view of the stack housing for the feed strips;

FIG. 8 is an elevational view showing the cam fingers for displacement of a strip from the stack;

FIG. 9 is a schematic view illustrating the arrangement of elements for feeding the strip from the stack;

FIG. 10 is a bottom sectional view showing the assembly of plates in the filling mechanism, along the line **10—10** of FIG. 11;

FIG. 11 is a sectional elevational view of the feed assembly shown in FIG. 10;

FIG. 12 is a schematic view showing the distribution of feed from the machanism to the dished cups of the stack;

FIG. 13 is an elevational view showing the arrangement of passages in the feed mechanism of FIGS. 10 and 11 at the start of a cycle;

FIG. 14 is an elevational view similar to that of FIG. 13 showing the arrangement of passages in an intermediate portion of the cycle;

FIG. 15 is an elevational view similar to those of FIGS. 12, 13 and 14 showing the arrangement of passages at the end of a feed cycle;

FIG. 16 is an elevational view showing the arrangement of elements for sealing the cover film onto the strip;

FIG. 17 is a side elevational view of the sealing mechanism shown in FIG. 16;

FIG. 18 is an end elevational view of the sealing mechanism showing the cup and die arrangement;

FIG. 19 is an elevational view crosswise of the slitting machanism;

FIG. 20 is a side elevational view of the slitting mechanism shown in FIG. 19;

FIG. 21 is an elevational view crosswise of the cross-cutting mechanism for cutting the cover film;

FIG. 22 is a top plan view of the mechanism shown in FIG. 21;

FIG. 23 is a side elevational view of the cutting mechanism shown in FIG. 21;

FIG. 24 is an elevational view showing a modification in the constructing of the cutting knife;

FIG. 25 is a schematic view in elevation of the drive mechanism for various of the elements of the machine; and

FIG. 26 is a top plan view of the arrangement of elements shown in FIG. 25.

As used herein, the term "flowable content material" is intended to refer to food and the like products that are usually packaged in cup-shaped containers for individual servings and the like such as food materials which may be represented by milk, cream, honey, and the like; viscous or jelly-like materials, preferably of the type reduced to a flowable state when heated to elevated temperature, such as catsup, jellies, mustard and the like; or particulate material such as nuts, condiments, seasonings and the like.

An important concept of this invention resides in a machine and method which is greatly simplified in its construction and operation for filling and sealing containers with content material wherein the machine and method operates on a plurality of containers arranged in side by side relation in crosswise alignment in a row in the form of a continuous strip with the containers spaced one from the other laterally in the row. As illustrated in FIGS. 1 and 2 of the drawings, the strip **10**, formed of metal foil, plastic film, or the like, is formed with five dished cup-shaped containers **12** of cylindrical shape extending downwardly from the surface of the strip with a spaced relationship between the dished cup-shaped members **12** to provide flanged portions **14** extending perpendicularly outwardly from the upper edges **16** of the dished cup-shaped members and with cutouts **17** in the forward or trailing or both edges of the flanged portions. The cup shaped members may be of cylindrical shape with the side walls **18** tapering slightly inwardly from the mouth portion downwardly to the bottom wall **20**. Instead, the dished cup-shaped members may be formed to other shapes such as to rectangular shape, oval shape, or other polygonal shape in cross-section with tapered side walls for easier molding and support, as will hereinafter be described. While the invention will be described with reference to a preformed strip having five dished cup-shaped containers, it will be understood that the cup-shaped members formed in the feed strip may vary from a minimum of two to more than five.

Referring now to FIG. 3 of the drawings, the machine will be described with reference to a plurality of horizontally disposed crosswise extending platens **30** supported on their ends in longitudinally spaced apart relation and pivotally interconnected one to the other to define an endless conveyor, the upper run of which is advanced continuously from (1) a feed section A wherein a strip **10** of container blanks is deposited onto the supporting platen **30**; (2) a filling section B wherein the content material is introduced into the dished cup-shaped container member **12**; (3) a covering section C wherein a continuous strip of film material is advanced at the same rate as the rate of endwise displacement of the supporting platens to cover the filled containers; (4) a sterilizing section D in advance of the filling section and covering section wherein the container is made sterile before filling and the filled container and covering film are made sterile after filling but before covering the filled containers; (5) a sealing section E wherein the film is sealed onto the flanged portions **14** about the cup-shaped members to effect a sealing relationship between the covering film and each of the containers; (6) a cooling section F in which the seal is set to stabilize the sealing relationship betwen the covering film and containers: (7) a slitting section G wherein the sealing film and strips are slit lengthwise between the containers to separate the sealed containers crosswise in the strip while the covering film remains connected lengthwise; (8) a cutting section H wherein the covering film is slit crosswise between supporting platens to separate the sealed containers one from the other, and finally (9) a delivery section I wherein the filled and sealed containers are removed from their supporting platen for shipment and use.

With reference now to FIGS. 4, 5 and 6, the conveyor comprises laterally spaced apart rigid frame members **40** and **42** interconnected by a member of longitudinally spaced apart cross brace members **44**. Laterally spaced apart guide rail sections **46** and **48** are fixed to the top side of the cross brace members with the rail sections **46** and **48** in longitudinal alignment to define longitudinally aligned laterally spaced apart supporting guide rails **46** and **48**.

Frame arms **50** and **52** depend from laterally spaced apart portions of the cross brace members **44** with the crosswise spacing between the arms **50** and **52** dimensioned to be greater than the crosswise dimension of the supporting platens **30** to enable the platens to be displaced therebeween. Elongate, horizontally disposed, rigid structural members **54** are fixed to the lower end portions of the frame arms with supporting roller bearings **56** rotatably mounted on roller shafts extending inwardly from the laterally spaced apart structural members with the roller bearings being spaced one from the other crosswise by an amount less than the crosswise dimension of the supporting platens **30** whereby, along the lower run of the conveyor for return of the platens to loading position, the end portions of the supporting platens **30** will be supported by and ride over the rollers **56** to define the supported lower run of the conveyor.

