June 24, 1969 J. M. MASSEY ET AL 3,451,187

PACKAGING MACHINE

Filed Sept. 27, 1966 Sheet 1 of 5

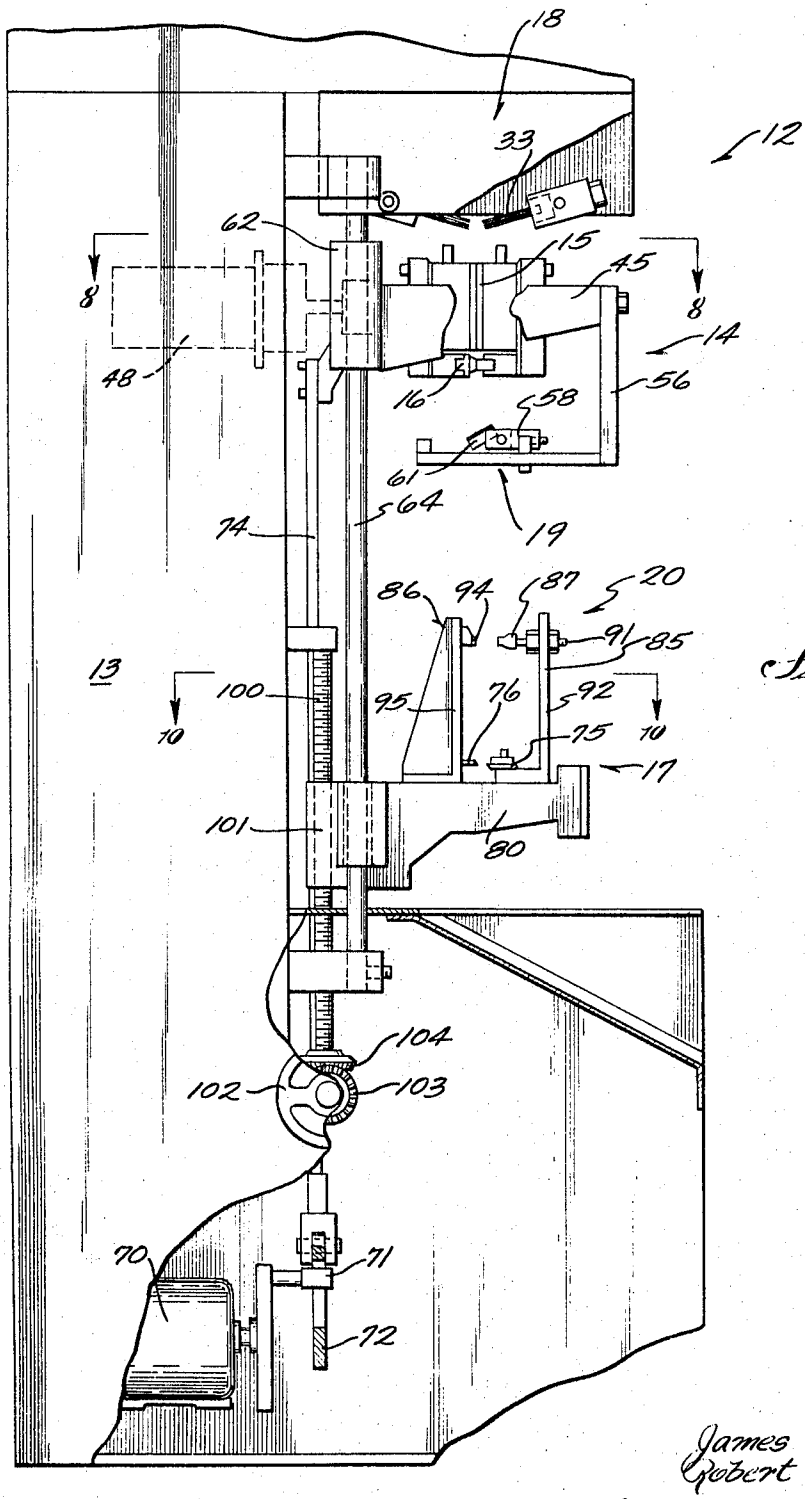

Fig. 1

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PACKAGING MACHINE

