Oct. 3, 1967 C. E. CLOUD ET AL 3,344,576

METHOD AND APPARATUS FOR PACKAGING

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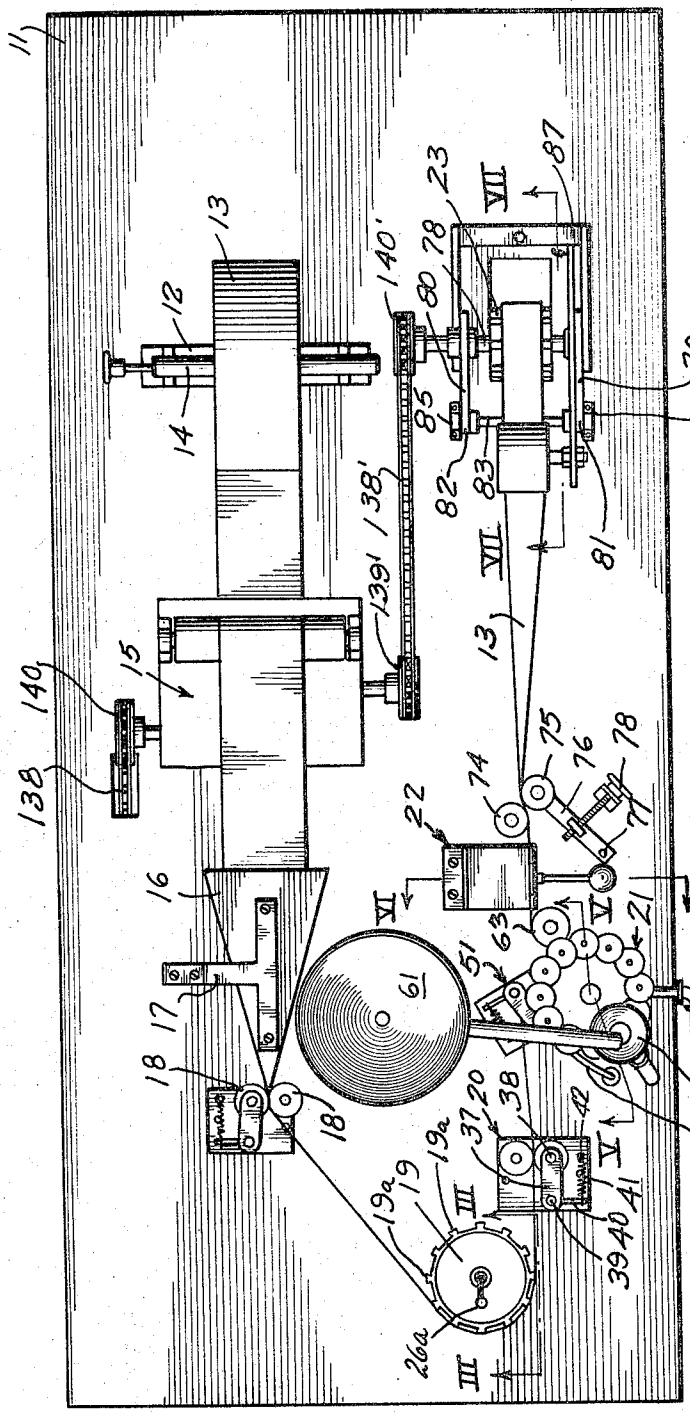

FIG. 1

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METHOD AND APPARATUS FOR PACKAGING

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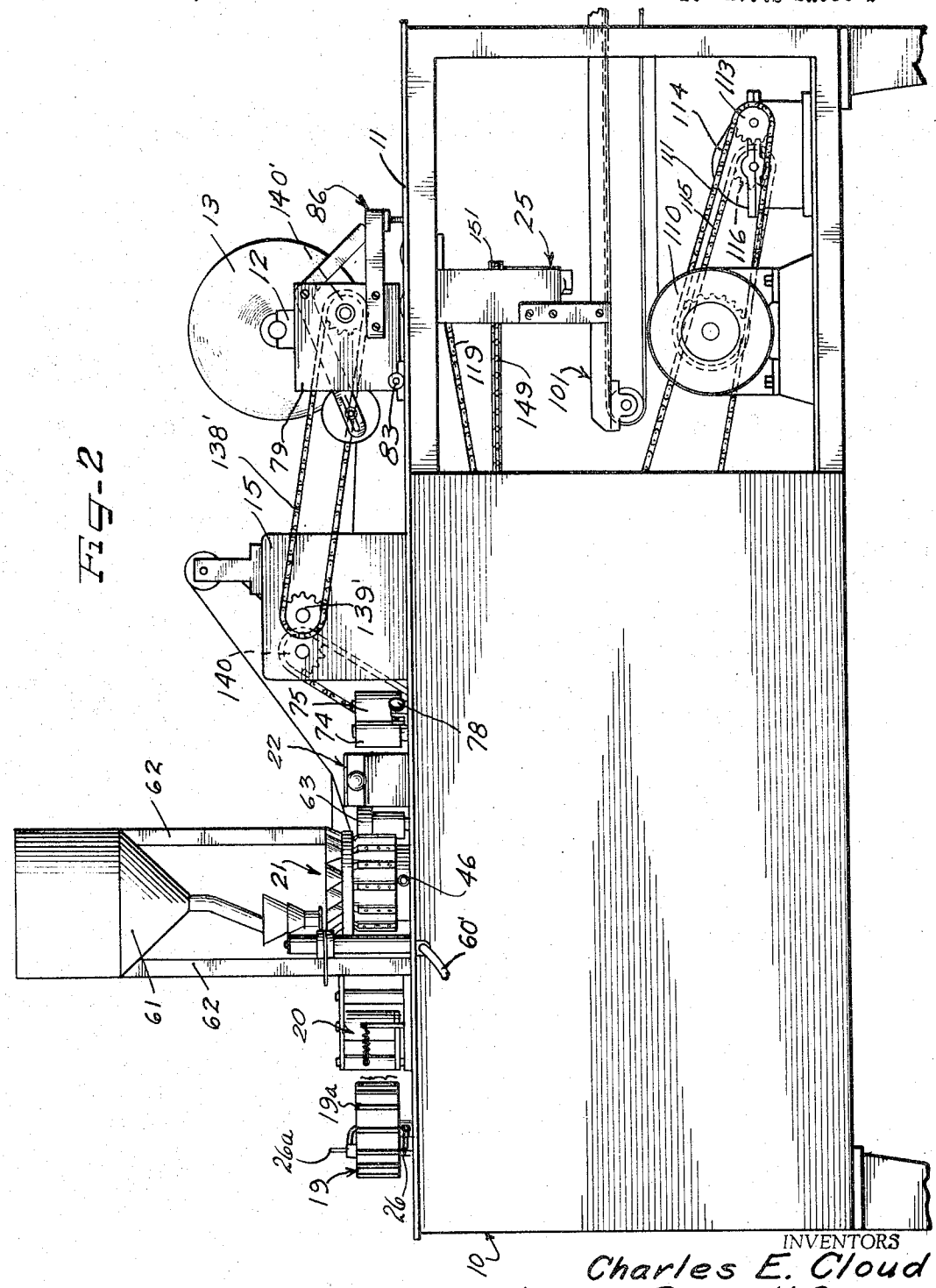

Fig-2

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METHOD AND APPARATUS FOR PACKAGING

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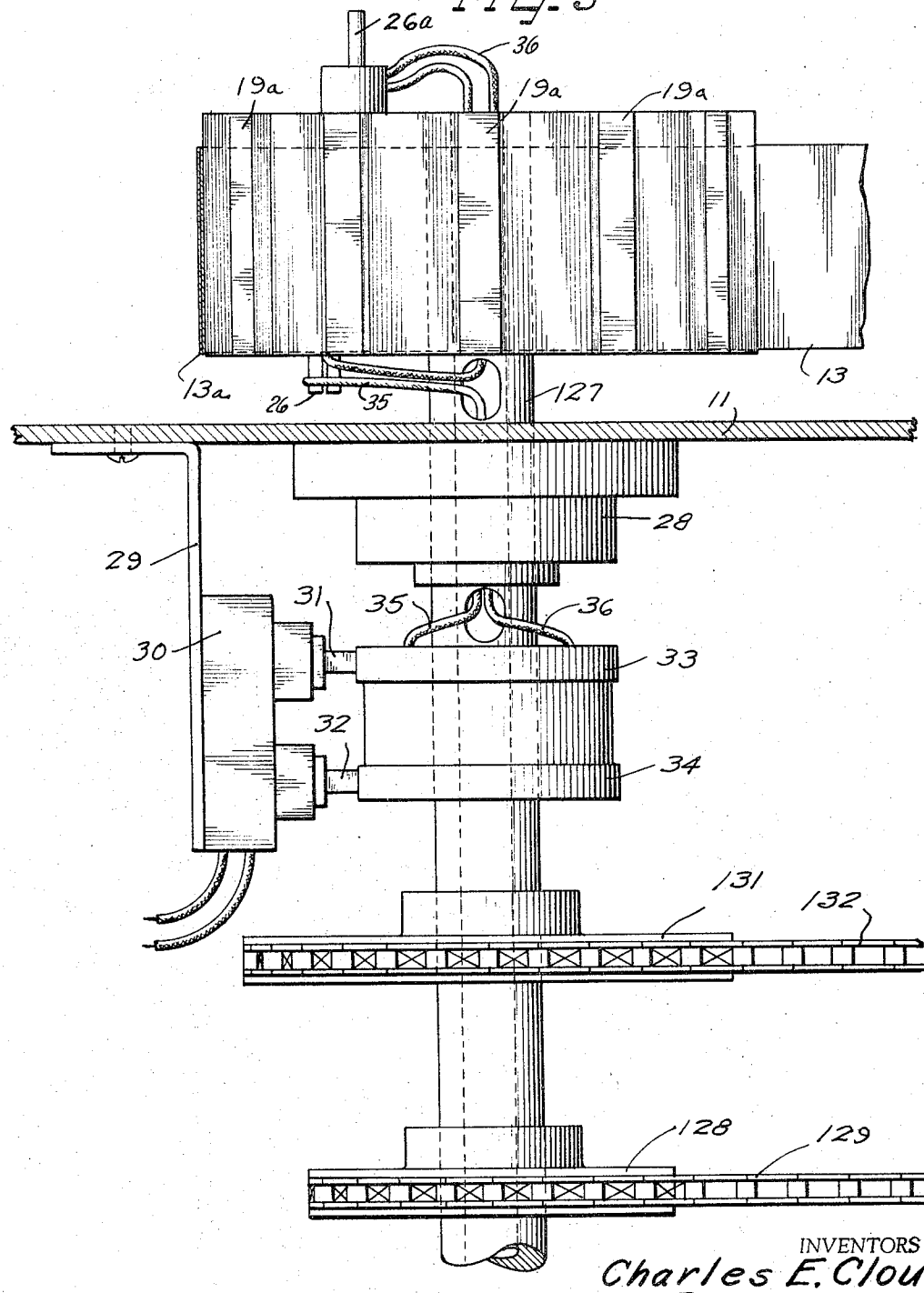
Fig. 3



