June 26, 1956 J. G. WOPPMAN 2,751,732

AUTOMATIC PACKAGING MACHINES

Filed June 30, 1953 4 Sheets-Sheet 1

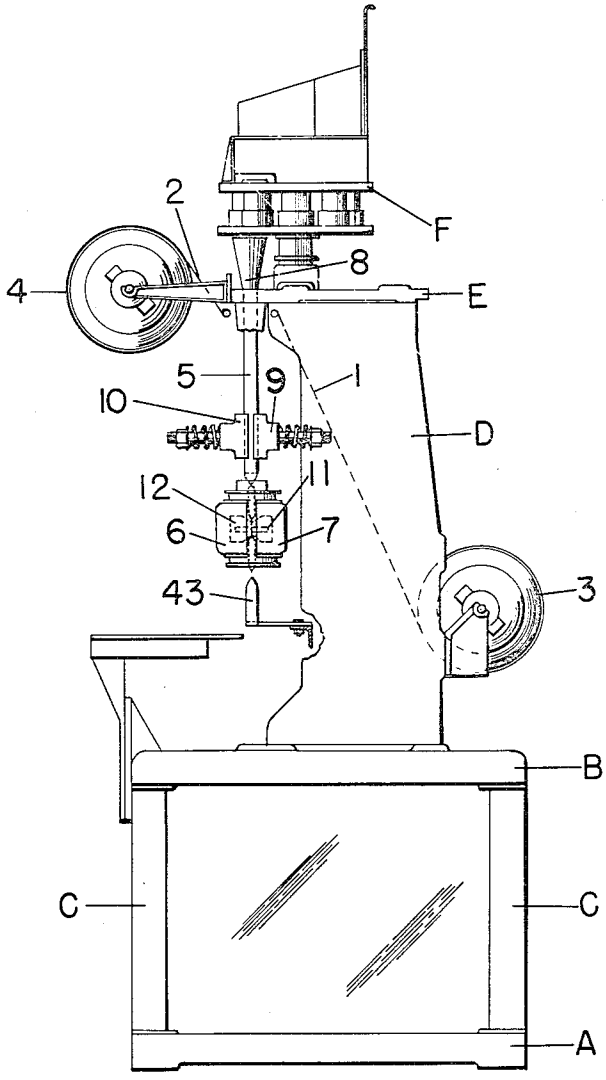


FIG. 1

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AUTOMATIC PACKAGING MACHINES

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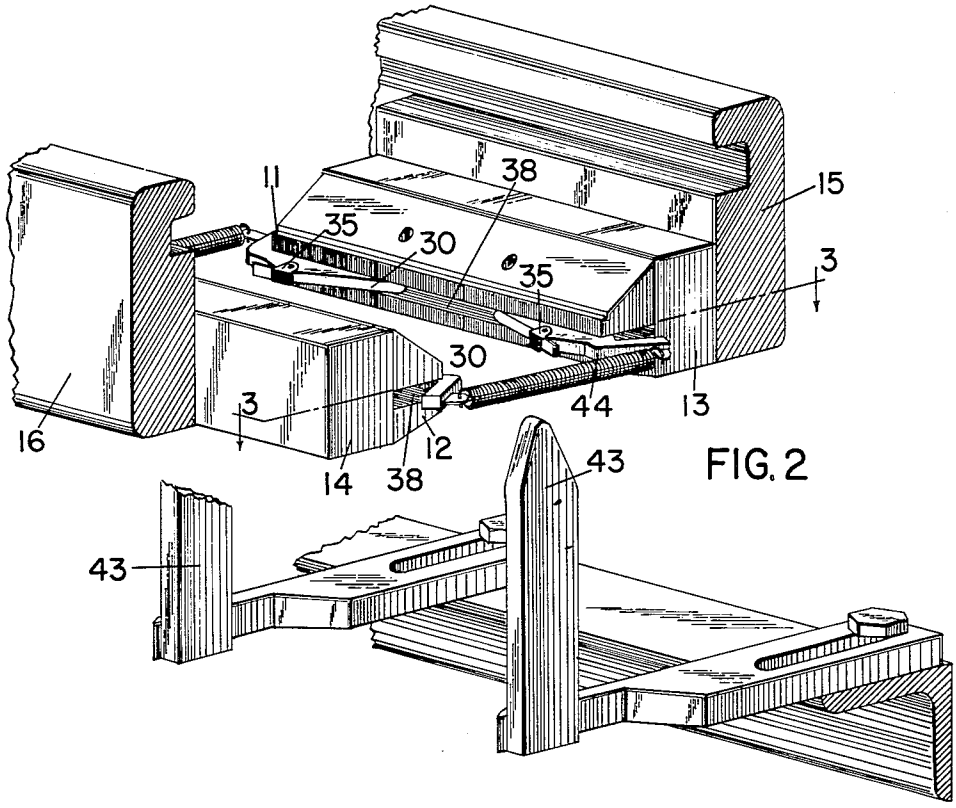