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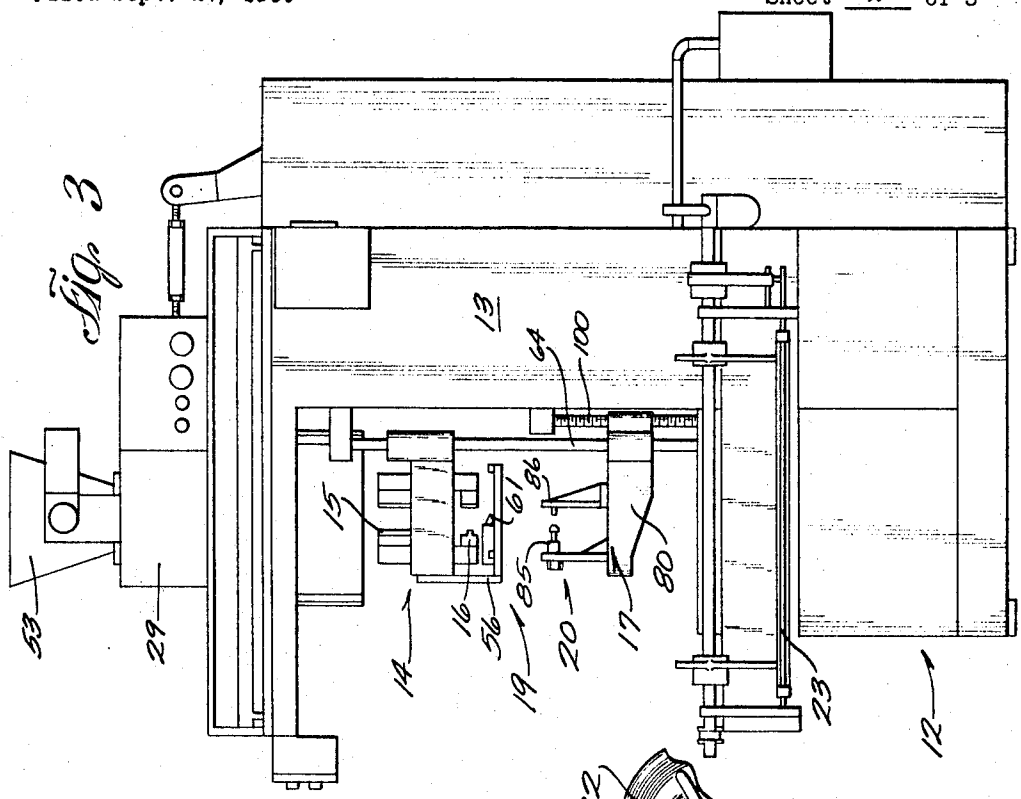
Fig. 3



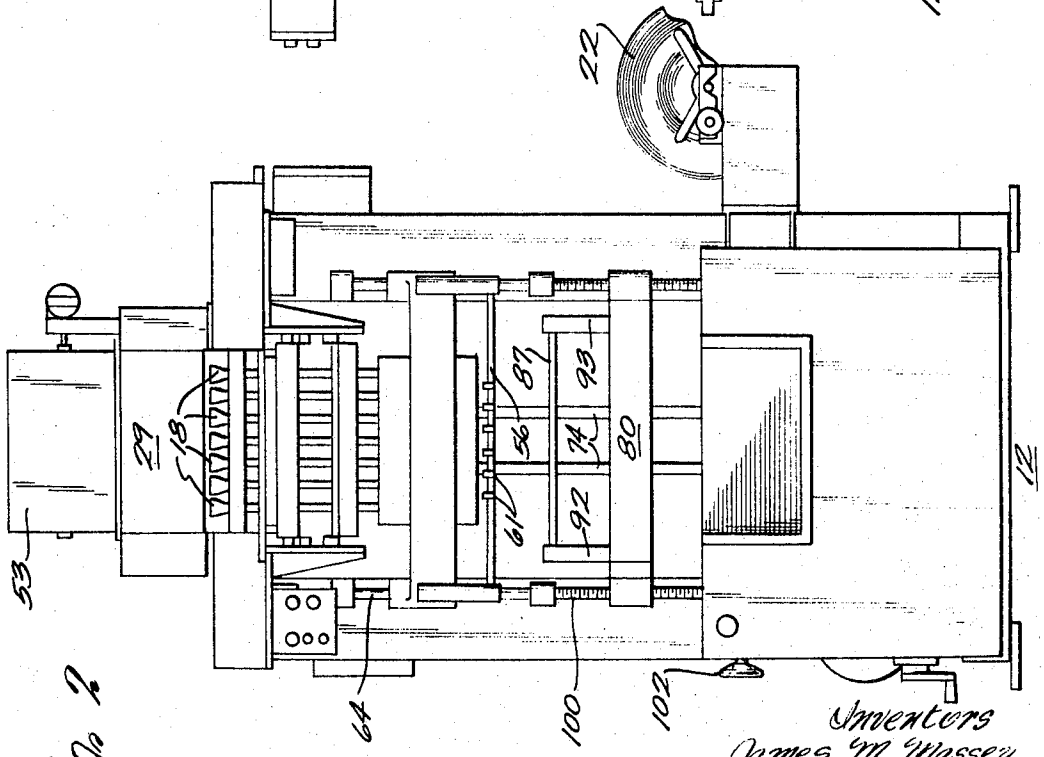


Fig. 2

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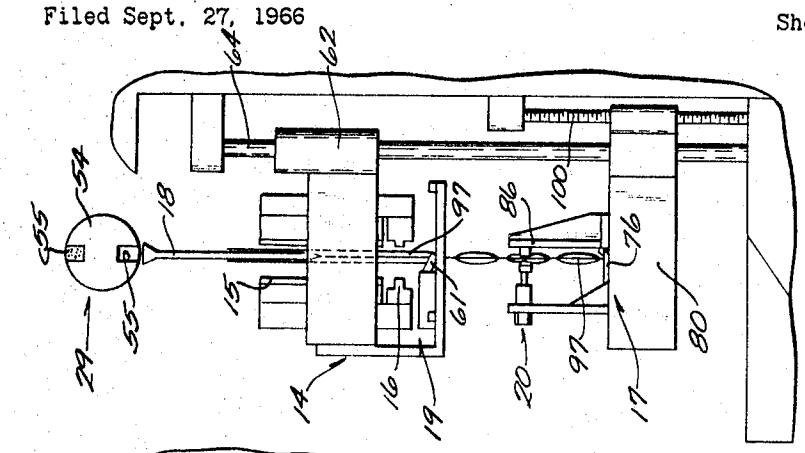