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METHOD AND APPARATUS FOR PACKAGING

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Fig. 4

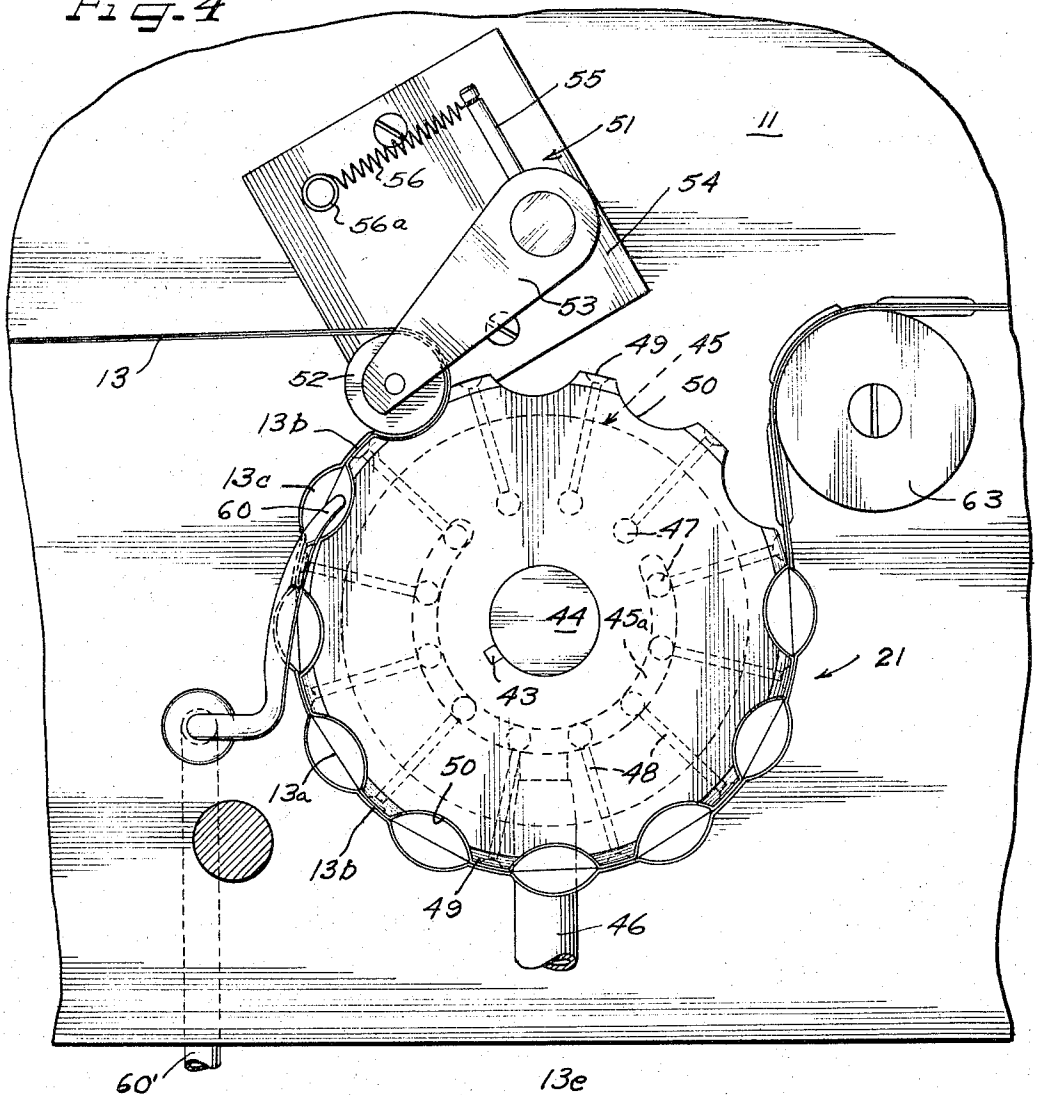
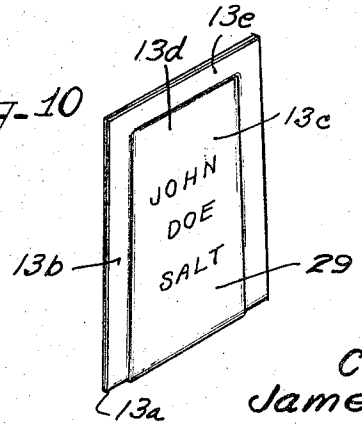


Fig. 10



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METHOD AND APPARATUS FOR PACKAGING

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Fig. 5

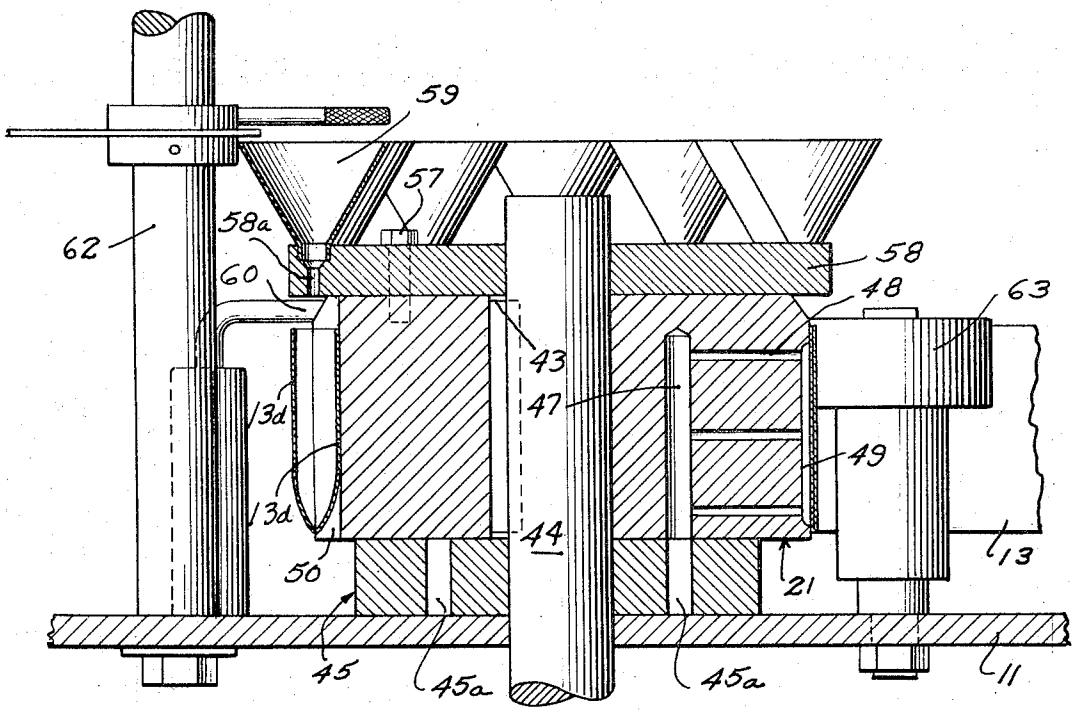
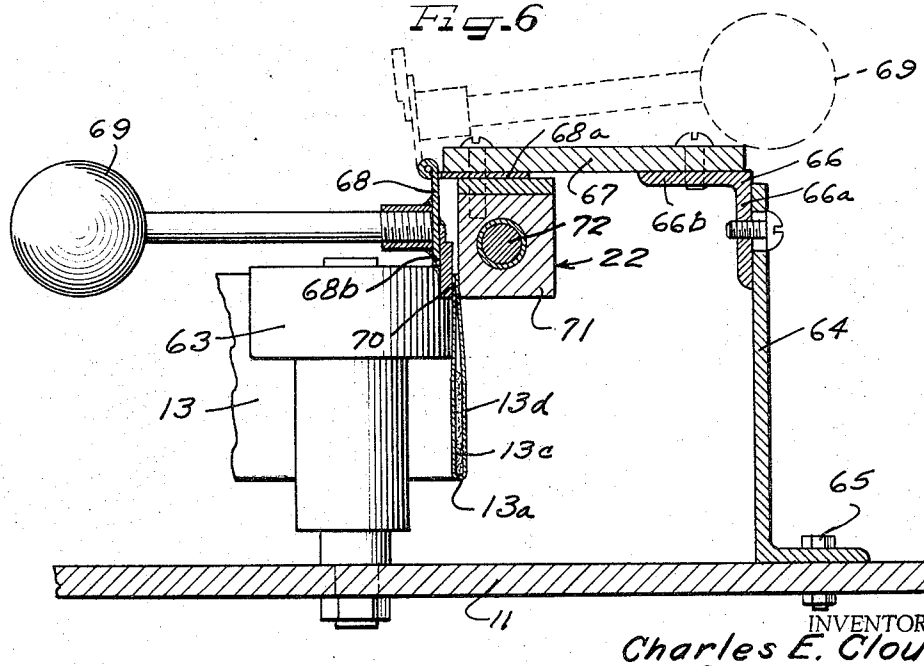


Fig. 6



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METHOD AND APPARATUS FOR PACKAGING