FIG. 2

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AUTOMATIC PACKAGING MACHINES

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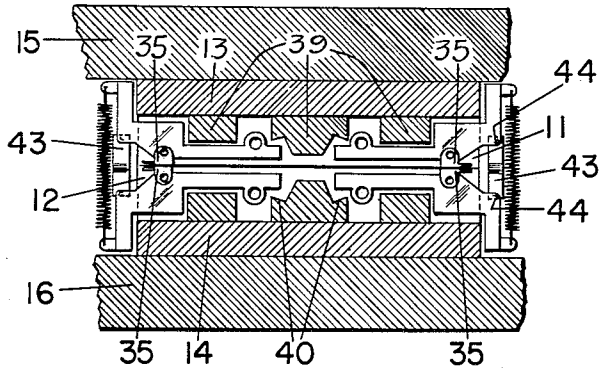


FIG. 5

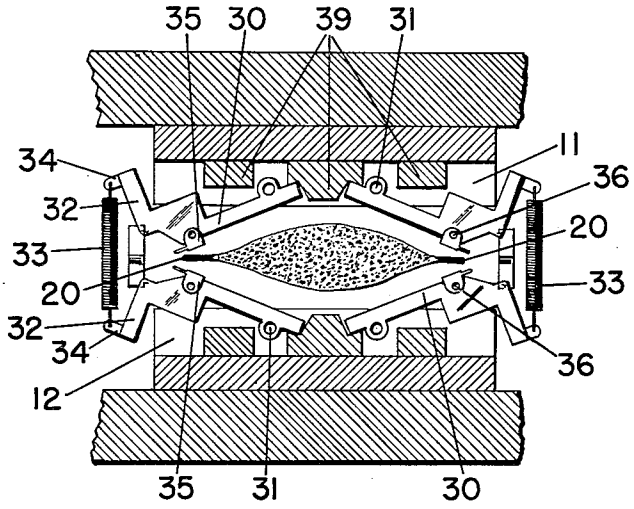


FIG. 3

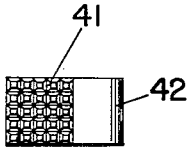


FIG. 6

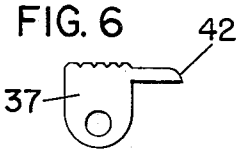


FIG. 7

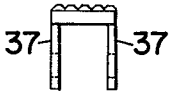


FIG. 8

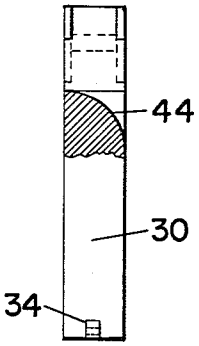


FIG. 9

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AUTOMATIC PACKAGING MACHINES