Fig. 4

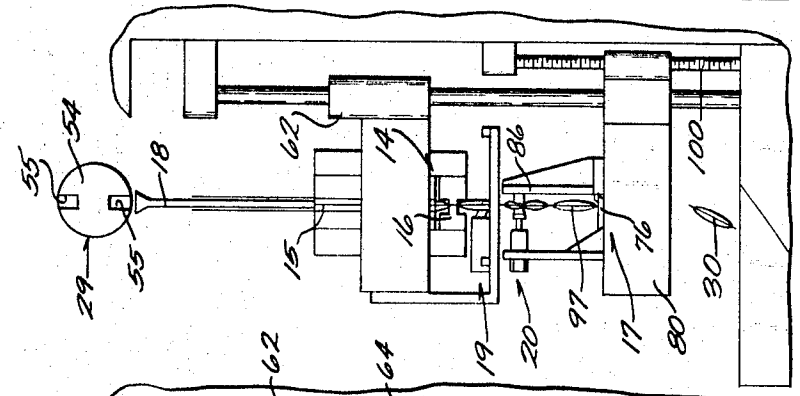

Fig. 6

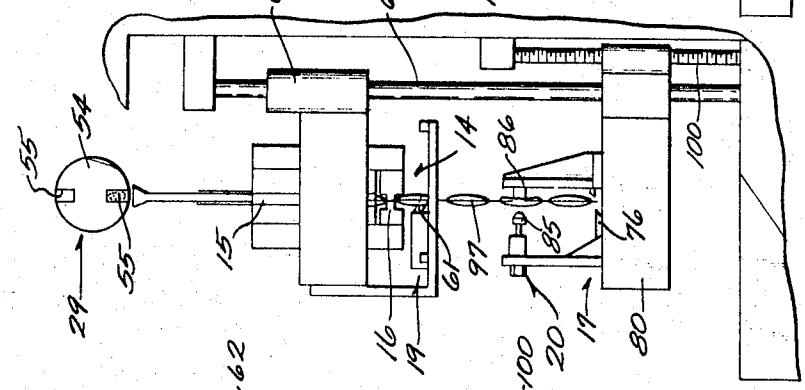

Fig. 5

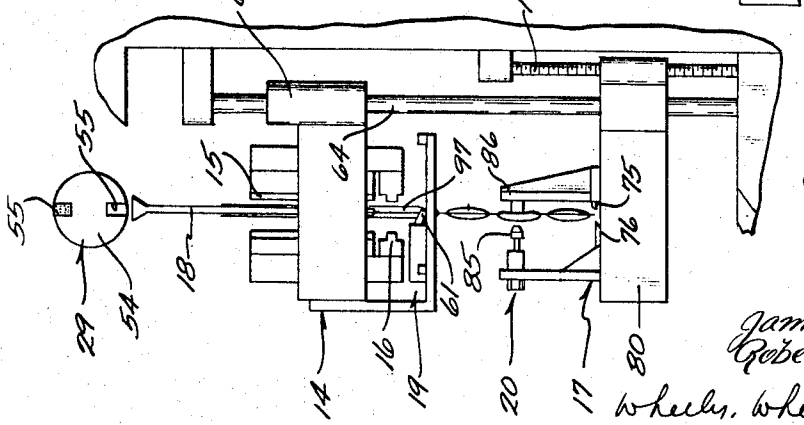

Fig. 4

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PACKAGING MACHINE

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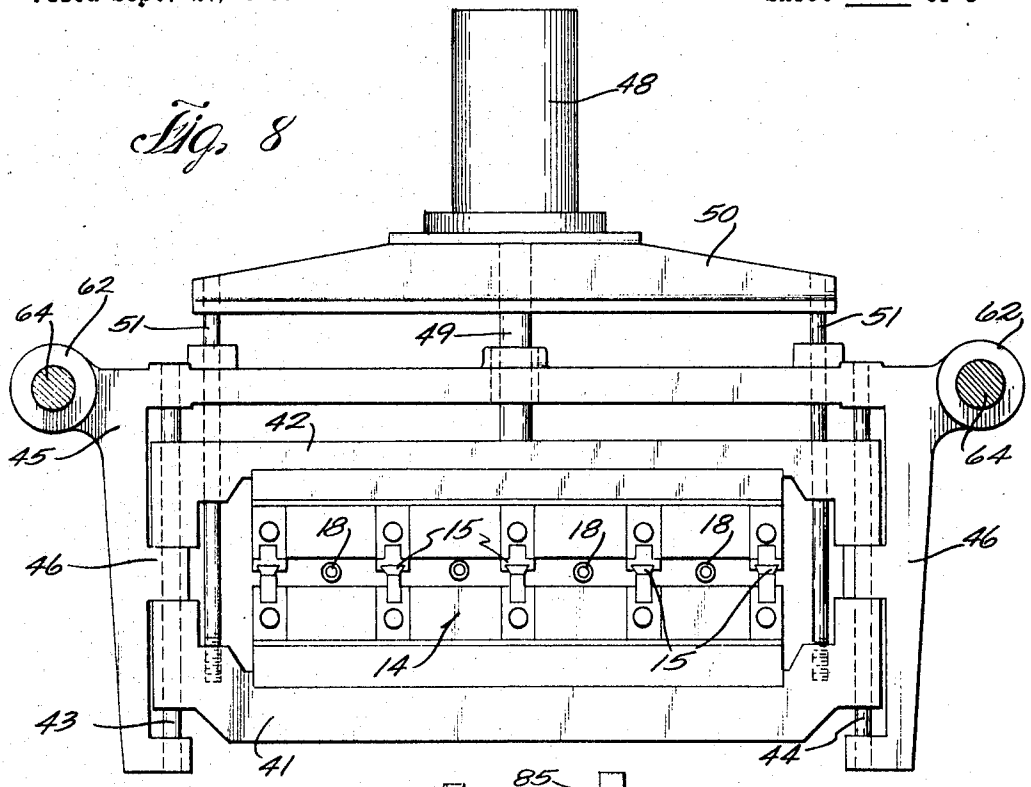
Fig. 8