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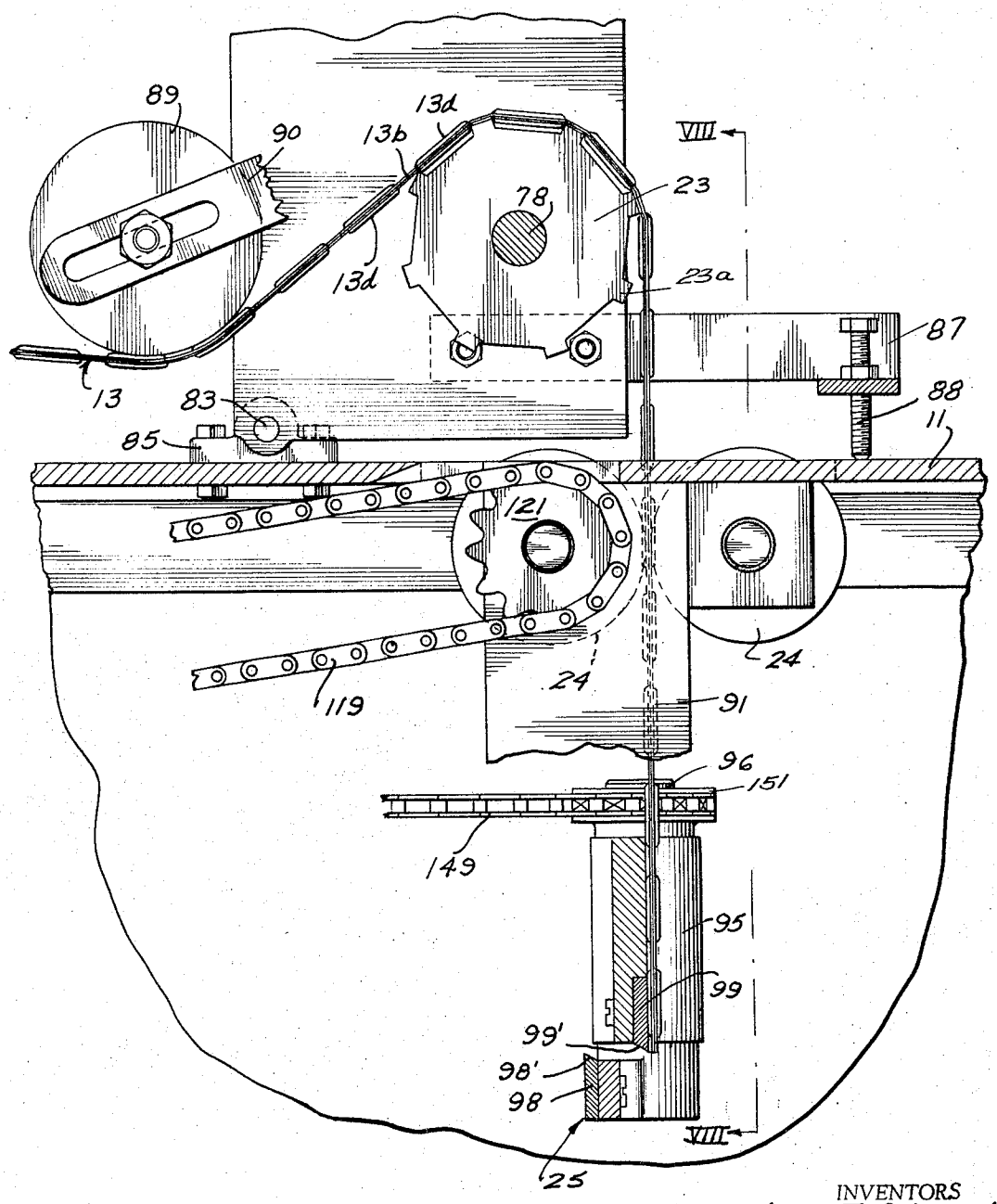
Fig. 7



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METHOD AND APPARATUS FOR PACKAGING

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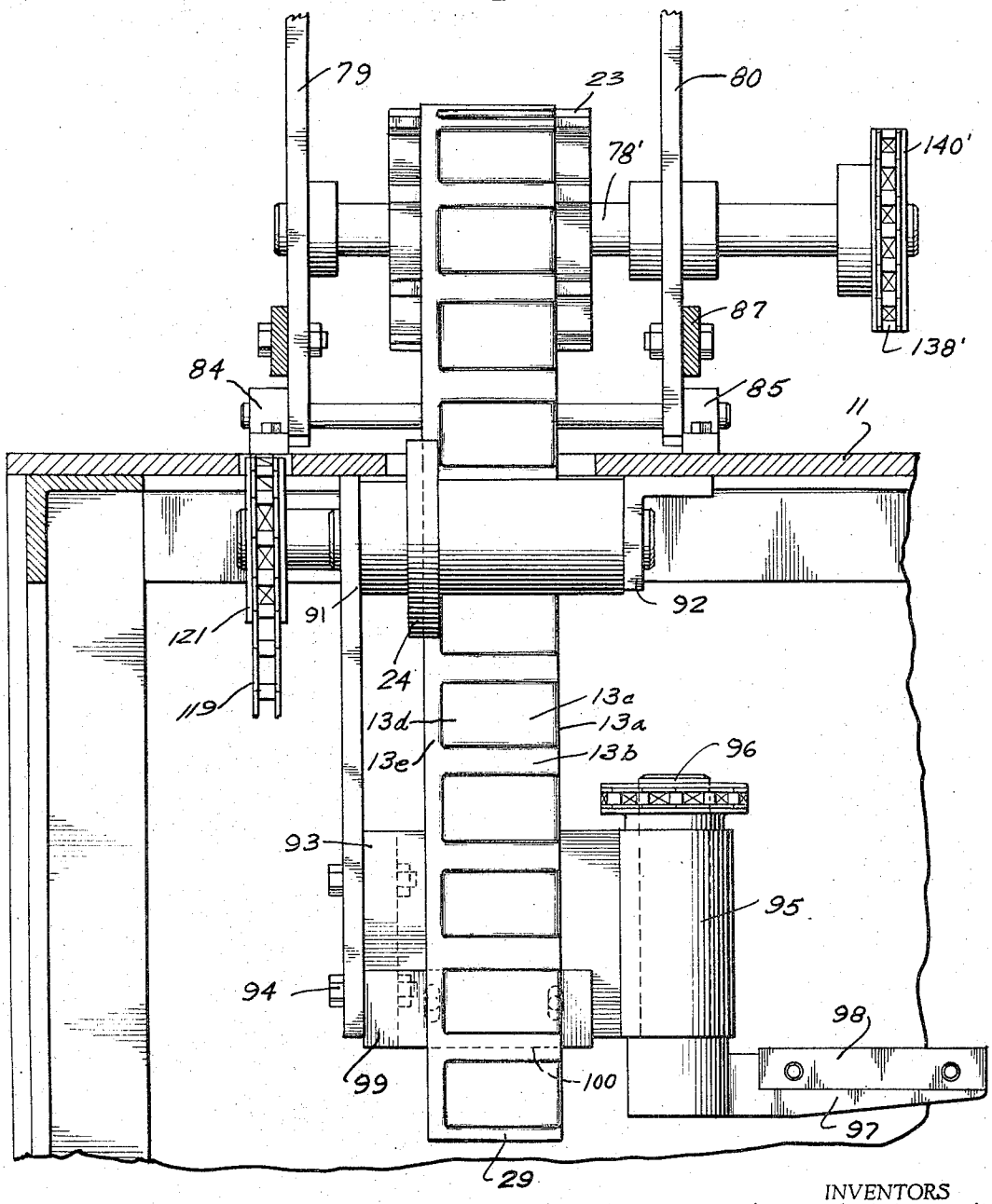
Fig. 8



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METHOD AND APPARATUS FOR PACKAGING

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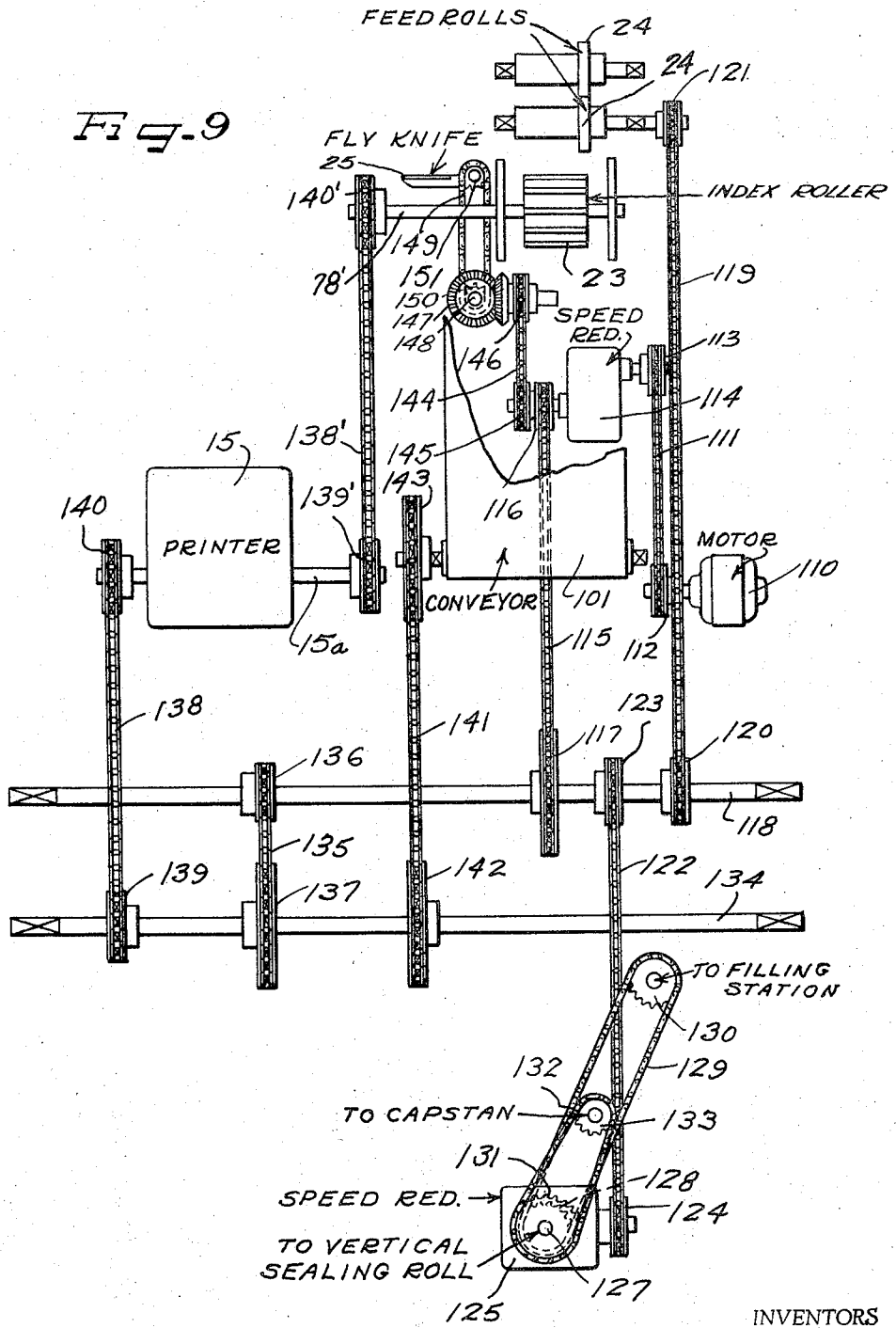
Fig. 9



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METHOD AND APPARATUS FOR PACKAGING