A pair of laterally spaced apart endless chains **58**, preferably in the form of a link chain, are trained about sprockets **60** and **62** mounted at each end of the frame for free rotational movement with one of said sprockets constituting a driven sprocket connected, as will hereinafter be pointed out, to a driving motor **66** mounted on a platform fixed to an interior lower end portion of the fixed frame and out of the path of the chains. Thus the sprocket **60** operates to effect lengthwise displacement of the endless chains in one direction with the upper run riding on the guide members **46** and **48** while the lower run is carried with the platen on the rollers **56**.

The platens are connected in the desired longitudinally spaced apart relation to the laterally spaced apart conveyor chains **58**. For this purpose, the ends of the supporting platens **30** are formed with countersunk openings extending vertically therethrough for receipt of a pin **70** extending upwardly from brackets **72** secured in longitudinally spaced apart relation to the chain links. Thus the platens are pivotally interconnected on the chain for continuous advancement therewith along the guide rails and about the sprockets as an endless conveyor.

Each platen is in the form of a rigid supporting plate having a flat outer surface **74** dimensioned to have a length and width greater than the length and width of the strip with a plurality of openings **76** extending through the platen spaced one from the other crosswise by a distance corresponding to the spaced relationship between the dished cup-shaped member **12** in the strip and with the openings **76** having a shape corresponding to the cross-section of the dished cup-shaped members and dimensioned to enable the cup-shaped members freely to extend therethrough so that the flanged portions **14** will rest on the surface portions **74** of the platen adjacent said openings.

Means are provided at the head end of the machine for feeding a strip of dished cup-shaped members onto the platen after it turns horizontally for travel along the upper run of the conveyor.

In the modification shown in FIGS. 7, 8 and 9, the strips **10** are stacked with the dished cup-shaped members in nesting relation to form a single column **80** of a larger number of strips but in a manner whereby a slight

vertically spaced relation will exist between the flanged portions **14** of adjacent strips.

The stack **80** is slidably received within a rectangularly shaped, vertically disposed elongate housing **84** which is mounted to extend crosswise of the conveyor and is formed with an elongate passage **86** extending vertically therethrough from an open top **88** to an open bottom **90**. The passage extending vertically through the housing is dimensioned to have a length and width corresponding to the length and width of the strip to enable the stack to be received in slidable relationship therein. The lower open end of the housing terminates a short distance above the surface of the platen **30** and in vertical alignment therewith. A pair of short flexible fingers **92** extend inwardly from the opposite side walls of the housing into the path of the flanged portions **14** extending laterally outwardly from the outermost containers of the strip whereby the fingers **92** engage the underside of the lateral edge portions of the lowermost strip in the stack to support the entire stack in the housing.

Means are provided to effect downward displacement of the lowermost strip in the stack so that it might fall free of the housing into the supporting platen in response to movement of the platen into position beneath the housing to receive the strip. For this purpose, there are provided at least two laterally spaced apart cam fingers **94** mounted for longitudinal movement between retracted and extended portions with the ends **96** of the fingers longitudinally aligned with the flanged portions **14** between nested cup-shaped members **12** and vertically aligned with the space **97** between the flanges of the lower-most and next to the lowermost strips in the stack.

The fingers comprise cam members having a horizontal, substantially flat top surface **98** and a bottom edge **100** which tapers downwardly from the forward edge **96** with the forward edge portion **96** having a height less than the spaced relation between the flanged sections of adjacent strips so that the end portion will enter freely between the flanged members but with the trailing portion of the cam fingers being dimensioned to have a height greater than said spaced relationship. Thus, when the laterally spaced apart cam members are displaced from retracted to extended positions, the cam fingers enter into the space between the adjacent strips and, as the cam member continues to advance towards extended position, the lowermost strip in the stack is engaged and cammed downwardly while the remainder of the stack is supported on the flat top surface **98** of the cam members. Such downward displacement of the lowermost strip from the stack operates to flex the strip crosswise whereby the flanged portions engaged by the fingers or pawls **92** clear the pawls to free the strip from the stack whereby it can drop gravitationally onto the waiting platform. When the cam members are returned to retracted positions, the remaining stack is let down until the outer flanged portions of the now lowermost strip in the stack comes to rest on the supporting pawls **92**.

The deposited strip is carried by the supporting platen forwardly along the top run of the conveyor for passage between one or more lamps **102** which direct sterilizing rays downwardly onto the strip and into the dished cup-shaped portions for sterilization in advance of filling with the content material. For this purpose, one or more quartz lamps **102** or other germicidal ultraviolet lamps are mounted to depend from a supporting wall **104** of an enclosure **218** to extend crosswise of the conveyor immediately above the top run of the conveyor for rendering the strips germicidal during passage therebeneath.

As the strip advances forwardly along the conveyor, it enters the filling section B where the dished cup-shaped members are filled with the desired content material. The filling device can be of various constructions conventionally employed for filling cups with fluid content material, but for proper filling of the cups substantially simultaneously in the crosswise strip and under sterile conditions, it is preferred to make use of a new and novel filling device of the type illustrated in greater detail in FIGS. 10 to 15 of the drawings.

With reference now to FIGS. 10–15, the filling mechanism comprises the combination of an upper, horizontally disposed feed plate **110**, an intermediate horizontally disposed transfer palte **112**, and a lower horizontally disposed delivery plate **114** with the vertical spacing between the upper feed plate **10** and the lower delivery plate **14** corresponding to the thickness of the intermediate transfer plate **112** and in which both the upper feed plate **110** and the lower delivery plate **114** are supported in fixed position by a suitable supporting bracket **116** fixed to the machine frame. The intermediate delivery plate **112** is mounted for rotational movement between the upper feed plate **110** and the lower delivery plate **114** on a central axle **118** which extends vertically through a central opening **120** in the upper plate and an axially aligned opening **122** through the lower plate for support of the through-extending end portions in suitable fixed bearing members **124** and **126**, diagrammatically illustrated in FIG. 11.