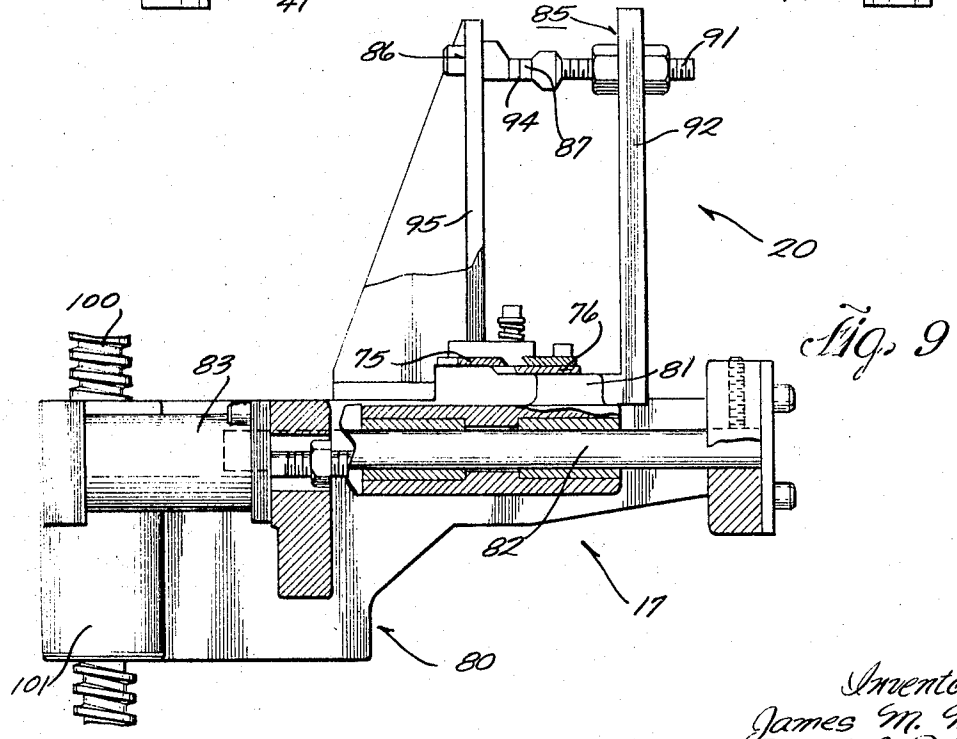


Fig. 9

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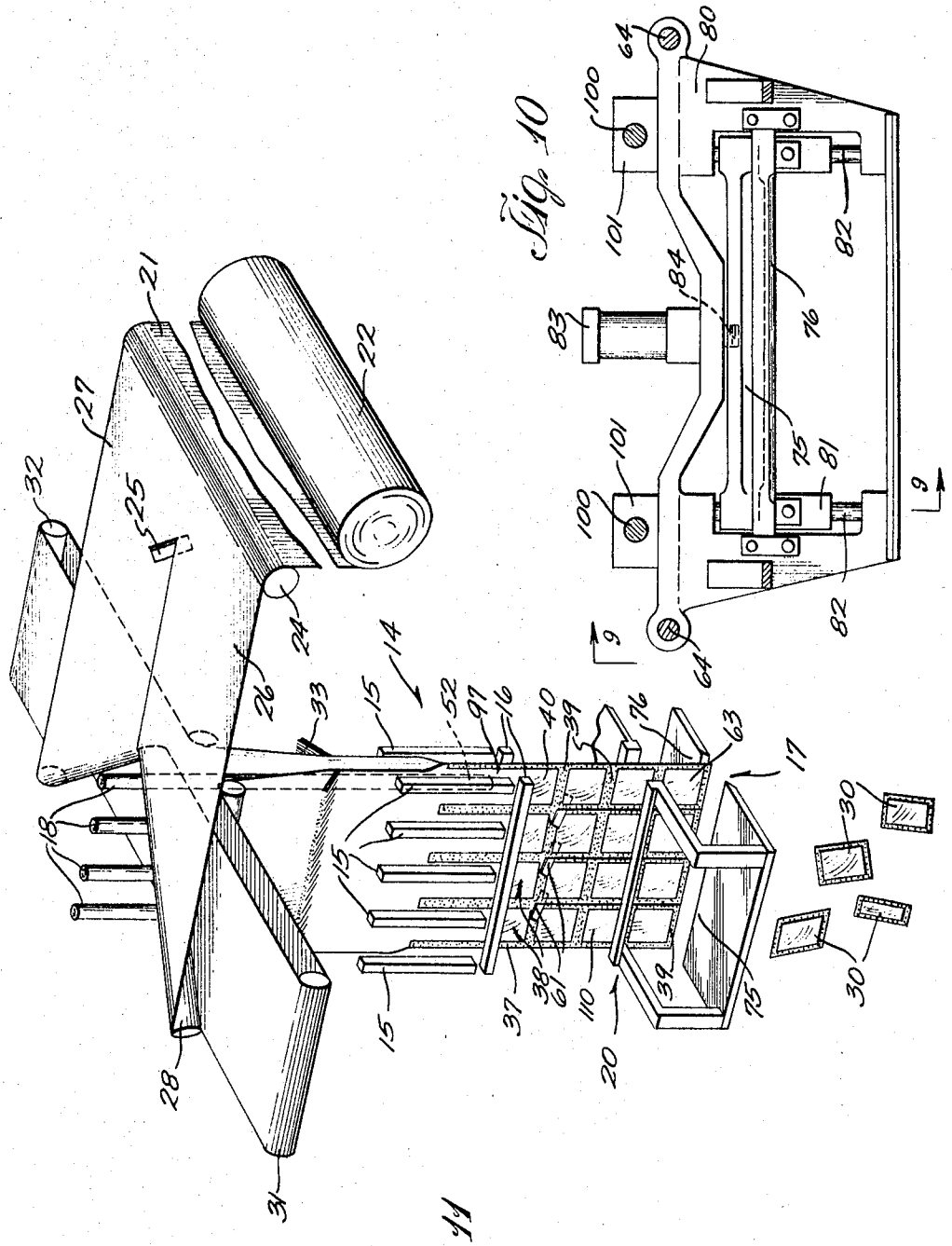

Fig. 10

Fig. 11

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3,451,187

PACKAGING MACHINE

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Int. Cl. B65b 43/06, 51/26, 61/06
U.S. Cl. 53—29 8 Claims

ABSTRACT OF THE DISCLOSURE

A packaging machine for producing and filling four side seal packages is provided with vertically movable knives to slice the rows of packages into longitudinally extending package strings. During upstroke of the longitudinally severing knives, relatively movable brake jaws clamp on the longitudinal strings below the cutters to hold the strings during the slicing operation. The longitudinal severing knives are mounted on a bracket which depends from the heat seal unit which includes longitudinal or vertical and horizontal or transverse heat sealing bars, which unit is movable vertically upward to move the cutters during the cutting operation.

This invention relates to packaging and more particularly to an improved process and apparatus to produce and fill flexible film packages. In the art these packages are sometimes referred to as four side seal packages. They are desirably formed and filled in multiple lanes, to increase production.

According to the present invention a plurality of packages are formed, filled and sealed and sliced from a continuous sheet of thermosealable package film. Two film plies in face relation are formed into transverse rows of pouches which are filled with the desired product and sealed. The product can be liquid or granular. The pouches are subsequently sealed and the packages thus formed are sliced along their longitudinal seams to create longitudinally extending package strings. The individual packages are then severed from the strings by cutting through the transverse seams.