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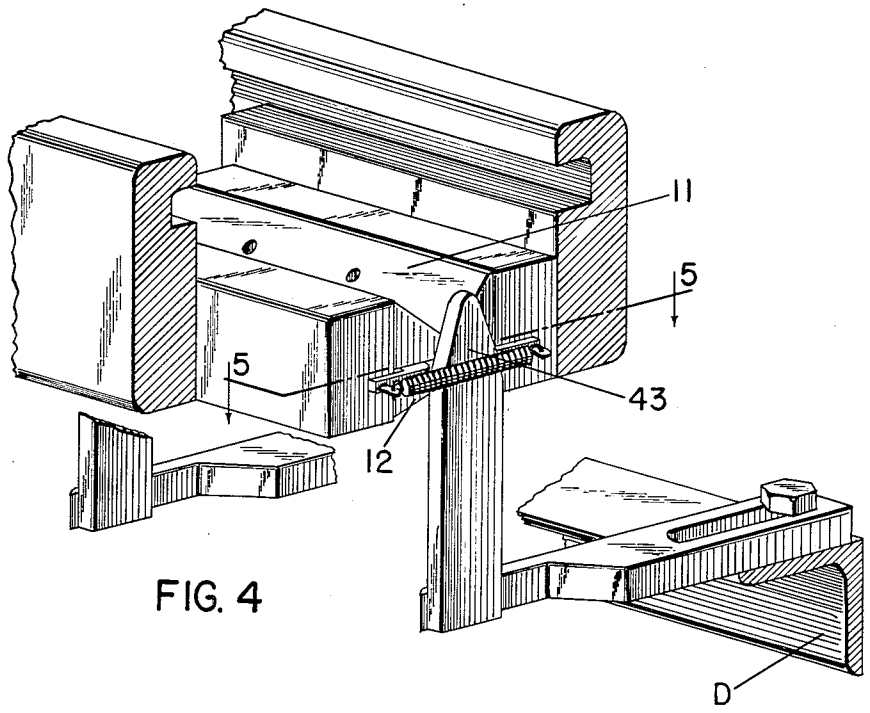


FIG. 4

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AUTOMATIC PACKAGING MACHINES

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Application June 30, 1953, Serial No. 365,015

6 Claims. (Cl. 53—180)

This invention relates to an improvement in automatic packaging machines, and more particularly to automatic packaging machines of the general type wherein a commodity in the form of small shaped articles or a measured quantity of a fluent material, e. g. silica gel, may be fed automatically with the aid of gravity to packages or containers, a series of which are successively formed by the machine. These containers are formed into a flattened tubular shape from opposed layers or ribbons of suitable material.

In the operation of such machines, two packaging material strips or ribbons are led over the opposite convex surfaces of a tube-former and are held firmly against said tube-former by suitable means, as idler rollers. The margins of said packaging material extend beyond said tube-former and are themselves held contiguously between the aforementioned idler rollers. The opposed ribbons are formed into a tube by the operation of suitable margin sealing dies. Paired opposed end sealing dies are positioned so as to receive the formed tubular material and effect a transverse seal thereof. These end sealing dies are secured in end sealing clamps which are adapted to reciprocate in a vertical plane and advance the packaging material through the machine. The end sealing dies are in open position during their upward stroke. At the end of the upward stroke, the end sealing dies close, seal the tube, and move downwardly drawing with them the tubular packaging material. The bottom seal thus formed also serves as the top seal of the package next below. Filling of the package is accomplished during the downward stroke, at which time a measured quantity of material is fed by gravity through the hollow tube-former into the package which has now been sealed on three sides. When the end sealing clamps have reached their lowest position, the end sealing dies open for the upward stroke.

After this cycle has been completed a given number of times, the strip material below the end sealing clamps consists of a like number of connected packages. Suitable cutting means are provided to successively sever the lowermost package from the strip at the center line of the end seal. Where packages of the heat-seal type are to be formed, the margin and end sealing dies are equipped with appropriate heating elements. When heat-seals are used, apparatus may be provided for directing a flow of compressed air over the surface of the sealed portions of the packaging strips to assure proper setting of the seal before said portions are subjected to any strains or distortions. Machines of this type have met with considerable commercial success.

It has been found, however, in normal operation that a length of the sealed package, depending upon the volume of material in the package, must be left empty. This empty bag space, or outage, is required so that the angle formed by the two sides of the package is sufficiently small as not to cause wrinkling of the packaging material when the end sealing dies close and seal the material. In a machine of the general type described, the size of the angle included between the two sides of the package will decrease as the length of unused packaging space is increased.