The upper feed plate **110** is formed with a number of passages **128** corresponding to the number of dished cup-shaped members **12** per strip with the passages **128** through the plate arranged in equally circumferentially spaced apart relation about a circle having for its center the axis **118** of the intermediate transfer plate **112**. Thus the passages **128** through the upper feed plate **110** will be 72° apart in the modification used to illustrate the invention with five dished cup-shaped members per strip. Fluid content material is conveyed to each passage in the feed plate by separate conduits **130** corresponding in number to the number of passages with one end of each conduit fixed to the inlet end of each passage while the other ends of the conduits communicate with a header **132** connected to a feed pump which displaces content material from a supply source to the header under constant pressure.

The lower delivery plate **114** is similarly formed with an equal number of passages **134** extending therethrough and circumferentially arranged in equally spaced apart relation about the same axis and along the same radius whereby the passages **134** through the delivery plate are circumferentially aligned with the passages through the feed plate **110** but with the passages of the delivery plate offset circumferentially by an amount which is at least the sum of the radius of the passage **128** and the passage **134** and two times the radius of the passages **136** through the transfer plate but less than 360° divided by the number of feed openings minus the sum of the passages as aforesaid. For example, in an assembly of five feed passages, each of which occupies a sector of 16°, the openings in the bottom delivery plate will be offset from the openings in the feed plate in the direction of movement of the transfer plate by an amount greater than 32° but less than 40°. A separate delivery tube **138** is fixed at its upper end to separate passages while the outlet end portions of the delivery tubes are arranged in crosswise alignment in laterally spaced apart relation corresponding to the spaced relationship between the dished cup-shaped members in the strip with the delivery ends located immediately above the cup members of the strip when supported in its carrier in filling position.

The intermediate transfer plate **112** is also formed with an equal number of passages **136** therethrough circumferentially aligned with the passages **128** through the feed plate and the passages **134** through the delivery plate with the passages **136** in the intermediate transfer plate being equally circumferentially spaced apart. The passages **136** in the transfer plate are dimensioned to have a total volume corresponding to the volume of the material adapted to be introduced in each of the cup members. Means are provided for effecting a fluid-tight seal between the plates about the circumferentially aligned pas-

sages. For this purpose, the upper and lower surfaces of the intermediate transfer plate **112** are provided with circumferential grooves **140–142** around the openings **136** with sealing O-rings **146** located within the grooves. Sealing O-rings **150** are provided between the plates for support of the intermediate plate in a manner to permit rotational movement relative to the adjacent plates.

Means are provided for rotation of the intermediate transfer plate **112** about its axis through increments of 360° divided by the number of passages or, in the illustrated modification, through 72° increments from start position with the passages **128** vertically aligned with the passages **136** of the transfer plate to a terminating portion with the passages **136** of the intermediate plate vertically aligned with the next of the series of passages of the transfer plate **112** or through an angle of 72°. For this purpose, the periphery of the intermediate plate is formed with cam edges **154** terminating in abrupt abutments **156** corresponding in number to the number of openings and spaced a corresponding angle apart.

A pawl **158**, pivotally mounted at **160** on the end portion of a horizontally disposed bar **162**, is constantly urged, as by spring means, for rotational movement about its pivot **160** into engagement with the peripheral surface of the intermediate plate **112**. The supporting bar is mounted for reciprocal movement along a path for displacement through an angle of 360° divided by the number of abutments, or 72°, between operated position, shown in broken lines, at the right in FIG. 10, and retracted position, shown in broken lines, to the left in FIG. 10.

When in retracted position, the pawl **158** is disposed with its end in operative engagement with an abutment **156**. As the bar is displaced through an angle of 72° to operated position, the pawl **158** actuates the intermediate plate **112** for rotational movement about its axis through a corresponding angle. During return movement to retracted position, the pawl rides over the cam surface **154** until it clears the next abutment upon return to retracted position for the next cycle of operation

At the beginnning of the feed cycle, with the pawl in retracted position, the passages **136** through the intermediate transfer plate are in registry with the passages **128** through the feed plate whereby content material, under pressure, is able to flow through the passages **128** to fill the underlying passages **136** of the transfer plate. As the intermediate transfer plate **112** is rotated from start position to terminating position, the passages **136** are displaced from communication with the passages **128** through the feed plate but without establishing communication with the oncoming passages **134** in the delivery plate thereby to isolate the passages in the transfer plate, as shown in FIG. 14, to cut off an increment of content material corresponding to the volume of the passages in the transfer plate calculated to correspond with the volume of material to be introduced into the cups. As the transfer plate continues in its rotational movement, the passages **136** come into communication with the passages **134** in the underlying delivery plate, as shown in FIG. 15, to enable transfer of the measured quantity of content material from the feed plate to the passages of the delivery plate for flow through the tubes to the dished cups of the underlying strip.

During continued movement of the intermediate plate, the passages **136** pass from communication with the passages **134** through the delivery plate before entering into communication with the oncoming passages of the feed plate whereby the passages **128** of the feed plate and the passages **134** of the delivery plate are again isolated to enable flow of the material from the feed passages into the passages of the transfer plate for the next cycle of operation.

It will be apparent that the passages in the separate plates need not be of the same dimension although most efficient transfer can be effected with equally dimensioned passages for uniform flow of material.

Referring again to FIG. 3, the filled cups are advanced along the conveyor until met by a cover film **164** in the form of a continuous film having a width corresponding to the width of the strip **10**. The cover film may be a thin film of polyester resin (Mylar), polystyrene resin, polyethylene resin, coated aluminum foil, aluminum-paper laminate, or the like fluid and substantially vapor impervious film stock of thermoplastic material preferably having a heat activatable adhesive on the outer surface thereof. One such film is marketed by Milprint Corporation of Milwaukee, Wisconsin, under the trade name PE 10053 or 30 pound CGS Adhesive Foil Superel.

The film **164** is supplied in jumbo rolls **166** supported on longitudinally spaced apart crosswise extending rollers **168** and **170** mounted at their ends for free rotational movement in suitable bearing blocks supported on the frame **172**. Thus the jumbo roll is supported for free rotational movement to pay out film in response to withdrawal of the film for passage over the tensioning roller **174** to the puller roller **176** for feeding film at a linear speed corresponding to the linear speed of the conveyor to position the film over the strips of filled cups as they are advanced along the conveyor.