The present invention relates broadly to the improvement in which the multiple lanes or strings of packages remain laterally connected until after the pouches are filled and sealed. Even after the lanes are separated by slicing through the longitudinal seams the "strings" of packages are kept laterally together as an integrated unit or array by a film brake which holds the package strings against the up-thrust of the longitudinal severing knives.

In this connection, the invention features slicing of the longitudinal seams on the upstroke of the longitudinal severing knives, while the brake jaws are clamped therebelow to hold the strings together.

Prior art packaging machines typically slice a continuous package film into longitudinal strings prior to the film reaching both the product filling station and the heat seal jaws. During the longitudinal slicing operation the film is moving and the cutters are stationary.

The conventional machines have encountered various problems in the tracking of the longitudinal strings to the filling station and the heat seal unit. One of the difficulties experienced is aligning the front and rear film panels to get uniform edges with no overlap. When a laminated film with an inner foil such as aluminum is used the outer paper or plastic covering of the front panel does not cover and hide the inner edges of aluminum foil of the rear panel resulting in a package with an undesirable appearance which may not meet customer specifications.

A further difficulty is experienced when package material having a polyethylene covering is used. The polyethylene tends to adhere to and build up on the heat seal jaws. When the film is slit longitudinally into strings prior to reaching the heat seal jaws the polyethylene accumulation tends to reseal the strings and accordingly interferes with subsequent separation of the rows into individual packages.