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Fig. 14

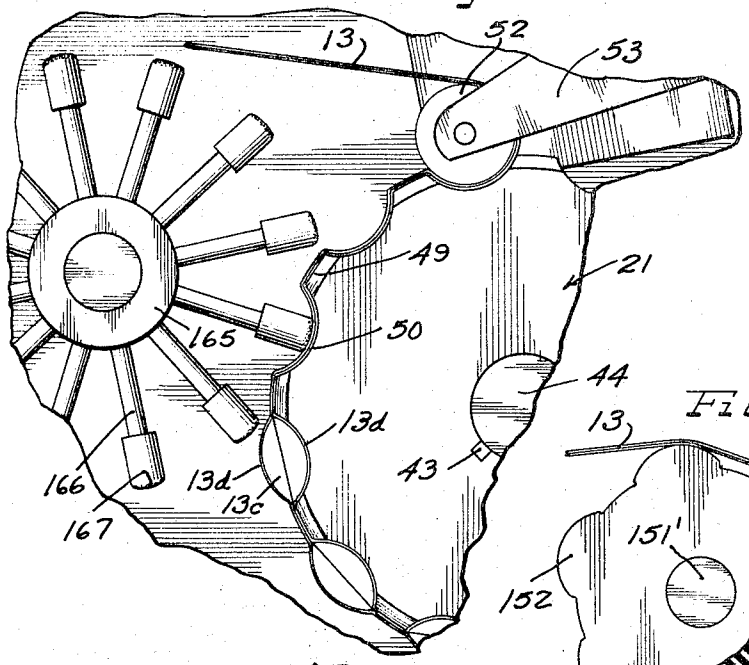


Fig. 11

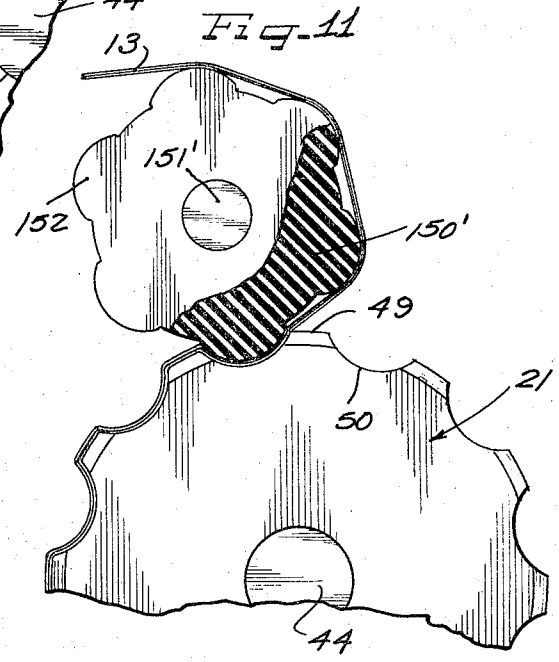


Fig. 13

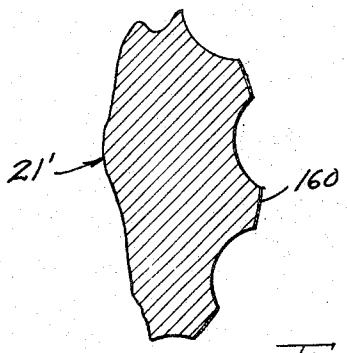
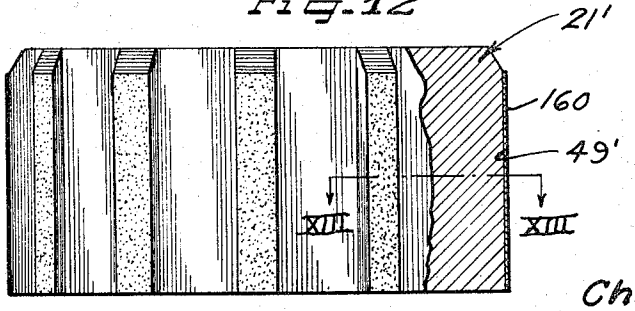


Fig. 12



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METHOD AND APPARATUS FOR PACKAGING

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Fig-15

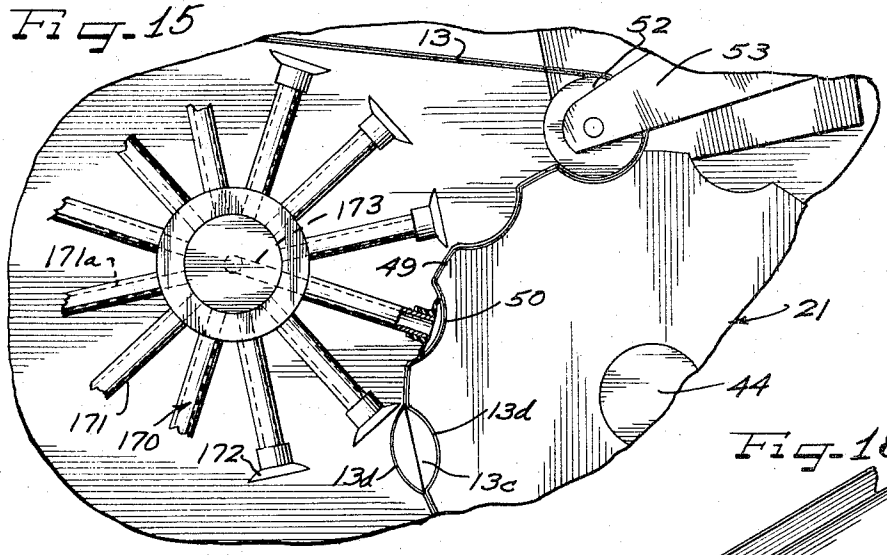


Fig-18

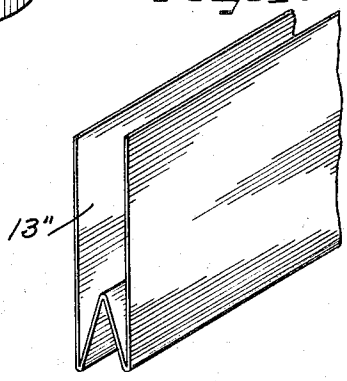


Fig-16

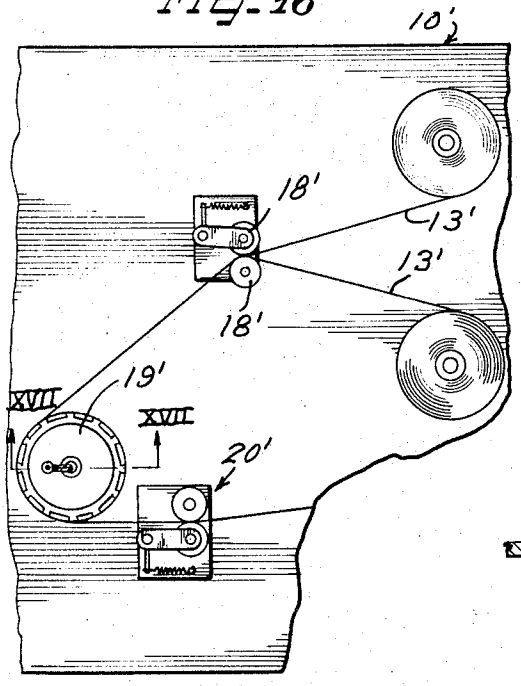
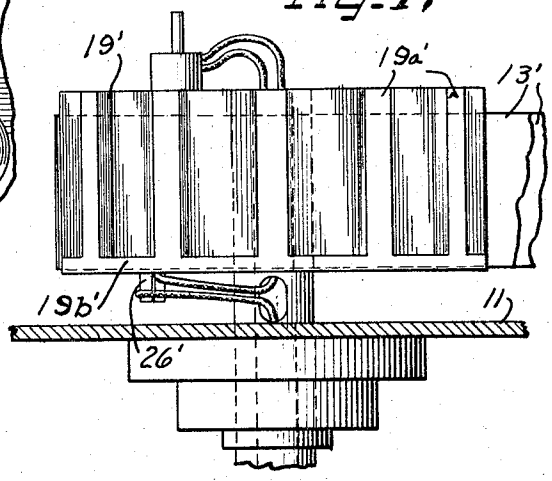


Fig-17



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United States Patent Office 3,344,576 Patented Oct. 3, 1967

3,344,576

METHOD AND APPARATUS FOR PACKAGING

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Filed June 26, 1963, Ser. No. 290,725
36 Claims. (Cl. 53—28)

This invention relates to a machine and method for continuously forming a series of filled packages from a continuous length of flexible material. The material may be any flexible medium, such as a plastic, paper, cloth, or metal strip, transparent or otherwise, or in fact any material that will conform to the herein described requirements. If desired, the strip material may be plastic coated where the pockets are to be formed by a heat sealing operation.

An important object of the invention is to provide an improved machine and method for high-speed production of filled packages.

Further objects severally are, the method of making such filled packages from a strip or strips of material by a series of steps performed thereon, the method of filling the pockets during the course of manufacture, and the method of making such flexible-filled packages from strip material, and filling the same during the course of forming the packages and before the packages are severed from the continuous strip.

Important features of the present invention relate to an improved apparatus for high-speed manufacture of filled packages from continuous strip material, which apparatus has means for filling the strip pockets with the desired amount of material such as salt or sugar following the formation of the spaced pockets along the length of the strip of material, and means for sealing open ends of the pockets and then severing the thus filled packages from the continuous strip of material.

A more specific feature of my invention relates to a new and improved packaging apparatus having an endless rotating filling station such as a drum, which filling station or drum is provided with spaced lands and valleys about its periphery around which the continuous strip is guided and longitudinally moved and with the distances between the lands being less than the distances between the vertical heat seals disposed along the length of the strip material.

According to other features of our invention, means is provided for holding the heat sealed areas of the continuous strip against the lands and means for pressing the sides of the pockets into the valleys on the filling station.

Yet another important feature of our invention relate to new and improved means for opening the pockets by moving one side wall of the pocket out of the valley to enable the pocket to be then filled with material, sealed, and then severed from the continuous length of strip material.

Further objects and advantages will appear from the detailed description and claims to follow, particularly in connection with the accompanying drawings, which illustrate more or less diagrammatically, and by way of example and not of limitation, single and double strip type machines and apparatus for carrying out the new process and producing filled packages.

On the drawings:

FIGURE 1 is a top plan view of our machine;

FIGURE 2 is a side view of our machine;

FIGURE 3 is an enlarged fragmentary view of a vertical heat sealer mechanism with portions shown in section as viewed on lines III—III looking in the direction indicated by the arrows as shown in FIGURE 1;

FIGURE 4 is an enlarged fragmentary top plan view of our bag opening and filling station;

FIGURE 5 is an enlarged vertical section through our bag opening and filling station as viewed on the lines V—V looking in the direction indicated by the arrows shown in FIGURE 1;

FIGURE 6 is an enlarged fragmentary vertical section of a heat sealing mechanism shown in full and dotted lines for sealing tops of filled pockets or bags as viewed on the line VI—VI looking in the direction indicated by the arrows shown in FIGURE 1;

FIGURE 7 is an enlarged fragmentary view of our machine illustrating a mechanism for severing the bags from the continuous strip and which section is taken substantially on the line VII—VII looking in the direction indicated by the arrows as seen in FIGURE 1;

FIGURE 8 is an enlarged fragmentary end view with parts shown in section further illustrating the mechanism for severing the filled bags or packages from the continuous strip and which section is taken substantially on the line VIII—VIII looking in the direction indicated by the arrows as seen in FIGURE 7;

FIGURE 9 is a schematic view illustrating the drives for the mechanisms of our machine;

FIGURE 10 is a perspective view of a filled bag or package produced by our machine;

FIGURE 11 is an enlarged fragmentary top plan view of a modified type of roller for engaging a continuous film strip with our filling station;

FIGURE 12 is a side view of a filling drum having modified means for holding heat sealed areas of a film strip thereagainst;

FIGURE 13 is a sectional view taken substantially on the line XIII—XIII looking in the direction indicated by the arrows shown in FIGURE 12;

FIGURE 14 is an enlarged fragmentary top plan view of a filling station having modified means for presssing the film strip into the valleys on the drum;

FIGURE 15 is an enlarged fragmentary view similar to FIGURE 14 only illustrating still another modified means for engaging the film strip in the valleys on the drum;

FIGURE 16 is a fragmentary top plan view of a machine similar to FIGURE 1 only one adapted to form filled packages from separate strips of stock;

FIGURE 17 is an enlarged fragment partially section view taken substantially on the line XVII—XVII looking in the direction indicated by the arrows as seen in FIGURE 16; and

FIGURE 18 is a fragmentary perspective view of another modified type of continuous strip adapted for use in our machine.