Located beyond the filling means and immediately in advance of the meeting between the covering film and the strips, another set of sterilization lamps **178** are provided with the rays directed downwardly onto the strip of filled cups and laterally onto the outer surface of the sealing film thereby to effect sterilization of the elements coming into contract with the content material before sealing. Again, the sterilization means may comprise rays from various sources, such as from a quartz tube or the like sterilization lamp positioned closely adjacent the top side of the strips and the film and extending crosswise thereof.

The filled cups and cover film travel together to the sealing station E where the cover film is heat sealed onto the flanged portions of the underlying strip immediately surrounding the filled cups completely to seal off each of the filled cups.

Referring now to FIGS. 16, 17 and 18, the sealing mechanism comprises an arbor **180** formed of a pair of laterally spaced apart standards **182** and **184** extending vertically in parallel relation on opposite sides of the conveyor and interconnected at their upper end portion by a cross arbor **186** and a their lower ends by a cross frame member **188** to provide a rigid structure straddling the conveyor beyond the film covering position.

Mounted for vertical sliding movement on the standards is a heat sealing assembly **190** formed of a crosswise extending carrier plate **192** secured at its ends to sleeve members **194** and **196** concentrically mounted on the standards **182** and **184** for vertical sliding movement relative thereto between raised and lowered positions. Fixed to the underside of the carrier plate **192** is a heater **198** mounting a sealing die **200** on the underside thereof and having an insulating block **202** interposed between the heater **198** and the carrier plate **192** thermally to insulate the heater and die from the supporting apparatus.

Covering the sealing die is a sheet of silicone rubber pad **207** which has a high temperature range and is resilient to effect complete sealing so as to overcome irregularities in the surfaces of the strips or metal surfaces of the sealing die or platens. Fixed over the silicone rubber pad is a covering **209** of Teflon which has high temperature resistance and prevents any sticking, distortion, or overheating of cover film or container.

The sealing die **200** is dimensioned to have a width and length corresponding to the width and length of the carrier platen with cavities **204** in the underside spaced one from the other to correspond with the spacing between the cup-shaped members of the strip and shaped to correspond with the outline at the upper end of the dished cupped portions of the strip to provide downwardly extending die portions **206** which correspond to the flat surfaces of the platen to effect sealing engagement of the flat surfaces about the filled cup-shaped

members and the corresponding overlying portions of the cover film to effect a heat seal therebetween responsive to displacement of the heating assembly to lowered position.

While not essential, it is desirable to provide additional support for the platen in sealing position. As illustrated in FIG. 16, such additional support comprises a crosswise extending plate **208** having laterally spaced apart ribbed portions **210** extending upwardly in the areas corresponding to the die elements **206** and dimensioned to have a height to engage the bottom side of the platen about the cup. The plates **208** are supported at their ends so that the upper face of the platen will be resiliently supported at a level slightly above the level of the lower end portion of the die elements **206**, when in lowered position. As a result, the die will effect downward displacement of the platen, in response to movement of the sealing die to lowered position to provide resilient engagement between the surfaces of the platen and the die parts with the cover film and strip located therebetween to insure the formation of a sealing engagement.

The heater **198** may be cored for the circulation of a heating fluid therethrough but it is preferred to make use of a heater embodying electrical heating elements with suitable control for maintaining the temperature of the heater at the desired level. For this purpose, the temperature of the die may be regulated within the temperature range of 350–750° F., depending somewhat upon the composition of the film and strip. Instead, use may be made of dielectric heaters for generation of the desired temperature in the film when the die elements are actuated to sealing position.

The means for actuation of the carrier plate **192** between raised and lowered positions to effect the desired sealing operation will hereinafter be described with reference to the driving means. It is desirable, though not essential, to coat the die surfaces with a release material, such as a silicone or polytetrafluoroethylene (Teflon), for easy release of the plastic materials.

As illustrated in FIG. 3, the portion of the apparatus beginning with the dispenser **84** and extending through the heat sealing device described is enclosed within a dust cover **218** to minimize the contamination of elements until the sealed package is achieved. Further to minimize contamination and deterioration of materials, including the content material with which the cups are filled, the area enclosed within the dust cover is preferably maintained under an inert or nonoxidizing atmosphere, as by the continuous introduction of nitrogen gas at the inlet **220**. The gas escapes from the space between the underside of the cover and covering side plates **222** over the upper flight of the conveyor extending outwardly laterally beyond the edges of the platens and on which the cover rests.

From the heat sealing station E, the sealed strips still supported by the platens, pass forwardly from within the cover **218** into a spray chamber **224** having a top wall **226** from which a plurality of shower heads **228** depend for application of water sprays **230** onto the top surface of the cover film to cool and set the seal. The water flows gravitationally from the film and drains from the chamber over the side cover plates **222** into receivers alongside the conveyor. Cooling by spray is desirable though not essential.

It has been found that separation of the strip into individual cups can be effected more accurately and much more efficiently if the position of the cups is stabilized during the ensuing cutting action. For this purpose, separation into individual cups is effected, in accordance with the practice of this inventoin, while the filled cup-shaped members are yet firmly supported by the platen for proper orientation and while the cup members are joined in the lengthwise as well as in the crosswise direction by the cover film.

For this purpose, the supporting platens **30** are each formed with slots **232** extending continuously longitudinally in the top surface from the leading edge to the trailing edge midway between adjacent cup receiving openings **76** with the leading end portion of the slots being flared laterally to provide a tapered entrant portion **234** to guide slitting knives **236** into the slots.