The packaging machine of the present invention eliminates these problems by longitudinally slicing the packages into strings subsequent to the package forming and filling operation and desirably on the upstroke of the slicing knives while the strings are held in lateral array by the film string brake.

The machine is desirably operated on a cycle comprising an upstroke and downstroke of a vertically reciprocating heat seal jaw assembly. At the dwell at the top of the upstroke the heat seal bars which comprise opposed jaws clamp on the opposed plies of package film and seal the film to form a row of multiple pouches with the upper edge of each pouch open and surrounding the outlet of a separate filler tube. During this top dwell the pouches are filled with the desired product. While the film remains grasped in the closed heat seal jaws, the heat seal jaw assembly proceeds on the downstroke and advances the film one package length. At the bottom dwell at the end of the downstroke a transverse or horizontal slicer severs the bottom or lower horizontal row of multiple packages from the package film.

The longitudinal seams between the multiple lanes are severed during the upstroke of the assembly. To hold the filled packages against the pressure of the upwardly moving slitting knives and to keep the strings in close lateral array, brake jaws engage the packages during the bottom dwell.

Further objects and advantages of the present invention will become apparent from the following disclosure in which:

FIGURE 1 is a fragmentary side elevational view of a packaging machine embodying various of the features of the present invention and adapted to practice the process of this invention, certain parts being broken away and others shown in section.

FIGURE 2 is a front elevational view of the packaging machine.

FIGURE 3 is a side elevational view of the side of the machine opposite that shown in FIGURE 1.

FIGURES 4, 5, 6 and 7 are diagrammatic side views of a packaging machine embodying the present invention and showing the operational sequence.

FIGURE 8 is a cross section taken along line 8—8 of FIGURE 1.

FIGURE 9 is a cross section taken along line 9—9 of FIGURE 10.

FIGURE 10 is a cross section taken along line 10—10 of FIGURE 1.

FIGURE 11 is a perspective diagrammatic view of the film flow and process steps.

Although the disclosure hereof is detailed and exact to enable those skilled in the art to practice the invention, the physical embodiments herein disclosed merely exemplify the invention which may be embodied in other specific structure. The scope of the invention is defined in the claims appended hereto.

Referring now to the drawings, FIGURE 1 shows a packaging machine or apparatus generally designated 12 of the type used to produce and fill a plurality of small four side heat sealed packages 30 from a continuous roll 22 of thermosealable film in accordance with the process of the present invention. Description of the packaging machine 12 is also illustrative of one mode of carrying out the process of the present invention.

The packaging machine **12** includes a frame generally designated **13**, which supports the machine components. Supported on the frame **13** are a package filler unit **29**; a plurality of package filler tubes **18**; a package forming heat seal unit **14** incorporating vertical or longitudinal heat sealing bars **15**, and horizontal or transverse heat sealing bars **16**; a film brake **20**; and a horizontal or transverse package cutter **17**.

In accordance with the present invention the machine is provided with a vertical or longitudinal string cutter or slicer **19** which depends from the heat seal unit **14** and moves therewith. This slicer **19** cooperates in novel fashion with the film brake **20** which holds the package strings during the longitudinal slicing operation.

As best shown in FIGURES 2 and 11 a continuous supply of film **21** is carried on the machine frame **13** on a supply roll **22**. The film may be supplied either in two separate rolls or in one roll with the front and back panels of the packages printed in adjacent lanes. Any conventional packaging material can be used that is thermosealable. The film or web rolls can be provided with registration marks for photoelectric scanner actuation of the machine. The film **21** travels around a dancer roll **23** (FIGURE 3) to an idler roll **24**. When one sheet of film containing the front and back panels is used as illustrated herein an inclined cutter **25** slits the film **21** into separate plies or panels **26** and **27**. Respective panels **26** and **27** are guided over respective 45 degree angle divider wings **28** and over parallel idlers **31** and **32** and then travel vertically and downwardly. Brushes **33** direct each panel inwardly between the opposed jaws of the heat seal unit **14** against the intervening filler tubes **18**.

In this location the film panels **26** and **27** are in face relation and are threaded between the coacting jaws or bars of the heat seal unit **14**.

The heat seal bars **15** and **16** are heated electrically either continuously or intermittently and can be thermostatically controlled. Each set of heat seal bars **15** and **16** can be adjustably positioned to produce packages of the desired length and width.

As best shown in FIGURE 8 the longitudinal heat seal bars **15** and horizontal heat seal bars **16** are mounted on opposed cross head rails **41** and **42**. The cross head rails **41** and **42** reciprocate upon guide pins **43** and **44** which are mounted on support bracket **45**. The support bracket **45** has two positive stop shoulders **46** against which the cross head rails **41** and **42** abut when the heat seal bars come together. The shoulders **46** accurately align the bite of the bars and the path of the package film. A double acting fluid operated motor **48** has its cylinder connected to a cross head **50** which has its ends connected to cross head rail **41** by stems **51**. Piston rod **49** is threaded into cross head rail **42**. Actuation of the fluid motor **48** will bring the cross head rails **41** and **42** together and accordingly the heat seal bars **15** and **16** will engage the film in sealing contact.