The present invention makes it possible to reduce the length of unused packaging material and to effect a more perfect end seal than has been possible heretofore. To accomplish this, novel grasping and spreading means are provided in the end sealing dies to place the packaging material under transverse tension prior to closure of the end sealing dies. This results in a package material saving of the order of 20 per cent in packages of normal size.

The novel improvement in packaging machines of the aforementioned type constituting the present invention will be apparent from the description which follows, when considered in connection with the accompanying drawings and claims.

In the drawings:

Fig. 1 is a side elevation of a packaging machine.

Fig. 2 is a projection illustrating the end sealing dies in open position and showing the spreading and grasping means of the invention.

Fig. 3 is a section taken substantially along the plane of line 3—3 of Fig. 2 showing also a package which has just been filled with a granular material.

Fig. 4 is a projection similar to Fig. 2 but showing the dies in closed relation.

Fig. 5 is a section taken substantially along the plane of line 5—5 of Fig. 4.

Fig. 6 is a front view of the grasping means.

Fig. 7 is a side view of the grasping means.

Fig. 8 is an end view of the grasping means.

Fig. 9 is an end view, partly in section, of one of the spreading means to illustrate the contour of the shoulder thereof.

Referring first to Fig. 1, the machine generally is built upon a framework having a base plate A, a table B supported by legs C, above base plate A. Paired standards D constitute side frames which are mounted upon table B and which support a platform E, which in turn supports a feed mechanism F and various other parts of the machine. The machine is illustrated and described as a single line packaging apparatus. However, two or more such units may be operably associated so as to function simultaneously thereby producing a correspondingly greater number of packages, in which event the combination might be termed a duplex machine.

The operation of the machine is essentially the same as that already described. In essence, strips of packaging material 1 and 2 of suitable width are led from rolls 3 and 4 over suitable guide and tensioning means (not shown) to the opposed surfaces of a tube-former 5, which is preferably of a flattened diamond shape in transverse cross section, and which extends downwardly to the vicinity of a pair of opposed end sealing clamps 6 and 7. Feed tube 8 extends downwardly from feed mechanism F through tube-former 5 and terminates at the lower extremity thereof. Feed tube 8 thus forms an inner core of tube-former 5, and aids in the support thereof. Flanking the outer flattened surfaces of tube-former 5 are suitable guide means (not shown) positioned above margin sealing clamps 9 and 10 to receive and position packaging material strips 1 and 2 against the outer flattened surfaces of tube-former 5 as the material is drawn downward. The guide means and the tube-former are so constructed as to cause the packaging material to conform to the outer surfaces of the tube-former and to cause the two strips of packaging material to be held adjacent each other at the margins thereof.

Suitable margin sealing clamps 9 and 10, having a pair of complementary opposed margin sealing dies (not shown) attached to the faces thereof, are provided below the above-mentioned guide means. These margin sealing dies are adapted to be brought together to seal the marginal portions of packaging material 1 and 2 extend-

ing beyond the tube-former 5, thereby completing formation of a packaging material tube. Where the character of the packaging material is such as to require heat to effect a proper seal, suitable heating elements may be mounted within the margin sealing clamps.

The means for drawing the tube of packaging material downwardly and effecting an end seal to the package consists of vertically reciprocating end sealing clamps 6 and 7, having end sealing dies 11 and 12 mounted on the inner faces thereof. Margin sealing clamps 9 and 10 and end sealing clamps 6 and 7, as well as the means which effect reciprocation of the end sealing clamps, are actuated by suitable means (not shown).

Referring now to Figs. 2, 3, 4, and 5, which further illustrate the present invention, end sealing dies 11 and 12 are supported by back up blocks 13 and 14, which are in turn held within end sealing clamps 6 and 7 respectively, by means of spacing blocks 15 and 16. Where packages of the heat-sealed type are to be formed, electric heating means may be provided in back up blocks 13 and 14.