General description

According to the illustrated form of the invention, a filled package **9** of the type shown at FIGURE 10 is adapted to be produced by our packaging machine **10**. The present machine has been found to be capable of producing hundreds of these packages per minute. The package **9** may be produced from a continuous strip of material or from several continuous strips of material, as shown in FIGURE 16. The type of machine used will depend upon the type of film to be used. Some films can be more readily folded than other films and machines of the type shown in FIGURE 1 can be readily used for producing filled packages of this type. Where other types of films are employed, such as celluloid, which films cannot be readily folded, it may be desirable to use a modified type of machine as shown in FIGURE 16.

The machine **10** has a base **11** supporting various components of our machine. Mounted on top of the base **11** is means comprising a roll stand **12** for supporting a roll or strip of packaging material **13**. The roll **13** is sup-

ported on an arbor **14** in such a way that when the strip is unrolled, the strip is disposed generally in a horizontal plane. The strip **13** may be of any suitable type and can be coated on at least one side with a sealable material such as plastic or other suitable adhesive.

Mounted at one side of the roll stand and included as optional equipment, is a printing device **15**. The strip **13** may be suitably printed by moving the same through the printing device **15**.

A suitable paper plow **16**, supported on a paper plow bracket **17**, is disposed forwardly of the printer **15** for folding the strip **13**. When the strip is folded at **13***a*, the fold is disposed at the bottom of the strip as the strip then assumes generally a V-shape.

In order to further prepare the strip **13** so that filled packages may be formed, a pair of guide rollers **18**, **18** is disposed on the downstream side of the plow and the folded strip **13** is guided therebetween to a vertical sealer **19**. The strip **13** is adapted to be pulled and moved through an arc as the vertical sealer is driven contemporaneously with the capstan and drive rolls **20**. The vertical sealer has a series of vertically extending circumferentially spaced heated lands **19***a* which are provided to form longitudinally spaced vertically extending heat seals **13***b* in the strip. After the strip has been heat sealed in the manner described, pockets **13***c* are formed and each is disposed between a pair of pocket side walls **13***d*. The strip is then moved through a filling station **21** and any suitable material may be inserted in the pockets **13***c* in the desired amount. Each pocket may be filled with the desired amount of sugar or salt or a cracker or a slice of bread. Where material such as sugar is to be placed in the pockets, the pockets are filled in a pouring operation as illustrated. Where each pocket is to be filled with a cracker or the like, and a pouring operation is not necessary, the cracker can be inserted from a side of the strip into an open pocket. Thereafter, the strip is moved through a top heat sealer **22** which provides a horizontal heat seal **13***e* to close each pocket **13***c*.

The generally vertical strip is then turned so as to again move in a generally horizontal plane over an index roller (FIGURE 7). A pair of feed rollers **24**—**24** is positioned beneath the index roller **23** in vertical alignment with a fly knife mechanism **25**. The rotation of the index roller **23** is synchronized with the fly knife mechanism **25** so that the filled packages or pouches **9** (FIGURE 10) are severed from the strip **13** at the areas of the heat seals **13***b*.

Vertical sealer and drive rolls

The vertical sealer **19** (FIGURE 3) is mounted on a hollow vertical shaft **127** supported on the base **11** by a bearing **28**. A junction box support bracket **29** is suspended from an underside of the base **11** and carries a junction box **30** having brushes or sliding contacts **31** and **32** which are engaged with electrically insulated collector rings **33** and **34** carried by the hollow vertical shaft **27** and rotatable in unison therewith. Electrical lead lines **35** and **36** are joined with a heater **26** and a heater thermostat **26***a* (FIGURE 3) which heats the lands **19***a* for forming the spaced vertical seals **13***b* in the folded strip **13**. The wire **35** is connected with one terminal of the heater **26** while the wire **36** is connected with the thermostat **26***a*.

After the folded strip **13** is formed with vertical seals **13***b*, the strip is drawn between the drive rolls **20**. The drive rolls **20** each have a vertical axis and are rotatably mounted on the base **11**. A pivot arm **37** is joined at **38** (FIGURE 1) with one of the rolls **20** and has a pivot **39** at an opposite end. The arm **37** is further connected to a lever arm **40** which is joined to a spring **41**. The spring **41** is attached to the base at **42**. The spring **41** serves to hold the rolls against opposite sides of the strip **13**. The one roller **20** can be pivoted away from the other roller on its pivot **39** to facilitate threading of the strip between the drive rolls. The spring insures that the drive rolls are snugly engaged with the strip to drive the same.

Pouch filling

The filling station or drum **21** is keyed at **43** on a drive shaft **44** for rotating on a suction block or plate **45** disposed between the base **11** and the drum **21**. The suction block **45** is affixed to the base and the drum **21** rotates on the block **45** (FIGURE 5). The suction block **45** has a C-shaped suction passage **45***a* (FIGURE 4) and a suction inlet pipe **46** is connected therewith.

A vertical suction passage **47** is joined with a set of vertically spaced radial suction passages **48**. The passages **47** and **48** are grouped in circumferentially spaced sets and lower ends of the vertical passages **47** are in alignment with the C-shaped suction passage **45***a* in the suction block **45**.

As will be seen in FIGURE 4, the drum **21** has vertically extending circumferentially spaced lands and valleys **49** and **50** about its perimeter. The valleys **50** may be of any desired shape such as arcuate or semi-square, and it is not absolutely essential that the strip contact the valley bottom when engaged about the drum **21**. The circumferential distance between the lands is less than the distance between the vertical heat seals **13***b* when the strip **13** is engaged about the drum **21**. In order to hold the strip **13** snugly against the drum **21** while the pockets **13***c* are opened and then filled, outer ends of radial suction passages **48** terminate at radially outer faces of the lands **49**. The drum suction passages **47** and **48** are activated only when in communication with the C-shaped suction block passage **45***a*. When the drum suction passages are disconnected from the suction block passages **45***a*, the strip **13** is no longer positively secured with the drum **21** as shown in FIGURE 4.

Means is provided for corrugating the strip **13** and for snugly engaging the strip against the lands and valleys **49** and **50** of the filling station or drum **21** which, in the form shown in FIGURE 4, comprises a bouncing roller assembly indicated generally at **51**. The assembly **51** includes a roller **52** supported on a roller support arm **53** which arm is pivotally mounted at one end on a plate **54** secured to the base **11**. A lever arm **55** is operatively connected with the pivot arm at one end and with a spring **56** at an opposite end, the spring being anchored at **56***a* to the plate **54**. The spring **56** exerts a force which tends to pull the lever arm toward the anchored end **56***a* of the spring **56** thus causing the roller **52** to be urged against the perimeter of the drum **21**. Immediately after the strip **13** is pressed against the drum **21**, the block and drum suction passages are operatively connected so that the land against which the strip is engaged has suction at its outer surface for holding the strip in snug engagement with the drum.

Co-rotatably secured with the drum **21** by bolts **57** (FIGURE 5) is a funnel support plate **58** which has a series of material passages **58***a* in vertical alignment with the valleys **50**. A series of funnels **59** have lower ends **59***a* telescoped inside of the material passages **58***a*.

Before the funnels are supplied with material to be poured into the strip pockets **13***c*, means is operated to open the pockets **13***c* by spreading the radially outermost pocket side wall **13***d* from the radially innermost pocket side wall **13***d*. This means, in the form illustrated in FIGURES 4 and 5, comprises an air spout or tube **60** having an inlet tube **60'** which is connected with a suitable air supply source for causing an air stream to be directed against uppermost edges of the corrugated or flexed side walls **13***d* to spread them and open the pockets **13***c*.

Positioned downstream of the air spout for unloading material into the funnels **59** after the air stream has been utilized to open the pockets **13***c*, is a material supply or hopper **61**. The material supply or hopper **61** is fixedly supported on the base by hopper posts **62**.

In order to guide the strip **13** having the filled pockets **13***c* away from the filling station **21**, a guide roller **63** is

mounted adjacent to the station **21** and the strip is moved around this roller to the top heat sealer **22**.

Top heat sealer

The heat sealer **22**, for closing the filled pockets **13***c*, includes a support bracket **64** mounted by bolts **65** on the base **11**. An angle **66** has one leg **66***a* secured to the bracket **64**, and support arm **67** is secured to other bracket leg **66***b* (FIGURE 6).

A hinge **68** has one hinge plate **68***a* secured with an underside of the support arm **67** and an opposite hinge plate **68***b* is secured with a handle **69** and a guide sealer **70**. The handle **69** and the guide sealer **70** are movable on the hinge **68** through an arc into an elevated position as shown by the dotted lines in FIGURE 6. A heated block **71** is secured with the support arm **67**. Disposed internally of the block **71** is a heating element or unit **72**. The upper edges of pocket side walls **13***d* are pulled longitudinally between guide sealer **70** and heated block **71** to close the pockets **13***c*.

Mounted adjacent the top sealer **22** is a pair of guide rolls **74** and **75**. The guide roll **75** is swingably mounted on one end of a pivot arm **76** that is pivotally secured at **77** to the base **11**. A screw adjustment mechanism **78** is provided to adjust the roll **75** with the desired amount of tension against the strip **13** (FIGURE 1).

Cut-off mechanism

The index roller **23** is mounted on an index roller shaft **78'** which is journalled at opposite ends on support arms or plates **79** and **80** (FIGURE 1). The arms **79** and **80** are pivotally mounted at one end at **81** and **82** on rock shaft **83** carried on bearing blocks **84** and **85**.

An index roller adjustment mechanism **86** is provided for vertically moving the index roller with respect to the fly knife so that it will be properly aligned with the transverse heat seals **13***b* to cut the filled pockets from the strip at these areas. The mechanism **86** includes a U-shaped frame **87** having a vertical screw **88** secured on the frame **87** with a lower end engaged against the base **11**. By moving the screw **88**, the index roller **23** will be pivoted on pivot axis or rock shaft **83**.