When actuated, the opposed bars **15** of each set come together as jaws and clamp on the film providing a plurality of longitudinal spaced apart heat seal bands or seams **37** best shown in FIGURE 11 with the bands separating the film into a plurality of vertical strings or lanes **38**. In the disclosed construction the longitudinal heat sealers provide five bands **37** and separate the film into four longitudinal strings **38**.

The horizontal heat sealing bars **16** are actuated concurrently with the longitudinal heat sealing bars **15** by fluid motor **48** and come together to form a single horizontal or transverse heat seal band or seam **39**. The transverse heat seal band **39** when servered as hereinafter described in the approximate center of the band provides the top seal for the package row **40** immediately beneath the bars **16** and the bottom seal for the horizontal package row **47** immediately above the bars **16**. The longitudinal side seal **37** and transverse seal bands **39** form a row of generally U-shaped pouches **97** with the top of each

pouch **97** open. The walls of a pouch **97** enclose or surround the outlet **52** of a filler tube **18**.

The filler unit **29** may be any conventional product filler. In the disclosed machine embodiment the filler unit **29** comprises a hopper **53** mounted above a rotating drum **54**. The hopper contains the bulk material which may be a powder or fluid to be deposited in the pouches. Drum **54** has diametrically opposite ports **55** aligned with the filling tubes and hopper discharge ports at the same time. With each cycle of the machine the drum rotates 180 degrees bringing a set of filled ports containing a measured portion directly over the filling tubes. The filler material is discharged from the ports into the filling tubes **18** and through the tubes into the pouches.

The row of filled pouches **97** is cut into vertical strings **38** by the longitudinal slicer **19** which is mounted on means including bracket **56** which depends from the support bracket **45** that holds the heat seal jaw unit **14**. A plurality of laterally spaced apart cutting blade holders **58** are mounted on the bracket **56**. In the disclosed construction three cutter holders **58** are mounted on bracket **56**, although more can be used if the machine **12** is arranged to form more than four vertical strings or lanes of packages simultaneously. The cutter holders **58** are positioned beneath the heat seal unit **14** and hold three cutting blades **61** such as razor blades, in an inclined position intercepting the package film. Support bracket **45** is secured to paired sleeves **62** which are vertically reciprocal about paired guide rods **64**. Reciprocation of the support bracket **45** and the heat seal unit **14** and longitudinal cutter carried thereon is effected by an electric motor **70** (FIGURE 1) which drives a cam **71** having a slotted cam follower **72** which reciprocates vertical rod **74** which causes reciprocal vertical movement of bracket **45** and the cross head **50** along the guide rods **64**.

The final package cutoff knife or transverse slicer which slices the upper horizontal or transverse heat seal band **39** of the bottommost row **63** of packages as shown in FIGURE 11 comprises an anvil blade **75** and a shear blade **76**. The anvil blade **75** is mounted to a bracket **80** which is vertically movable about guide rods **64**. The shearing blade **76** is mounted on a movable rail **81** which is guided by guide pins **82**. A double acting fluid motor **83** mounted on bracket **80** has a piston rod **84** connected to the movable rail **81**.

The film brake or clamp **20** has a movable jaw **85** and a fixed jaw **86**. The movable jaw **85** comprises a longitudinal bumper strip **87** preferably with a rubber face which is mounted by two studs **91**, to two upstanding brackets **92** and **93** which are secured to the movable rail **81**. The fixed jaw comprises a longitudinal strip **94** mounted on an upstanding bracket **95** which is secured to the fixed cross head **80**. When the movable rail is actuated by the motor **83** the opposed brake jaws come together and clamp on the film.

Bracket **80** is vertically movable along guide rods **64**. Means to adjust the vertical position of the transverse slicer **17** and brake **20** are provided by two threaded rods **100** which are threaded into two internally threaded sleeves **101** integral with the bracket **80**. A hand crank **102** on a horizontal shaft **103** turns the threaded rods by means of two sets of bevel gears **104**. The adjustment means afforded by this arrangement permits vertical positioning of the transverse slicer to sever the lower package row **63** in the center of the horizontal heat seal band **39**.

In operation of the packaging machine of the present invention, the steps of forming, filling and slicing are performed during a cycle comprising an upstroke and downstroke of the reciprocating heat sealing assembly **14**. The film **21** is guided to the heat sealing unit **14** which is in a dwell position prior to its being pulled down on the downstroke. The position of the heat seal unit **14** is illustrated in FIGURE 4 with the heat sealing jaws

15 and 16 open. Also illustrated in FIGURE 4 is the position of the cam follower 72 which is connected to the heat seal assembly by a vertical rod 74.

The pouches 97 are formed as illustrated in FIGURES 5 and 11 by simultaneously closing the heat seal jaws 15 and 16 to create a plurality of vertical heat seal bands 37 best shown in FIGURE 11 to form the sides of the pouches and form one transverse heat seal band 39 across the width of the film which forms the bottom of each pouch in the horizontal rows 47. The fluid motor 48 that closes the heat seal bars 15 and 16 can be actuated by cam operated switches or any other suitable arrangement. When the cam operated switches are closed they operate a solenoid which pressurizes the fluid motor 48. After the pouches 97 are formed they are filled by actuation of the filter unit which includes rotation of the drum 54 and discharge of the product into the tubes 18 which carry the product into the pouches 97.