For this purpose, as shown in FIGS. 19 and 20, a bracket **238** formed of a pair of laterally spaced upright members **240** and **242** interconnected at their upper end portions by a cross bar **244** spans the conveyor and is removably secured to upright stationary frame members **246** by setscrews **248**. A slitting cage **250** is supported from the cross bar **244** in a manner to permit vertical and crosswise adjustment for proper alignment of the slitting blades **236** with the platen slot **232**. For vertical adjustment, the slitting cage is formed with a threaded opening **252** through the center of the top wall **254** adapted threadably to receive a hanger rod **256** which is fixed in position in the opening **252** by a setscrew **258**. The upwardly extending threaded end portions of the rod **256** project through an opening **260** in the center of the cross bar **244** with nut members **262** and **264** on opposite sides of the cross bar to regulate the length of rod depending from the bar. For lateral adjustment, a pair of angle members **266** and **268** are secured, as by welding, to the underside of the cross bar **244** with a laterally spaced relationship therebetween which is slightly greater than the width of the slitting cage **250**. Crosswise extending threaded openings **270** are provided in the vertically disposed members **272** of the angle and bolt members **274** extend laterally through said openings with the head end of the bolt extending outwardly for turning movement of the bolts for displacement inwardly beyond the angle into engagement with the opposite side walls of the slitting cage **250**. Lateral adjustment can be effected by loosening one bolt and tightening the other to grip the slitting cage therebetween at the level adjusted by the hanger rod.

The slitting cage has a number of laterally spaced apart knife supporting arms **276** depending there from in laterally spaced relation corresponding to the spaced relation between the slots **232** in the platen with an elongate slot **278** extending vertically in each arm from the lower end for a distance greater than the length of the slitting blade **236** with a portion of the slitting blade extending downwardly beyond the lower edge of the arm to a level to extend part way into the slot **232** in the platen. The slitting blades are secured in their respective arms of the slitting cage by means of setscrews **280** extending laterally through an opening to one side of the slot to engage the blade portion between the setscrew and the opposite wall of the slotted arm. Thus the slitting blades can be secured in position of use and adjusted downwardly or upwardly within their supporting slots and secured in the adjusted position by the setscrew. The latter can be locked in clamping position by nut members **282**. Each arm is provided with its own locking screw for individual adjustment of the slitting blades. Thus the slitting blades **236** are fixed in position and remain stationary as the platen and film move through the slitting section thereby to sever the film into lengthwise strips while severing the strip **10** crosswise between the cup-shaped members to separate the cup-shaped members one from the other while supported in the platen and while interconnected by the lengthwise cover strips.

For proper orientation of the platen **30** with the stationary cutting blades **236**, a pair of stationary guide bearings **284** are secured in a calibrated laterally spaced apart relation to the frame members for passage of the platens **30** in sliding engagement therebetween. The side guide bearings **284** are located alongside the slitting cage at a level with the platens and they are supported in a manner to permit lateral adjustment for actuating platens of different crosswise dimension or for lateral adjustment properly to locate the platens as they pass therebetween.

Each bearing member **284** is supported on a spindle **286** extending through a horizontally disposed arm **288** which extends laterally through an opening in a bracket **290** fixed to the frame but with the end portion of the arm threadably received in a nut member **292** having a head which extends outwardly beyond the bracket to enable turning movement for lateral adjustment of the supporting arm.

The next step is to cut the cover film between the longitudinally aligned cups complete to separate the filled cups one from another. For this purpose, a cut is effected crosswise between adjacent platens while the filled cups are still in the platens for proper orientation and support. While use can be made of a single shear type blade, operation with a single blade is difficult by reason of the tendency for the separated cups to follow the blade on the upstroke and by reason of the difficulty in retaining proper alignment during shear.

In the preferred practice of this invention, crosswise cutting of the film between the platens is achieved by a guillotine in the form of a plurality of laterally spaced apart razor blades **294** mounted at an angle to provide a plurality of laterally spaced apart, inclined cutting edges **296** which terminate in a plurality of equally spaced apart piercing points **298** which are first to pierce the film followed by the cutting edges simultaneously to slice the film at a plurality of laterally spaced apart sections with the point of one blade overlapping the trailing edge portion of the adjacent blade to insure a continuous slice across the film. The number of blades is not important as long as the severance of the film occurs substantially simultaneously at a number of laterally spaced apart points.

The blades are secured in a blade holder **300** extending crosswise of the conveyor above the platen with the lateral end portions of the holder removably secured to sleeve members **302** and **304** concentrically arranged for vertical sliding movement about cylindrical standards **306** and **308** fixed at their lower ends to the frame **310** and at their upper end portions by a cross bar **312** to enable vertical displacement of the sleeves and blade support between raised and lowered positions with the blade holder in vertical engagement with the top side of the platen and with the cutting edges of the blade extending on a continuous line below the level of the surface of the platen when in lowered position.

Means are provided for displacement of the blade holder between raised and lowered positions when the cutting blades are in vertical alignment with the narrow space between longitudinally aligned platens to sever the film crosswise of the platens on the downstroke and to raise the plate holder and blades to raised position before advancing the platens for the next cycle of operation. In practice, about ¼ inch spacing is provided between platens in longitudinal alignment along the top flight of the conveyor and the slice is made substantially midway between the platens.

Reciprocal movement of the sleeve sections **302** and **304** on the standard is effected by a crank arm **314** rotatably supported at its upper end on a shaft **316** extending laterally from an ear **318** fixed rigidly to the sleeve while the other end is pivotally secured to a rocker arm, as will hereinafter be described.

Instead of making use of a blade holder **300** having a plurality of cutting blades mounted therein, use can be made of a single blade of the type shown in FIG. 24 in which the single blade is provided with a continuous cutting edge at the bottom contoured into a plurality of connecting V-shaped sections to give the desired piercing and slicing effect at multiple crosswise points during movement of the blade to lowered position.

In the modification shown in FIG. 22, the multiple blades are locked in position on the blade holder by means of a clamping plate **320** tightened by a wing nut **322** to hold the blades between the clamping plate and the holder.

At the end of the top run of the conveyor, the separated sealed cups can be lifted from the platens by suitable vacuum means or the cups can be stripped from the platens by strippers or resilient fingers as the platen turns downwardly about the drum at the end of the conveyor for return to the head end of the machine.

The top film can be stripped from the sealed cups for access to the content material by gripping the portion of the film overlying the notched corner portions of the film for removal from the cup.