The index roller **23** has a series of teeth **23***a* about its perimeter which are spaced apart a distance slightly in excess of the width of the filled pocket **13***c* on the strip to engage with the pocket and move the pocket in timed relation to the fly knife **25**. A tension roll **89** is supported on an arm **90** carried on the plate **79** for applying tension to the strip **13** to hold the strip against the index roller **23**. It will further be noted that after the strip **13** leaves the top sealer **22**, it is moved to an essentially horizontal plane as the strip passes beneath the tension roll **89**.

The feed rollers **24** are mounted on the base below the index roller **23** for drawing the strip from the index roller **23** and for guiding the strip to the fly knife **25**. As will be noted from FIGURE 8, the feed rolls **24** engage the strip only at the area of the horizontal heat seal **13***e*. The feed rollers **24** do not engage with the filled pouch or pockets **13***c* to avoid possible damage to them. The feed rollers **24** are supported on the underside of the base **11** and are journalled on a pair of support brackets **91** and **92**. The support bracket **91** extends below the support bracket **92**, and the fly knife support bracket **93** is secured by fasteners **94** to the lower end of the bracket **91**. The bracket **93** has a sleeve-like journal **95** at its outer end. Supported in the sleeve-like journal **95** is a fly knife drive shaft **96**. The drive shaft has a radial arm **97** and a knife blade **98** is supported and projects upwardly through the radial arm **97**. The second blade **99** is fixedly mounted on the fly knife support bracket **93** for coaction with the blade **98**. Each of the blades has a beveled edge **98'** and **99'** (FIGURE 7). When the strip is properly aligned on the index roller **23**, the knives will operate to cut or sever filled packages **9** from the strip **13** at parting line **100** (FIGURE 8). After the filled package is severed from the strip **13**, the package will fall to a conveyor **101** (FIGURE 2) and the filled pouches can then be dumped into cartons for further packaging. If desired, the strip can be perforated at the parting line **100**, to permit the user to separate the packages **9** from one another.

Drives

Our packaging machine **10** may be operated by means of an electric motor **110** through a chain **111** and sprockets **112** and **113** to drive a speed reducer **114**. The speed reducer **114** is joined through a chain **115** and sprockets **116** and **117** to a first jack shaft **118**. It will be appreciated that while a continuous drive is preferable, an intermittent type drive could be used such as by providing the speed reducer **114** with a conventional Geneva drive. The first jack shaft **118** drives feed rolls **24** through a chain **119** and sprockets **120** and **121**. The first jack shaft **118** through chain **122** and sprockets **123** and **124** is connected to a second speed reducer **125**. The speed reducer has a power take-off shaft **127** carrying a small sprocket **128** which is connected through a chain **129** to a sprocket **130** mounted on the drive shaft in the suction roll. The second and larger sprocket **131** is also mounted on the drive shaft **127** and is connected by means of a chain **132** to a sprocket **133** for driving the capstan or drive rolls **20**.

The first jack shaft **118** drives a second jack shaft **134** through chain **135** and sprockets **136** and **137**. A chain **138** and sprockets **139** and **140** connect the second jack shaft **134** with the printer **15**. The printer **15** has a power take-off shaft **15***a* and a chain **138'** and sprockets **139'** and **140'** serve to drive the index roll drive shaft **78** and the index roll **23**.

The jack shaft **134** is further provided with a chain **141** and sprockets **142** and **143** for driving the conveyor **101**, as seen in FIGURE 9. The conveyor may be of any suitable type.

The speed reducer **114** is also joined by means of a chain **144** and gears **145** and **146** to a beveled gear **147**. The beveled gear **147** is mounted on a shaft **148** and a chain **149** is connected by means of sprockets **150** and **151** to the fly knife **25**. The gear sprocket is carried on the shaft **148**.

Modifications

In our experiments with our machine, we have found that a paper depressor roller **150'** may be substituted for the bouncing roller assembly **51**, as shown in FIGURE 11. The roller **150'** can be rotated by a vertical shaft **151'** as the drum **21** rotates to cause the strip **13** to be pressed against the lands **49** and into the valleys **50** in the same manner previously described. The roller is provided with a series of circumferentially spaced rounded protuberances **152**, each having a configuration corresponding to the curvature of each of the valleys **50** so that as the roller **150'** co-rotates with the drum **21**, the protuberances **152** can be nestingly engaged in the valleys **50** to bottom the strip against the valley bottoms.

Our experiments have further revealed that layers of sticky adhesive material such as uncured gum rubber **160** can be mounted on lands **49'** of drum **21'**, as shown in FIGURES 12 and 13. It will be appreciated that the adhesive material will serve to hold the strip **13** against the drum **21'** and that suction will not be employed as used on the drum **21**. Where the strip **13** is comprised of certain types of material such as celluloid, the uncured gum rubber may be used very effectively for holding the same on the drum. Where the strip is made from a rather porous-type paper, it is generally preferable to use a suction type drum **21** rather than the drum **21'** having gum rubber layers **160** on its lands **49'**.

A rotating wheel **165**, having circumferentially spaced radially extending arms **166**, may be substituted in place of the air spout **60** for opening the pockets **13***c*, as shown

in FIGURE 14. The radially outer ends of the arms **166**, as here illustrated, are preferably provided with adhesive-like material such as gum rubber **167**. The wheel **165** is adapted to be co-rotated with the drum **21** and the radially outer ends of the arms **166** are spaced so that the adhesive-like material **167** will engage against the corrugated strip **13** at the bottom of the valleys **50** to pull out the radially outer pocket side wall from the valley bottom and away from the radially inner pocket side wall which is left engaged with the valley bottom. During the rotation of the wheel **165**, the arms **16** move free of the lands **649**, for the adhesive material **167** engages the valley bottoms **50**.

Another type of means may be substituted in place of the air spout **60** as shown in FIGURE 15, which comprises a rotary suction type wheel **170**. The rotary suction type wheel **170** is adapted to co-rotate with the drum **21** in much the same manner as the wheel **165** co-rotates with the drum **21**, as shown in FIGURE 14. In this instance, however, the wheel is provided with circumferentially spaced radially outwardly extending arms **171** each of which has a suction cup **172** at its outermost end. The arms **171** are hollow providing a suction passage **171***a*. The rotating wheel **170** is mounted on a suction block (not shown) having a suction passage **173** which extends radially toward the drum **21** in alignment with the valley bottom which radially confronts the suction passage **173**. In operation, as the wheel **170** is rotated, the arms **171** will be connected with the suction passage **173**. Each arm will be connected with the suction passage **173** for only a short interval during each revolution of the wheel, which interval occurs when the suction arm immediately adjacent to the drum **21** is projected into and engaged with the unopened pocket disposed in the valley bottom. At this time, the suction forces will operate to cause the suction cup **172** to grasp the radial outer pocket side wall **13***d* and to pull the side wall out of the valley bottom and away from the radial inner side wall to open the pocket **13***c* for filling.

Shown in FIGURES 16 and 17 is a modified packaging apparatus or machine **10'**. The machine **10'** differs from the machine **10** in that a pair of strips **13'**, **13'** is fed into the machine between a pair of guide rollers **18'**, **18'** over a vertical sealer **19'**. The vertical sealer **19'** is identical to the vertical sealer **19** only sealing means is provided for forming pocket bottoms along a bottom edge of the strips **13'**. The machine **10** illustrated how a single strip **13** can be folded to form a pocket bottom. The machine **10'** can be used with strip materials which have a tendency to crack when folded. Where a cellophane type of strip is used in our machine **10**, there is a tendency for the lacquer to crack and after the packages are filled, the cracks may permit moisture or other material to enter the package. In order to successfully use certain types of strip materials such as cellophane, we have found that it is preferable to form the filled packages from a pair of strips rather than a single folded strip. The machine **10'** illustrates how a pair of strips **13'**, **13'** may be used in the formation of filled packages. This machine **10'** could also be used with a single strip such as the strip **13** where it is desired to form a heat seal along the longitudinal folded area at one margin of the strip.

The vertical sealer **19'** has circumferentially spaced vertically extending lands **19***a'* which are joined at bottom ends with a circular land **19***b'*. The vertical sealer **19'** operates in the same manner as the vertical sealer **19** which has been previously described herein. As the strips **13'** are moved about the circumference of the vertical sealer **19'**, the strips are formed with transversely extending longitudinally spaced heat seals which correspond to the heat seals **13***b* on the strip **13**. In addition, the strips are formed with a longitudinally extending heat seal by the use of the circular land **19***b'*, which longitudinal seal extends along one edge of the thus joined strips **13'** and forms the bottom of the pouches. These lands are heated by heater **26'**.

The other components for filling the pouches, formed by the machine **10'**, are identical to those already illustrated and described in connection with the machine **10** and further illustration and description of such components is believed unnecessary.

It is further contemplated that other types of strips may be used on our machines such as the strip **13''** shown in FIGURE 18. The strip **13''** can be used in our machine **10** to form pouches having gusset-shaped bottoms.

Method

The steps of our method have already been described at length herein, but in order to summarize the previous description, the following statements are submitted.

In all forms of our invention, it is contemplated that filled packages **9** may be continuously formed from one or more continuous strips and that after the packages are formed and filled with any suitable material, the packages may then be severed from the strip or strips. By manufacturing packages in this manner, the packages can be formed and filled at higher rates of production than has been attainable with prior types of machines and methods.

After the strip or strips have been formed with vertical heat seals, the strip or strips are corrugated whereby the vertical heat seals are caused to be moved closer together. All of the pocket side walls project outwardly from the same side of the strip or strips when the strip is in a corrugated condition. Thereafter, it is contemplated that the pocket side walls of each pocket be spread to open the pocket and then the pockets are filled with material. In accordance with our previous description herein, it will be appreciated that several methods may be employed for opening the pockets. The pockets may be blown open or mechanically pulled open, as desired, and depending upon the type of material of which the strip is comprised. The open ends of the pockets and then sealed shut and the filled pouches may be cut or perforated at the area of the transverse heat seal to permit ready severance of the filled pouches from the continuous strip or strips.

Although minor modifications might be suggested by those versed in the art, it should be understood that we wish to embody within the scope of the patent warranted hereon, all such modifications as reasonably and properly come within the scope of our contribution to the art.

We claim as our invention:

1. In a packaging apparatus,

means for guiding and longitudinally moving a continuous strip having longitudinally spaced pockets separated by transversely spaced heat seals with ends of the pockets being open and with each pocket having sides, a moving filling station having spaced lands and valleys about its periphery around which the continuous strip is guided and longitudinally moved and with the distances between the lands being less than the distances between the transversely spaced heat seals, means for pressing the sides of the pockets into the valleys and engaging the continuous strip about the periphery of the endless station,

means for holding the heat seals on the continuous strip against the lands as the filling station is moved while the pockets are integral with the continuous strip,

means to spread the strip sides of each pocket between the seals at opposite ends of the pocket,

means to fill the open pockets with material, and means for sealing the pocket sides together at the open end of each pocket after filling.