Each of the end sealing dies 11 and 12 is constructed or machined so as to provide a suitable housing or recess 38 for paired spreading means or "fingers" 30, which are retained in said housing by pins 31 near the innermost ends thereof. The outermost ends of fingers 30 project beyond the outer edges of the end sealing dies and terminate in a rearwardly extending arm 32. Opposed cooperating fingers 30 are urged into operative association by suitable biasing means, here shown as spring 33 secured to the arms 32 as at 34. Each finger 30 is provided with suitable grasping means 35 rotatable about a pivot pin 36 for engagement with a similar grasping means on the opposed cooperating finger. Grasping means 35 is positioned on each finger at a point opposite the sealed margin 20 of the packaging material tube. Fingers 30 are preferably machined to receive the U-shaped projections 37 of grasping means 35 so that the upper and lower surfaces of the fingers will be continuous. The recess 38 (Fig. 2) into which fingers 30 retract upon closure of the dies is so formed as to provide blocks 39 (Figs. 3 and 5) in the middle one of which bearing surfaces 40 are formed to arrest the rotary movement of fingers 30 about pivot 31 when the dies are opened.

When the end sealing dies are closed, grasping means 35 are the only part of the fingers which are in contact with the packaging material. At the end of the downward stroke, the end sealing dies are opened and the die assembly begins to move upwardly. The grasping means 35 must accordingly be disengaged from the package material before the die assembly begins its upward motion in order that the packaging material will not be torn or the margin seals thereof disturbed by passing over knurled surface 41 and extension 42 of the grasping means. Furthermore, it is essential that the action of springs 33 be arrested temporarily as the end sealing dies open in order that the distance between the opposed pairs of grasping means will not be shortened too abruptly and cause wrinkling of the end seal. Suitable disengaging means are employed to effect separation of the grasping means from the package material and retain the opposed grasping means, in spaced apart relation as the dies open. This separation and temporary retention of the fingers is effected by wedges 43, the opposed faces of which taper gradually to a rounded upper end. Said wedges 43 are suitably attached to frames D as illustrated in Figs. 1 and 2, and as shown in Figs. 4 and 5, are so positioned as to engage shoulders 44 of the fingers 30 when the end sealing dies are in their downward position. Shoulders 44 are rounded on the underside thereof, as shown in section in Fig. 9, to reduce wear on both the shoulder 44 and wedge 43.

In the operation of the machine, opposed strips of packaging material 1 and 2 are caused to embrace tube-former 5 with the margins thereof extending beyond said former and are guided by suitable means so as to pass

between margin sealing dies 9 and 10. The opposed strips of packaging material are thereupon formed into a tube by the successive operation of the margin sealing dies. Assuming now that the operation of the machine has progressed to a point where a tube of packaging material extends below the end sealing clamps 6 and 7 and said end sealing clamps are moving upward, as the end sealing clamps approach the end of their upward stroke, the margin sealing dies are caused to open and are completely opened when the end sealing clamps are at the end of their upward stroke. At this point, the end sealing clamps are caused to close, and in closing the novel spreading means of this invention are caused to operate. As the clamps begin to close, opposed grasping means 35, engage the sealed margins 20 of the packaging tube and rotate about pins 36 while holding said margin rigidly between the opposed knurled surfaces of said grasping means. Increased pressure upon the opposed grasping means causes the fingers to overcome the action of springs 33 and rotate a fixed distance inwardly about their pivot points 31, thereby stretching taut that portion of the packaging tube between the end sealing dies to form a smooth surface between the sealing dies.

When the end sealing dies are closed, the end sealing clamp assembly begins its downward stroke drawing packaging material over tube-former 5 and into position opposite the margin sealing dies. As downward motion begins, the filling operation of the package is begun. The commodity to be charged is supplied from feed mechanism F through inner feed tube 8 of tube-former 5.