FIGURE 6 illustrates the reciprocating jaw unit 14 at the bottom of its downstroke. At this position of the reciprocating jaw unit 14, fluid motor 83 is actuated in timed sequence with the reciprocation of the heat seal unit 14 to close the film brake 20 and transverse cutter 17. The shear blade 76 of the transverse cutter 17 closes against the anvil blade 75 and shears off a horizontal row of packages 63 by slicing a transverse heat seal band 39 in the approximate center. The movable jaw 85 of the film brake is also closed against the fixed jaw 86 and clamps the strings of packages 30 that were filled and sealed in a prior cycle. The fluid motor 83 can be actuated by a solenoid operated by a cam operated limit switch. The cam 71 is shown in the appropriate position at the bottom of the downstroke.

FIGURE 7 shows the reciprocating jaw unit 14 at the top of the upstroke. During the upstroke film brake 20 remains closed on the film. The heat sealing jaws 15 and 16 open and the jaw assembly 14 proceeds on the upstroke ascent. The longitudinal cutting blades 61 of slicer 19 slice the vertical heat seal bands 37 separating the sealed packages into strings 110 as best illustrated in FIGURE 11 as the jaw assembly and cutters 61 ascend. The brake 20 holds the bottom ends of the strings 110. Accordingly, the strings 110 are held in close lateral array during the slicing operation for good control over alignment and registration of the heat seal bands 37 with the respective cutters 61.

When the slicing operation is completed and the jaw unit 14 has reached the top of its upstroke, the film brake 20 opens by actuation of the fluid motor 83 and releases the film. The machine is then ready for a new cycle commencing as shown in FIGURE 4. When the transverse heat sealing jaws 16 come together at the dwell at the top of the upstroke the pouches 97 that were filled in the prior cycle are then sealed along their top edge with the same heat seal band 39 that forms the bottom of the row of pouches to be filled during this cycle. The filled pouches are then severed from the package film when they reach the transverse slicer in a subsequent cycle.

Various features of the invention will become apparent from the following claims.

We claim:

1. A package forming and filling machine having a vertically reciprocating heat seal unit adapted to form package pouches in multiple lanes in facing plies in a heat sealable film and to draw said film downwardly as successive package pouches are formed and filled, and a longitudinal slicer to slice through seams between said lanes to separate the film into package strings, the improvement to hold said strings in close lateral array after the film is sliced longitudinally and comprising means mounting said slicer below said heat seal unit and for movement therewith, a film brake below said heat seal unit and slicer, and means for actuating the film brake in timed sequence with the reciprocation of the heat seal unit to clamp on the film when the slicer is at the bottom of its stroke and hold the film while the slicer moves upwardly to slice the film into strings on its upstroke, and to release the film on the downstroke of the heat seal unit to allow the film to feed past the film brake on said downstroke.

2. The machine of claim 1 in combination with a transverse cutter below the film brake and means to actuate said cutter while the film brake is clamped on the film, thus to sever the bottommost transverse row of filled packages from said strings.

3. The machine of claim 1 in which said heat seal unit has longitudinal and transverse heat seal bars which form U-shaped pouches in the film plies before the film is sliced into package strings.

4. The machine of claim 3 in which said bars are supported on the means mounting said slicer, said slicer having knives vertically aligned with the longitudinal bars of the heat seal unit to slice through seams formed in the film by said bars.

5. A packaging machine for forming and filling multiple four side sealed packages from a continuous supply of two plies of film by heat sealing said plies to form successive rows of top opening pouches, said machine forming said pouches between a series of longitudinal and transverse spaced apart heat seal bands formed by heat seal jaws mounted on a support reciprocating vertically in an upstroke and downstroke, said machine having a product filler to fill the pouches, the improvement for longitudinal slicing of the film into individual strings comprising a bracket secured to said support and depending therefrom, cutting blades mounted on said bracket in alignment with said longitudinal heat seal bands and effective during the ascent of the support to separate the film into strings, and means for securing the film during the upstroke of said support to hold the strings in lateral array during action of the cutting blades thereon.

6. A packing machine in accordance with claim 5 wherein said means for securing the film during the upstroke comprises relatively movable jaws and means to close said movable jaws on said package film during the ascent of said heat sealing jaw assembly and release said jaws at the top of the upstroke.

7. A process for forming, filling, sealing and slicing a plurality of four side seal packages of a selected predetermined length and width from a continuous sheet of package forming thermosealable film, comprising the steps of:

(a) forming opposed plies of package film;
(b) tracking said plies into face relation;
(c) heat sealing said plies to form a row of open top pouches bounded by longitudinal and transverse heat seal bands closing the sides and bottom of said pouches;
(d) filling said pouches with the desired product through the open tops thereof;
(e) advancing the film one package length;
(f) heat sealing the upper edge of the package row by a transverse heat seal band;
(g) longitudinally slicing the side heat seal bands in a direction opposite said advance to form package strings;
(h) severing the individual packages from the film by slicing the transverse heat seal bands at the top of each package in the row.

8. A process in accordance with claim 7 plus the step of holding the film against retraction while slicing the film into strings.

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U.S. Cl. X.R.

53—178, 183