2. In a packaging apparatus,

means for guiding and longitudinally moving a continuous strip having longitudinally spaced pockets

separated by transversely spaced heat seals with ends of the pockets being open and with each pocket having sides,

a rotating filling station comprising a drum having circumferentially spaced lands and valleys about its circumference around which the continuous strip is guided and longitudinally moved and with the distances between the lands being less than the distances between the transversely spaced heat seals,

means for pressing the sides of the pockets into the valleys and for engaging the vertical heat seals against the lands,

means for holding the heat seals on the strip against the lands as the drum is rotated,

means to spread the pocket sides between each pair of seals to open the pockets while the pockets are integral with the continuous strip,

means to fill the open pockets with material, and means for sealing the pocket sides together at the open end of each pocket after filling.

3. The apparatus of claim 2 further characterized by said means to open the pockets including a rotating wheel having circumferentially spaced suction cups engageable with the radially outer sides of the strip for pulling the outer sides out of the valleys on the drum and which cups are releasable from outer sides as the pockets are opened.

4. The apparatus of claim 2 further characterized by said means to open the pockets being operable to direct an air stream against edges of the strip sides of each pocket to separate the sides and to open each pocket.

5. The apparatus of claim 2 further characterized by said means to open the pockets including a rotating wheel having radially extending arms having means comprising an adhesive-like material such as gum rubber on radially outer ends which are engageable with outer sides of the pockets for pulling the outer sides of the strip out of the valleys and which are releasable from the outer sides as the pockets are opened.

6. The apparatus of claim 2 further characterized by said means for holding the heat seals against the lands including suction outlets on the lands enabling suction forces to be generated to effect the holding of the heat seals against the lands.

7. The apparatus of claim 2 further characterized by said means for holding the heat seals against the lands comprising a thickness of a sticky adhesive material such as uncured gum rubber mounted on each land.

8. In a packaging apparatus,

a source of packaging material having at least one sealable surface,

means for forming the packaging material into a continuous strip having longitudinally spaced pockets separated by vertical heat seals with upper ends of the pockets being open and with each pocket having sides,

a rotating filling station comprising a drum having circumferentially spaced lands and valleys about its circumference around which the continuous strip is moved and with the distances between the lands being less than the distances between the vertical heat seals, means for pressing the sides of the pockets into the valleys and for engaging the vertical heat seals against the lands,

means for holding the heat seals on the strip against the lands as the drum is rotated,

means to radially spread the pocket sides between each pair of seals to open the pockets while the pockets are integral with the continuous strip,

funnels positioned to discharge material into the opened pockets between each pair of seals,

a fixed material supply positioned to discharge material constantly into said funnels as they pass thereunder,

timed means for rotating said drum and funnels successively past said material supply to flow material into open pockets,

heat means for sealing the pocket sides together at the open end of each pocket after filling, and

means for successively cutting filled packages from the continuous strip between successive pairs of vertical seals on the continuous strip.

9. In a packaging apparatus,

means for guiding and longitudinally moving a continuous strip having longitudinally spaced pockets separated by heat seals with upper ends of the pockets being open and with each pocket having sides,

a rotating filling station comprising a drum having circumferentially spaced lands and valleys about its circumference around which the continuous strip is guided and longitudinally moved and with the distances between the lands being less than the distances between the vertical heat seals,

means for pressing the sides of the pockets into the valleys and for engaging the vertical heat seals against the lands,

means for holding the heat seals on the strip against the lands as the drum is rotated,

means to radially spread a radially outer pocket side from a radially inner pocket side leaving the radially inner pocket side in the associated valley to open each of the pockets while the pockets are integral with the continuous strip,

means to successively pour material into the open pockets,

means for sealing the pocket sides together at the open end of each pocket after filling, and

means for successively cutting filled packages from the continuous strip between successive pairs of vertical seals on the continuous strip.

10. The method of forming filled packages from at least one continuous strip of flexible material, which comprises,

processing the strip forming successive pockets along the length of the strip with ends of the pockets along one margin of the strip being open,

converting the strip from an essentially flat form to an undulated form,

successively opening the pockets along the length of the strip by moving one pocket side wall on each pocket relative to an adjacent pocket side wall,

successively filling the pockets, and

closing open ends of the pockets along the length of the strip.

11. The method of continuously forming filled packages from a pair of continuous strips of flexible material as the strips are continuously advanced together, which comprises,

processing the strips by sealing them together at bottom edges and also sealing the strips to form successive pockets along the length of the strips with upper ends of the pockets being open and with the pockets being separated by vertical heat seals,

converting the thus joined strips from an essentially flat form to an undulated form with the joined strips being bent at the vertical heat seals and with side walls of each of the pockets being concentrically curved,

successively opening the pockets along the length of the joined strips by moving one vertical pocket side wall on each pocket relative to an adjacent vertical pocket side wall,

successively filling the pockets,

closing upper ends of the pockets along the length of the joined strips, and

successively severing the pockets from the continuous strip to form filled packages.

12. The method of continuously forming filled packages, which comprises,

processing the strip material forming successive pockets along the length of the strip material with ends of the pockets being left open,

corrugating the strip material with the pockets all dis-

posed on the same side of the length of strip material,
successively opening the pockets along the length of the corrugated strip material by moving and spreading at least one of the pocket side walls relative to the associated pocket side wall,
successively filling the thus opened pockets,
sealing open ends of the pockets, and
severing the filled pockets from the continuous length of strip material to form filled packages.

13. The method of continuously forming filled packages, which comprises,
processing the strip material forming successive pockets along the length of the strip material with the pockets being separated by transversely sealed areas and with ends on one side of said pockets being left open,
corrugating the strip material by moving the transversely sealed areas along the length of the strip material closer together and by bulging the pockets in a common direction away from and along one side of the length of strip material,
spreading the pocket side wall of each pocket to open the same,
filling the open pockets,
sealing the open ends, and
severing the pockets from the continuous length of strip material at the transversely sealed areas to form filled packages.

14. The method of continuously forming filled packages, which comprises,
processing the strip material forming successive pockets along the length of the strip material with the pockets being separated by transversely sealed areas and with ends on one side of said pockets being left open,
corrugating the strip material by moving transversely sealed areas along the length of the strip material closer together and by bulging the pockets in a common direction away from and along one side of the length of strip material,
spreading the pocket walls nearest to the transversely sealed areas away from the other pocket side walls disposed while holding the other pocket side walls against movement to open the pockets,
filling the pockets,
sealing shut the open ends of the pockets, and
cutting the pockets along the transversely sealed areas to form filled packages.

15. The method of continuously forming filled packages, which comprises,
processing the strip material forming successive pockets along the length of the strip material with upper ends of the pockets being left open,
corrugating the strip material with the pockets all disposed on the same side of the length of strip material,
successively opening the pockets along the length of the corrugated strip material by moving and spreading at least one of the pocket side walls relative to the associated pocket side wall,
successively filling the thus opened pockets,
sealing upper open ends of the pockets,
turning the strip material from a generally vertical plane to a horizontal plane,
moving the thus turned strip material in a downward direction, and
severing the pockets therefrom by cutting the strip material at the areas disposed between the pockets to continuously form filled packages.

16. In a packaging apparatus,
means for supporting a strip of packaging material coated on at least one side with a sealable film moving forward in a horizontal plane,
means for forming the strip with longitudinally spaced pockets separated by vertical heat seals and having upper open ends,
a rotating filling station comprising a drum having alternating lands and valleys around which said strip is moved,
means for pressing the strip into the valleys to draw the longitudinally spaced vertical heat seals closer together to facilitate opening of the pockets between the heat seals,
means for impelling air between each pair of seals to open and balloon pocket sides between each pair of seals into open pockets,
funnels positioned to discharge material into the opened pockets between each pair of seals,
a fixed material supply positioned to discharge material constantly into said funnels as they pass thereunder,
timed means for rotating said drum and funnels successively past said air impeller means and said material supply to flow material into the open pockets, and
heat means for sealing the strip together at the open end of each pocket after filling.

17. In a packaging apparatus,
means for supporting a strip of packaging material coated on at least one side with a sealable film,
means for longitudinally folding said strip with the film innermost and with the folded edge of the strip at one strip margin,
means for forming transversely spaced heat seals transversely of said strip between its sides,
a rotating filling station comprising a drum around which said strip is moved,
means for impelling air between each pair of seals to open and balloon pocket sides between each pair of seals into open pockets,
funnels positioned to discharge material into the opened pockets between each pair of seals,
a fixed material supply positioned to discharge material constantly into said funnels as they pass thereunder,
timed means for rotating said drum and funnels successively past said air impeller means and said material supply to flow material into the open pockets, and
heat means for sealing the strip together at the open end of each pocket after filling.

18. In a packaging apparatus for packaging material in a series of spaced pockets in a continuous film strip wherein the pockets open along one strip margin,
a moving station about which the strip is trained and progressively moved, the station having alternating land and valleys,
means for pressing the strip into the valleys and thereby corrugating the strip,
means for blowing open the pockets,
means for filling the pockets, and
means for closing by heat-sealing the material of the strip at the open end of each pocket after the same has been filled.

19. In a packaging apparatus for packaging material in a series of spaced pockets in a continuous film strip wherein the pockets open upwardly,
a rotating station about which the strip is trained and progressively moved with the spaced pockets opening upwardly, the station having alternating lands and valleys,
means for pressing the strip into the valleys and thereby corrugating the strip,
means for blowing open the pockets,
a series of annularly arranged funnels overlying said station and said valleys each for discharging directly into a pocket of the strip trained about the station,
means for delivering material successively to the series

of funnels as they rotate past and below said means for delivering material,

a rotary element having peripheral spaced transverse ribs between each pair of which a filled pocket on the strip is adapted to be wedged for holding the pocket in spaced relation, and

means for cutting the filled pockets successively from said strip as it progressively moves forward from said rotary element with filled pockets upstream on said rotary element holding the pockets spaced for cutting.

20. In a packaging apparatus,

a base,

an index roller journalled on said base having a series of circumferentially spaced teeth about its perimeter for receiving a continuous strip having longitudinally spaced filled packages and with the teeth being spaced a distance slightly in excess of a transverse dimension of a filled pocket on a strip for receiving filled pockets between said teeth,

a knife positioned below the index roller for cutting filled pockets from a continuous strip at longitudinally spaced areas between filled pockets,

means for rotating said index roller and for actuating said knife for making transverse cuts in a continuous strip between filled pockets, and

means for moving said index roller with respect to said knife for adjusting the spacing therebetween to enable the knife to make its cuts at areas between filled pockets on a continuous strip to form filled packages.