Near the end of the downward stroke, shoulders 44 of opposed pairs of fingers engage the opposed inclined faces of wedges 43 at a point above the base of the wedge where the distance between opposed faces thereof is equal to the distance between the shoulders of an opposed pair of fingers when the dies are closed. As the end sealing clamps move farther downward, shoulders 44 advance down the opposed inclined faces of wedges 43, thereby increasing the distance between opposed shoulders 44, and the fingers 30 pivot about pins 31, and retract a distance sufficient to disengage the opposed grasping means 35 from the package material.

The end of the downward stroke now having been reached, the end sealing dies are opened and the margin sealing dies are closed, thus completing the operating cycle. The end sealing clamps immediately begin to move upward. Wedges 43 check the action of springs 33 and retain fingers 30 in a retracted position while the end sealing dies open. As the end sealing clamps begin to move upward, the action of springs 33 causes gradual extension of the fingers as the shoulders thereof retreat up the inclined faces of the wedges 43. When the shoulders clear the end of the wedges, springs 33 cause the fingers to continue to rotate about their pivots 31 until the inward ends thereof stop against bearing surfaces 40.

Obviously, the object of wedges 43 may be served by other means which will provide the necessary cam action, and it is not essential to this invention that said means be rigidly attached to the frame of the machine.

The savings in packaging material realized through this invention are apparent from the following table. The dimensions of 2 oz. and 4 oz. packages of silica gel manufactured on a machine of the general type described before and after incorporation of the present invention are illustrated.

Weight	Dimensions		Material Saved, percent
	Before	After	
2 oz.	5" x 5"	5" x 3⅞"	22
4 oz.	5" x 7"	5" x 5⅝"	20

While I have shown and described one embodiment of

my improvement to an automatic packaging machine, I do not wish to be limited to the specific details of construction disclosed, since it is understood that changes may be made therein within the range of engineering skill without departing from the spirit of the invention.

I claim:

1. In a packaging machine comprising means for shaping suitable opposed strips of packaging material, means for sealing the side margins of said strips to thereby form a tube, a pair of vertically reciprocating end sealing dies for successively drawing the packaging material through said shaping means and closing longitudinally spaced portions of the resulting tube to produce a succession of individual commodity containers, the improvement comprising in combination means mounted on said end sealing dies to engage the packaging material at the margins thereof and stretch said material horizontally before the end sealing dies close, and means to disengage said grasping means from said packaging material following sealing but before the end sealing dies open.

2. In a packaging machine comprising means for shaping suitable opposed strips of packaging material, means for sealing the side margins of said strips to thereby form a tube, a pair of vertically reciprocating end sealing dies for successively drawing the packaging material through said shaping means and closing longitudinally spaced portions of the resulting tube to produce a succession of individual commodity containers, the improvement comprising in combination two elongated spreading means pivotally secured at their inner ends within each opposed end sealing die for oscillation in a plane normal to the face of said die from a position between said opposed dies when said dies are open to a position rearward of the face of said dies when said dies are closed, biasing means operatively associated with each of said spreading means at the outer end thereof and with a cooperating opposed spreading means similarly associated with the opposed end sealing die, grasping means pivotally associated with each said spreading means near the outermost end thereof positioned to register with the cooperating opposed grasping means at the margin of said tubular packaging material and hold said packaging material opposite said end sealing dies against slippage as said dies close, and disengaging means, positioned to register with said spreading means as said end sealing dies approach the end of their downward stroke, to separate said grasping means from the packaging material following sealing and to overcome the action of said biasing means and retain said spreading means and grasping means in spaced apart relation as said end sealing dies open.

3. In a packaging machine comprising means for shaping suitable opposed strips of packaging material, means for sealing the side margins of said strips to thereby form a tube, a pair of vertically reciprocating end sealing dies for successively drawing the packaging material through said shaping means and closing longitudinally spaced portions of the resulting tube to produce a succession of individual commodity containers, the improvement comprising in combination a pair of fingers mounted on separate single pivots intermediate the ends of each sealing dies for oscillation in a common plane normal to the longitudinal axis of said tube and cooperating with the corresponding fingers on the opposed die to comprise paired members for engaging said packaging material, at the sealed margins thereof, grasping means mounted at the free end of each finger for oscillation in the common plane with said fingers and having an inwardly directed contact face to prevent slippage of said packaging material between the cooperating fingers when said fingers are in engagement with said material, and disengaging means positioned to register with the paired opposed fingers as the end sealing dies approach the end of their downward stroke, to separate said grasping means from the packaging material following sealing but before the end sealing dies open and to retain said fingers in spaced apart relation as the end sealing dies open.