In operation, the conveyor is advanced continuously in stepwise fashion with the amount of advancement in each step calibrated to correspond to the distance between centers of adjacent platens for the advancement of one platen to the position of the platen in advance thereof and with a dwell between steps during which the various operations are carried out including the feed of the empty strip **10** from the housing onto the platen in position of rest in loading position, feed of the content material to the set of cups in the platen located in the feeding zone; the actuation of the heated die to lowered position into engagement with the cover film for heat sealing the cover film to the rim portions of the strip about each of the filled cups; and the actuation of the guillotine to lowered position for cutting the film crosswise during the downward stroke. All such operations are adapted substantially simultaneously to take place during the dwell of the conveyor after which another cycle is adapted to take place to advance the conveyor through the next step whereby the one platen in each of the operating zones is replaced by the oncoming platen to repeat the cycle of operations.

The various operations are powered from a variable speed drive including an electric motor **330** having a pair of spur gears **332** and **334** keyed onto the driving shaft **336**.

For intermittent operation of the conveyor in the described stepwise fashion, an endless chain **338** interconnects the gear **332** with another gear **340** keyed onto a horizontally disposed shaft **342** mounted for rotational movement in bearing members fixed to the lower frame. Another driving chain **344** interconnects another spur gear **346** on the shaft **342** with a similar gear **348** mounted for free rotational movement in a bearing **350** fixed to the underside of the upper conveyor frame. An eccentric block **352** is fixed to the shaft for rotational movement therewith and a linking arm **354** is rotatably connected at one end **356** to a hub located eccentrically on the block **352** while the other end of the linking arm **354** is rotatably connected with a hub **358** on the end of a horizontally disposed rocker arm **360** pivoted at a point offset from the hub onto a bearing member fixed to the frame. Thus the arm **360** will be rocked up and down about its pivot in response to rotational movement of the gears **346** and **348**.

A pawl **362**, pivoted on an intermediate portion of the rocker arm, rides on the periphery of a ratchet wheel **364** keyed to the shaft on which the sprocket **60** rotates and over which the conveyor chain operates. The ratchet wheel is divided peripherally into four sections, each of which includes a gradually rising cam portion **366** and a drop-off in the form of a shoulder portion **368** to enable the pawl to ride up on the cam surface until it clears the shoulder during movement of the rocker arm in the one direction and to engage the shoulder for incremental rotation of the ratchet wheel through a quarter turn during movement of the rocker arm **360** in the opposite direction to effect the desired incremental displacement of the conveyor chain during the return stroke while the conveyor dwells during the down stroke. The length of the linking arm **354** can be adjusted by conventional means to vary the stroke or the amount of eccentricity in the block **352** can be adjusted for variation in the length of stroke.

The cutoff mechanism can be operated off the same shaft **342** or from a separate shaft. For this purpose, an

eccentric block **370** is keyed onto the shaft **342** and a linking arm **372** is rotatably supported at one end on an eccentric portion **374** of the block while the other end is rotatably connected to a hub **376** on the end of another rocker arm **378** pivoted onto a shaft **380** rotatably supported by a bearing fixed to the frame. The lower end portion of the crank arm **314** is pivoted onto the same hub portion **376** of the rocker arm **378** whereby the sleeve members **302** and **304** are reciprocated on their standards between raised and lowered positions responsive to rotational movement of the gears. The eccentric block **370** can be positioned on the shaft to time the reciprocal movement for occurrence of the down stroke during the described dwell of the conveyor. The length of the stroke can be regulated by the adjustment of the amount of eccentricity or the effective length of the linking arm **372** and the occurrence of the stroke can be adjusted by the angle of the eccentric block **370** on the shaft.

A separate chain drive is provided for the operation of the sealing mechanism, filling mechanism and strip feeding mechanism from the motor drive **330**. A separate chain **381** interconnects another gear **334** on the drive shaft with a gear **382** keyed onto a horizontally disposed shaft **384** mounted for rotational movement in bearings fixed to the frame.

An eccentric block **386**, keyed to the shaft **384**, has a linking arm **388** rotatably connected at one end onto a hub **390** extending laterally from an eccentric portion of the block **386** while the upper end of the linking arm is rotatably connected to a hub **392** on the outer end portion of a rocker arm **394** pivoted at the inner end on a shaft **396** supported by a bearing member fixed to the underside of the conveyor frame.

A crank arm **398** connects the hub portion of the rocker arm **394** with the sleeve members **196** carrying the sealing mechanism to effect reciprocal movement of the crank arm **398** and corresponding movement of the sealing mechanism between raised and lowered positions responsive to rotational movement of the shaft **382**. Again, the stroke can be adjusted by the amount of eccentricity or adjustment in the effective length of the linking arm **388** and the time sequence of the stroke can be adjusted by the angle of the eccentric block **386** to take place during the dwell of the conveyor.

A second shaft **400** mounted on bearings **402** connected to the frame is rotated by means of a chain **404** which travels about a gear **406** keyed onto the shaft **384** and another gear **408** keyed onto the second shaft **400**. An eccentric **410** is keyed onto the shaft **400** and a linking arm **412** interconnects the eccentric with a rocker arm **414** pivoted for rocking movement about a stub **416** supported in bearing member **418** fixed to the frame. A rack bar **420** is mounted for reciprocal movement in the longitudinal direction and is connected at one end to the outer end portion of the rocker arm **414** for effecting reciprocal movement of the rack bar responsive to rocking movement of the rocker arm. A pinion gear **422**, on one end of a vertically disposed rotatable shaft **424**, meshes with the rack bar to effect rotational movement of the shaft **424** responsive to longitudinal displacement of the rack bar. The shaft **424** is supported in bearing members **426** and an arm **428** extends perpendicularly from the upper end of the shaft over the side of the conveyor frame and above the upper flight thereof and on which the pawl **160** is mounted for rocking movement to effect incremental rotational displacement of the intermediate feed plate, as previously described. The stroke can be regulated by the amount of eccentricity in the connection to the bar **410** or by adjustment in the effective length of the linking arm **412** and the sequence of rotational movement can be adjusted by the angular relation of the eccentric bar **410** to effect actuation of the intermediate transfer plate during the dwell of the conveyor and while a strip and carrier is properly located beneath the outlets from the filling plate.