21. In a packaging apparatus,

means for guiding and longitudinally moving a continuous strip having longitudinally spaced pockets separated by heat seals with upper ends of the pockets being open and with each pocket having sides,

a rotating filling station comprising a drum having circumferentially spaced lands and valleys about its circumference around which the continuous strip is guided and longitudinally moved and with the distances between the lands being less than the distance between the vertical heat seals,

means for pressing the sides of the pockets into the valleys and for engaging the vertical heat seals against the lands, means for holding the heat seals on the strip against the lands as the drum is rotated,

means to radially spread the pocket sides between each pair of seals to open the pockets which the pockets are integral with the continuous strip comprising a rotating wheel having a series of circumferentially spaced arms provided with suction cups at radially outer ends which arms are spaced and positioned to project into the valleys as the wheel and drum are rotated in side-by-side relation, the arms having radial suction passages with each passage being connected with a main suction passage when its associated suction cup is engaged in a valley for pulling the side walls apart,

means to fill the open pockets, and

means for sealing the pocket sides together at the open end of each pocket after filling.

22. In a packaging apparatus,

means for guiding and longitudinally moving a continuous strip having longitudinally spaced pockets separated by heat seals with upper ends of the pockets being open and with each pocket having sides,

a rotating filling station comprising a drum having circumferentially spaced lands and valleys about its circumference around which the continuous strip is guided and longitudinally moved and with the distances between the lands being less than the distances between vertical heat seals,

means for pressing sides of pockets into the valleys and for engaging vertical heat seals against the lands,

means for holding heat seals on a strip against the lands as the drum is rotated,

means to radially spread pocket sides between each pair of seals to open each pocket,

means to pour material into open pockets,

means for sealing the pocket sides together at the open end of each pocket after filling,

an index roller journalled having a series of circumferentially spaced teeth about its perimeter for receiving a continuous strip having longitudinally spaced filled pockets and with the teeth being spaced a distance slightly in excess of a transverse dimension of a filled pocket on a strip for receiving filled pockets between said teeth,

a knife positioned below the index roller for cutting filled pockets from a continuous strip at longitudinally spaced areas between filled pockets,

means for rotating said index roller and for actuating said knife for making transverse cuts in a continuous strip between filled pockets, and

means for moving said index roller with respect to said knife for adjusting the spacing therebetween to enable the knife to make its cuts at areas between filled pockets on a continuous strip to form filled packages.

23. In a packaging apparatus,

a base,

an index roller journalled on said base having a series of circumferentially spaced teeth about its perimeter for receiving a continuous strip having longitudinally spaced filled packages and with the teeth being spaced a distance slightly in excess of a transverse dimension of a filled pocket on a strip for receiving filled pockets between said teeth,

a rotating fly knife positioned below the index roller for cutting filled pockets from a continuous strip at longitudinally spaced areas between filled pockets,

means for synchronized rotation of said index roller and of said rotating knife for making transverse cuts in a continuous strip between filled pockets, and

means for moving said index roller with respect to said knife for adjusting the spacing therebetween to enable the knife to make its cuts at areas between filled pockets on a continuous strip to form filled packages.

24. In a packaging apparatus,

a base,

an index roller journalled on said base having a series of circumferentially spaced teeth about its perimeter for receiving a continuous strip having longitudinally spaced filled packages and with the teeth being spaced a distance slightly in excess of a transverse dimension of a filled pocket on a strip for receiving filled pockets between said teeth,

a tension roller mounted adjacent said index roller for holding a continuous strip against said index roller,

a knife positioned adjacent the index roller for cutting filled pockets from a continuous strip at longitudinally spaced areas between filled pockets.

feed rollers disposed between said index roller and said knife for feeding a continuous strip to said knife and with said feed rollers only being engageable with a longitudinal heat sealed area extending along one margin of a continuous strip,

means for rotating said index roller and for actuating said knife for making transverse cuts in a continuous strip between filled pockets, and

adjusting means for moving said index roller with respect to said knife for adjusting the spacing therebetween to enable the knife to make its cuts at areas between filled pockets on a continuous strip to form filled packages, said index roller being journalled on a frame which frame has a frame pivot and with said

adjusting means being operable to move said index roller and said frame on said frame pivot.

25. The apparatus of claim 2 further characterized by said means for pressing sides of pockets into said valleys comprising a bouncing roller urged against the perimeter of the drum and having a yieldable suspension enabling the roller to move radially of the drum about its perimeter for pressing a continuous strip firmly against said drum, the lands and into the valleys, the roller and the drum being rotatable in opposite directions with respect to one another.

26. The apparatus of claim 2 further characterized by said means for pressing sides of pockets into said valleys comprising a roller rotatably mounted adjacent said drum and having protuberances about its circumference each having a shape corresponding to a rounded shape of each of said valleys for periodic projection into said valley as said drum and roller are rotated, the drum and the roller being rotatable in opposite directions with respect to one another.

27. The packaging apparatus of claim 1 further characterized by said means for holding the heat seals on the continuous strip against the lands comprising a fixed suction block having a suction passage continuously connected with a suction source, said filling station having sets of suction passages with each associated with one of said lands adapted for periodic communication with the suction passage on the fixed suction block enabling suction forces to be generated to hold heat sealed areas of a continuous strip against the lands while strip pockets are opened and filled .

28. In a packaging apparatus,
means for supporting a strip of packaging material having at least one sealable surface,
a rotatable sealer having peripherally spaced lands engageable against only one side of the strip for simultaneous formation of a series of spaced heat seals transversely of the strip between its vertical sides,
means carried by the rotatable sealer for heating the lands,
a rotating filling station comprising a drum around which the strip is moved,
the means for supporting a strip and said filling station being positioned relative to the rotatable sealer to cause the strip to be engaged against a series of said lands at the same time,
means for opening up pockets along the length of the strip,
means to flow material into the open pockets, and
heat means for sealing the strip at the open end of each pocket after filling.

29. In a packaging apparatus,
means for feeding a strip with confronting sides,
means for forming upwardly opening spaced pockets in the strip which pockets are separated by vertical heat seals,
an endless rotating filling station having spaced lands and valleys about its periphery around which the continuous strip is guided and longitudinally moved and with the distances between the lands being less than the distances between the veritcal heat seals,
means for pressing the sides of the pockets into the valleys and snugly engaging the continuous strip about the periphery of the endless station,
means for holding the heat seals on the continuous strip against the lands as the filling station is rotated while the pockets are integral with the continuous strip,
means to spread the strip sides of each pocket between the seals at opposite ends of the pocket,
means to pour material into the open pockets, and
means for sealing the pocket sides together at the open end of each pocket after filling.

30. In a packaging apparatus,
means for feeding a strip with confronting sides,
means for forming spaced pockets opening along one margin of the strip which pockets are separated by heat seals,
a filling station having spaced lands and valleys along which the continuous strip is guided and moved and with the distances between the lands being less than the distances between the vertical heat seals,
means for pressing the sides of the pockets into the valleys and against the lands,
means for holding the heat seals on the continuous strip against the lands as the pockets are filled and while the pockets are integral with the continuous strip,
means to spread the strip sides of each pocket between the seals at opposite ends of the pocket,
means to fill the open pockets, and
means for sealing the pocket sides together at the open end of each pocket after filling.

31. The method of forming filled packages, which comprises,
processing a continuous length of sealable strip material forming successive pockets along the length of the strip material with the pockets being separated by transversely sealed areas and with ends of said pockets along one margin of the strip being left open,
corrugating the strip material by moving the transversely sealed areas along the length of the strip material closer together and by bulging the pockets in a common direction away from and along one side of the length of strip material,
spreading the pocket side wall of each pocket to open the same,
filling the open pockets, and
sealing the open ends before detachment of the packages from the strip material.

32. In a packaging apparatus,
guide means for supporting a strip of packaging material having at least one sealable surface,
means disposed adjacent the guide means for forming spaced heat seals extending transversely of the strip leaving pockets between the seals along its length comprising a rotatable sealer,
means carried by the rotatable sealer for heating the same,
means for pulling the strip from the guide means about the sealer in the formation of the heat seals,
a filling station positioned at one side of the guide means and related with respect to the guide means so that the strip is trained generally in the shape of a U and about the sealer to the filling station and with the strip being engaged only at one side of the strip,
the filling station having spaced lands and valleys about its periphery along which the strip is guided and moved,
means for holding the continuous strip against the filling station as the filling station is moved, means to spread the strip sides of each pocket between the seals,
means to load material into the open pockets, and
means for sealing the pocket sides together at the open end of each pocket after filling.

33. In a package manufacturing and filling machine,
means for supporting a strip of packaging material having at least one sealable surface including plow and guide means,
means disposed adjacent the guide means for forming spaced heat seals extending transversely of the strip leaving pockets between the seals along ts length comprising a rotatable sealer,
means carried by the rotatable sealer for heating the same,
means for pulling the strip about the sealer in the formation of the heat seals,
a filling station related with respect to the guide means and the sealer so that the strip is trained from the guide means generally in the shape of a U and about the sealer to the filling station and with the sealer being engageable only along one side of the strip,

the filling station having spaced lands and valleys about its periphery along which the strip is guided and moved,

means to open each pocket,

means to deposit material into the open pockets,

means for sealing the pocket sides together at the open end of each pocket after filling, and

means to sever filled packages from the strip by cutting the strip at the transverse seals.

34. In a package manufacturing and filling machine,

means for supporting a strip of packaging material having at least one sealable surface including guide means,

means disposed adjacent the guide means for forming spaced heat seals extending transversely of the strip leaving pockets between the seals along its length comprising a rotatable sealer,

means carried by the rotatable sealer for heating the same,

a filling station related with respect to the guide means and the sealer so that the strip is trained from the guide means generally in the shape of a U and about the sealer to the filling station and with the sealer being engageable only along one side of the strip,

means to open each pocket,

means to deposit material into the open pockets,

means for sealing the pocket sides together at the open end of each pocket after filling,

means to angularly turn the strip to facilitate severance of filled packages from the strip, and

means to sever the thus turned strip to sever the filled packages by cutting the strip at the transverse seals.

35. In a packaging apparatus,

means for guiding and longitudinally moving a continuous strip having longitudinally spaced pockets separated by transversely spaced heat seals with ends of the pockets being open and with each pocket having sides,

a rotating filling station having circumferentially spaced lands and valleys about its circumference around which the continuous strip is guided and longitudinally moved and with the distances between the lands being fixed relative to one another and relative to the axis of the rotating filling station and less than the distances between the transversely spaced heat seals,

means for holding the strip against the filling station,

means to spread the pocket sides between each pair of seals to open the pockets while the pockets are integral with the continuous strip,

means to fill the open pockets with material,

means or sealing the pocket sides together at the open end of each pocket after filling, and

means for severing filled packages from the strip.

36. The method of forming filled packages from at least one continuous strip of flexible material, which comprises,

training the strip generally in the shape of a U and applying heat from only one side of the strip at an inside surface of the U at spaced intervals along the length of the U-shaped strip to prolong heat dwell time thereby forming successive pockets along the length of the strip with ends of the pockets along one margin of the strip being open, converting the strip from an essentially flat form to an undulated form,

successively opening the pockets along the length of the strip by moving one pocket side wall on each pocket relative to an adjacent pocket side wall,

successively filling the pockets, and

closing open ends of the pockets along the length of the strip.

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