4. In a packaging machine comprising means for shaping suitable opposed strips of packaging material, means for sealing the side margins of said strips to thereby form a tube, a pair of vertically reciprocating end sealing dies for successively drawing the packaging material through said shaping means and closing longitudinally spaced portions of the resulting tube to produce a succession of individual commodity containers, the improvement comprising in combination paired fingers extending laterally outwardly from individual pivot points spaced intermediate the mid point and the outer extremity of each die and rearwardly of the face thereof, said fingers being mounted for oscillation about said pivots in a plane normal to the face of said sealing dies and from a position to the rear of the die faces to a position between said dies, each of said fingers having an opposed corresponding fingers on the opposing die so that closure of the dies causes said fingers to engage the sealed margins of said packaging material, grasping means pivotally mounted on each of said fingers at the free outer end thereof at the point of engagement with the corresponding opposed finger for oscillation in the plane of finger oscillation and having a frictional surface on the inner faces thereof, whereby the sealed edge of said packaging material when grasped between the opposed pawls is held against slippage, and disengaging means, positioned to register with the opposed fingers as the end sealing dies approach the end of their downward stroke, to separate said grasping means from the packaging material following sealing but before the end sealing dies open and to retain said fingers in spaced apart relation as the end sealing dies open.

5. In a packaging machine comprising means for shaping suitable opposed strips of packaging material, means for sealing the side margins of said strips to thereby form a tube, a pair of vertically reciprocating end sealing dies for successively drawing the packaging material through said shaping means and closing longitudinally spaced portions of the resulting tube to produce a succession of individual commodity containers, the improvement comprising in combination two fingers mounted within each said end sealing die on separate single pivots spaced intermediate the ends and the mid point of each end sealing die for oscillation about said pivots in a common plane normal to the longitudinal axis of said packaging tube, each of said fingers having a projection at its outermost end directed rearwardly of the faces of said end sealing dies, in a plane normal to the axis of said pivot, and cooperating through biasing means, associated with said projection, with a corresponding finger on the opposed die to comprise two sets of paired members for engaging the sealed margins of said tube, a grasping means pivotally mounted intermediate the pivot point and projection of each finger at the point of engagement with the corresponding opposed finger for oscillation in the common plane with said fingers and having an inwardly directed frictional contact face to prevent slippage of said packaging material between the cooperating fingers when said fingers are in engagement with said material, and a disengaging wedge rigidly fixed to the frame of said machine and positioned to register with the opposed fingers as the end sealing dies approach the end of their downward stroke, to separate said grasping means from the packaging material following sealing but before the end sealing dies open and to retain said fingers in spaced apart relation as the end sealing dies open.

6. In a packaging machine comprising means for shaping suitable opposed strips of packaging material, means for sealing the side margins of said strips to thereby form a tube, a pair of vertically reciprocating end sealing dies for successively drawing the packaging material through said shaping means and closing longitudinally spaced portions of the resulting tube to produce a succession of individual commodity containers, the improvement comprising in combination a pair of fingers pivotally mounted on said end sealing dies intermediate the ends thereof

for oscillation in a common plane normal to the longitudinal axis of said tube and cooperating with the corresponding fingers on the opposed die to comprise paired members for engaging said packaging material, at the sealed margins thereof, grasping means mounted at the free end of each finger for oscillation in the common plane with said fingers and having an inwardly directed contact face to prevent slippage of said packaging material between the cooperating fingers when said fingers are in engagement with said material, and disengaging means positioned to register with the paired opposed fingers as the

end sealing dies approach the end of their downward stroke, to separate said grasping means from the packaging material following sealing but before the end sealing dies open and to retain said fingers in spaced apart relation as the end sealing dies open.

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