A cam disc **430** is keyed to the shaft **400** for rotational movement therewith. A switch **432** with its switch arm **434** urged into resilient engagement with the periphery of the cam to make the switch during a portion of its rotational movement and to break the switch during the remainder is adapted to control the operation of the cam fingers **94**. The switch is connected for operation of an air or fluid cylinder and piston motor having the base of the cylinder pivotally anchored onto the frame in endwise alignment with the housing **84** and with the outer end of the piston **436** connected to a cross bar **438** having its lateral edges slidably received in horizontally disposed guide slots **440** in a gib **442**. The cam fingers **94** extend horizontally forwardly in laterally spaced apart relation from the cross bar to separate the lowermost strip from the stack when displaced with the bar to operative position and to free the stack for downward displacement when withdrawn to retracted position. The length of stroke of the strip fingers may be regulated by the amount of displacement of the piston and the timed sequence of the displacement of the cam fingers to operated position can be regulated by the angle of the eccentric **430** so as to occur during the dwell of the conveyor when an empty carrier platen is properly located in position immediately below the stack to receive the released strip that is displaced therefrom.

It will be apparent that the described mechanism for operation of the various elements including the conveyor mechanism constitute mechanical take-offs from a single drive. It will be understood that separate drives may be employed for various of the operations and it will be further understood that the mechanical means may be replaced by suitable fluid cylinders constituting a cylinder and piston arrangement operating under fluid pressure with the end of the piston rod operatively connected to the mechanism to effect the described displacements thereof while the end of the cylinder is pivotally connected to the frame members while electrical control means are employed for the desired sequencing of the operation of the various cylinder and piston arrangements to effect the described sequence of operations.

It will be further understood that other changes may be made in the details of construction, arrangement and operation, without departing from the spirit of the invention, especially as defined in the following claims.

I claim:

1. A machine for packaging and sealing individual cup-shaped members with content material compristing a plurality of crosswise extending supporting platens arranged in longitudinally spaced apart relation with each supporting platen having a plurality of laterally spaced apart cup receiving openings and means for advancing said platens stepwise along a path from a feed end to a delivery end of the machine, a means for delivering and for depositing a strip of material having a length and width corresponding to the length and width of the platen and a plurality of dished cup-shaped portions spaced laterally one from another by an amount corresponding to the spacing between the cup receiving openings in the platen and dimensioned to be received in said openings with portions about said cupped portions resting on the surface of the platen, means for introducing content material into each of the dished cup-shaped portions crosswise in the platen supported strip, means for advancing a continuous covering film over the strip of filled cups which strip is dimensioned to have a width corresponding to the width of the strip and advanced at a rate corresponding to the rate of advancement of the strip supporting platens, heating dies mounted for movement into and out of engagement with the cover film for engagement of the cover film and strip between the supporting platen and the heating dies to heat seal the covering film to the strip about the filled cups, spray means for applying coolant onto the surfaces of the covering film to set the seal, slicing knives longitudinally aligned with the space between adjacent cups in the platen

supported strip and positioned with their cutting edges projecting downwardly below the level of the film and portions of the strip between the filled cups to sever the film and strip into crosswise sections for separation of the filled cups and for slicing the cover film in lengthwise strips while the filled cups are supported in the platen wherein said cutting action is achieved responsive to advancement of the platen relative to the slicing knives, cutters extending crosswise of the platens and mounted for movement between raised and lowered positions for severing the film strips crosswise when actuated to lowered position and means for actuation of the cutters to lowered position between adjacent platens to sever the film crosswise and separate the sealed cups one from another while still being supported in the platens, and means for removing the separated filled cups from the supporting platens.

2. A machine as claimed in claim 1 in which the platens comprise rigid plates having a flat top surface between and about the plurality of openings with grooves extending lengthwise between adjacent openings from the leading edge to the trailing edge of the top surface.

3. A machine as claimed in claim 2 in which each groove has an entrant portion of wider dimension to guide the slicing knives into the grooves for passage therethrough.

4. A machine as claimed in claim 1 in which the means for advancing the platens stepwise comprises laterally spaced apart gear wheels, endless chains trained about the gear wheels for endwise displacement responsive to rotational movement of the gear wheels, and driving means operatively connected to the gear wheels for rotational movement in a stepwise fashion for predetermined increments of movement.

5. A machine as claimed in claim 4 in which the driving means comprises a shaft connecting a laterally spaced pair of gear wheels, a ratchet wheel fixed on the shaft for concurrent rotational movement, a pawl mounted for reciprocal movement between operated and retracted positions, means constantly urging the pawl into engagement with the periphery of the ratchet wheel, motor means, and link means operatively connecting said motor means with said pawl for displacement of the pawl between operated and retracted positions for rotation of said ratchet wheel during movement of the pawl from retracted to operated position.

6. A machine as claimed in claim 4 in which the platens are pivoted at their lateral edges onto the link chains.

7. A machine as claimed in claim 4 in which the platens are endwise aligned on the chain with a small spaced relationship therebetween.

8. A machine as claimed in claim 1 in which the portions between the dished cup shaped members of the strip are flat for engagement with the flat surface of the platen between the openings.

9. A machine as claimed in claim 1 in which the strip is formed with cutout portions in one of the edges including the leading edge and the trailing edge midway between adjacent cup shaped members.

10. A machine as claimed in claim 1 in which the means for delivery of the strips comprises a housing having an opening extending vertically therethrough which is open at the bottom and dimensioned to have a length and width corresponding to the length and width of the strips to enable a stack of strips slidably to be received therein, means at the lower end portion of the housing extending inwardly from the lateral edges into the paths of the lateral edges of the strips to support the stack of strips within the housing, and means for downward displacement of the lowermost strip in the stack while supporting the remainder of the stack whereby the lateral edge portions of the lowermost strip are flexed to clear the supporting means and release the lowermost strip from the stack to fall gravitationally from the stack.

11. A machine as claimed in claim 10 in which the means for downward displacement of the lowermost strip from the stack comprises laterally spaced apart cam fingers having a flat top surface and a bottom surface which tapers rearwardly and downwardly from the leading edge with the leading edge of the cam fingers in lengthwise alignment with the space between the lowermost and the next lowermost strip in the stack with the depth of the cam fingers increasing from a depth less than the spaced relation between the strips of the leading edge to a depth greater than the spaced relationship towards the trailing edge of the cam fingers and means for displacement of the cam fingers between extended and retracted positions with the leading edge of the cam fingers clear of the stack in retracted position and with the thicker portions of the cam fingers between the strips when in extended position to effect downward displacement of the lowermost strip in the stack.

12. A machine as claimed in claim 11 in which the cam fingers are formed with a flat upper surface and with the cam edge in the lower surface to cam the lowermost strips from the stack while supporting the remainder of the stack on the upper flat surface thereof during displacement of the cam fingers from retracted to extended positions and back.

13. A machine as claimed in claim 11 which includes means timing the cam fingers for displacement from retracted to extended positions responsive to movement of a platen into position beneath the stack to receive the freed strip.

14. A machine as claimed in claim 11 which includes a horizontally disposed crosswise extending frame plate with the cam fingers fixed to extend forwardly therefrom in laterally spaced apart relation, laterally spaced apart guide plates having longitudinally aligned slots in which the lateral edges of the frame plates are slidably received for guiding the frame plates during reciprocal movement, and means for displacement of the frame plate between extended and retracted positions.

15. A machine as claimed in claim 14 in which the means for displacement of the frame plate comprises a fluid cylinder.

16. A machine as claimed in claim 1 in which the means for introducing content material into each of the plurality of crosswise aligned dished cup shaped members comprises three plates mounted one on the other in sealing relation with the outer plates fixed in position and with the intermediate plate rotatable relative the fixed plates about a common axis, each of said plates having openings extending therethrough corresponding in number to the number of dished cup shaped members in the strip and equally spaced from the axis with the openings in each plate being equally spaced circumferentially by an amount corresponding to 360° divided by the number of openings but with the openings through the lower plate offset circumferentially from the openings in the upper plate by an amount at least equal to the sum of the widths of an opening in the upper plate and an opening in the lower plate plus two times the width of an opening in the intermediate plate, conduit means communicating at one end with the bottom side of the openings in the bottom plate for receipt of content material flowing therefrom with the other ends spaced laterally to overlie the dished cup shaped portions of the strips, other conduit means connecting each of the openings in the top plate with a source of supply of content material for flowing content material into the openings, and means operatively engaging the intermediate plate for rotational movement about its axis through a distance equivalent to the distance between the centers of adjacent openings in the plate whereby the openings in the intermediate plate are displaced circumferentially from registry with the underside of an opening in the upper plate through an intermediate portion wherein an opening in the intermediate plate is out of communication with the openings in either the upper and lower plate to a position wherein the opening in the intermediate plate is in registry with an opening in the bottom plate and then beyond into registry with the oncoming opening in the upper plate.

17. A machine as claimed in claim 16 in which the openings in the plates are of cylindrical shape.

18. A machine as claimed in claim 16 in which the openings in the intermediate plate are dimensioned to have a volume corresponding to the volume of content material delivered to each of the dished cup shaped members.

19. A machine as claimed in claim 16 in which the movement of the intermediate plate is timed to occur when an empty strip comes to rest immediately beneath the outlets from the lower conduits.

20. A machine as claimed in claim 1 in which the heat sealing means comprises a sealing die plate having portions projecting downwardly therefrom corresponding to the portions of the strip about the dished cup shaped members and means mounting the die plate above the strip with the sealing film draped over the top side thereof for vertical movement of the die plate between raised position above the strip and lowered position with the projections in pressing engagement with the top side of the film for engagement of the strip and film between the projection and the corresponding flat portions of the platen, means for heating the plate and means for actuation of the hot plate from raised to lowered position while the strip and film are in vertical alignment to effect sealing engagement between the film and strip portion immediately surrounding the dished cup shaped portions of the strip.

21. A machine as claimed in claim 20 in which the surface of the projections is formed with a layer of release material.

22. A machine as claimed in claim 20 which includes a resilient pad on the end of the projections from the hot plate for resilient engagement with the film and strip.

23. A machine as claimed in claim 20 in which the hot plate has a width and length corresponding to the width and length of the platen with the projections corresponding to the flattened portions of the platen between the spaced openings.

24. A machine as claimed in claim 1 which includes a housing enclosing the machine from the strip feed to the sealing means.

25. A machine as claimed in claim 24 which includes means for introducing an inert gas into the enclosure.

26. A machine as claimed in claim 1 which includes means beyond the sealing means for cooling the heat seal established between the film and strip.

27. A machine as claimed in claim 26 in which the cooling means includes means comprising water sprays mounted to project cooling water onto the top surfaces of the sealed film and strips upon issuance from the sealing means.

28. A machine as claimed in claim 1 in which the slicing knives are laterally spaced apart one from the other by an amount corresponding to the spaced relationship between centers of the dished cup shaped members of the strip with the knives longitudinally aligned midway between adjacent dished cup shaped members.

29. A machine as claimed in claim 28 in which the platens are formed with slots extending lengthwise through the upper surfaces thereof between the dished cup shaped members and in which the slicing knives are aligned lengthwise with said slots for passage therethrough during advancement of the platen with the strip and sealed film longitudinally relative to the knives, and means for advancing the platen and supported strips lengthwise relative the knives to slice the strip and film into endless crosswise sections.

30. A machine as claimed in claim 28 which includes guide means fixed to the frame adjacent the cutting knives for stabilizing the position of the platens during displacement longitudinally relative to the array of cutting knives.

31. A machine as claimed in claim 1 in which the cutters for severing the film crosswise between longitudinally aligned strips comprises a crosswise extending blade having laterally spaced apart V-shaped portions defining a continuous cutting edge having spaced peaks for penetration of the film at a plurality of laterally spaced apart points, and means mounting the cutting blade for movement between raised and lowered positions with the cutting edge of the blade below the surface of the platen in the space between the platens when in lowered position to cut the film crosswise and sever the sealed dished cup shaped members filled with content material.

32. A machine as claimed in claim 31 which includes means for actuating the cutting blades from raised and lowered positions and back while in vertical alignment with the space between adjacent platens.

33. A machine as claimed in claim 31 in which the cutting blade is formed of a crosswise support and a plurality of crosswise spaced razor edge members mounted to depend angularly from the crosswise support.

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