

May 19, 1959

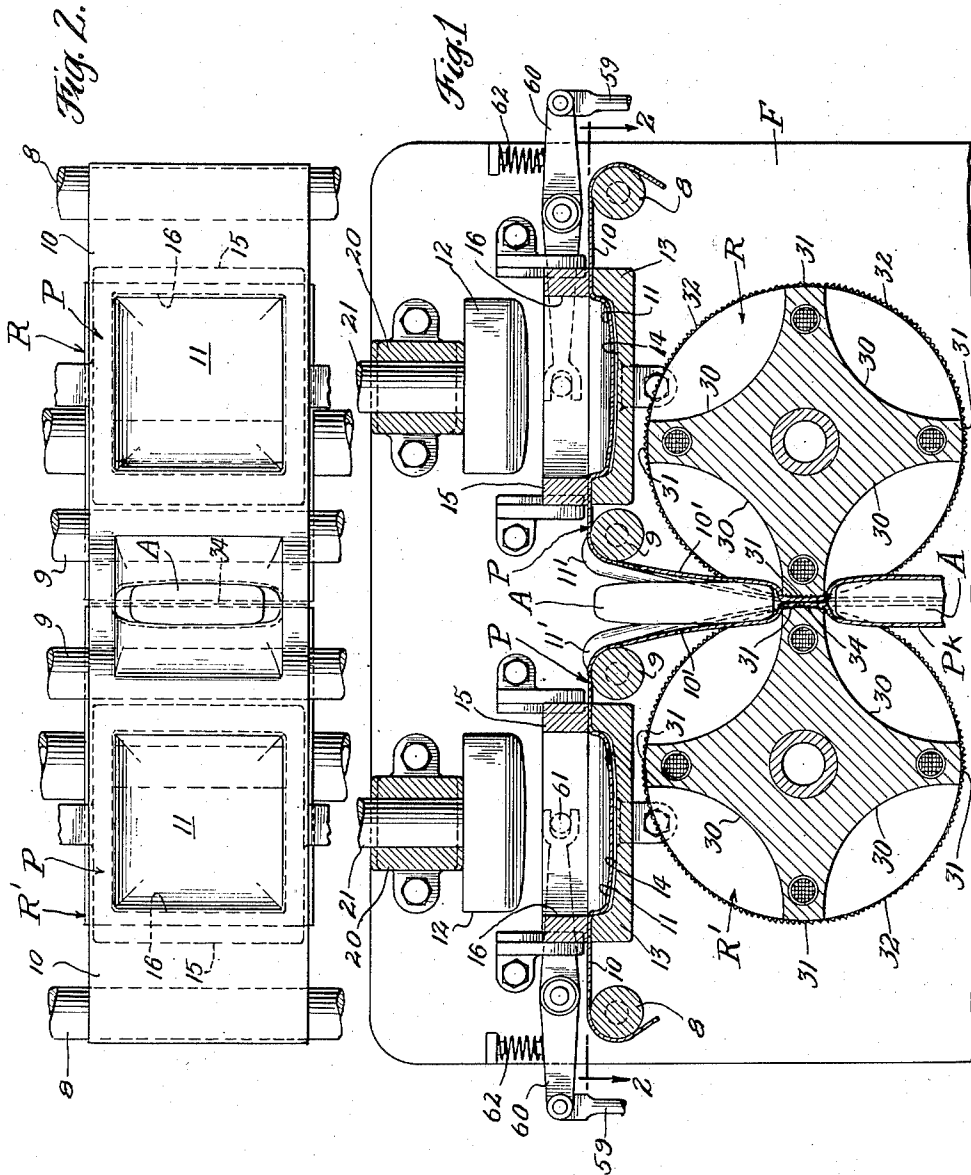
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2,886,931

METHOD AND APPARATUS FOR FORMING AND SEALING PACKAGES

Filed Jan. 4, 1956

3 Sheets-Sheet 1



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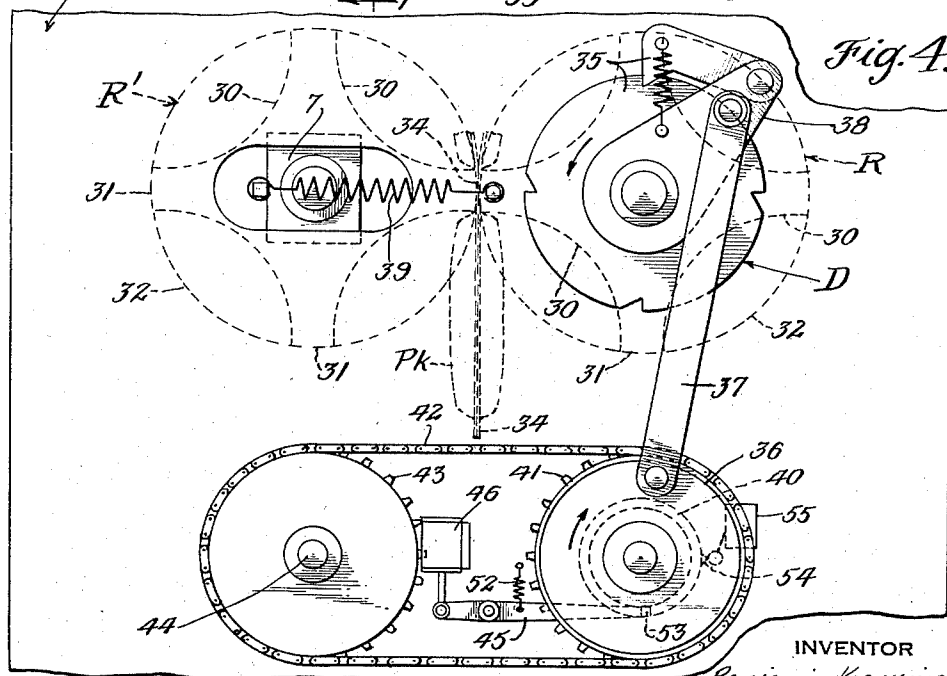
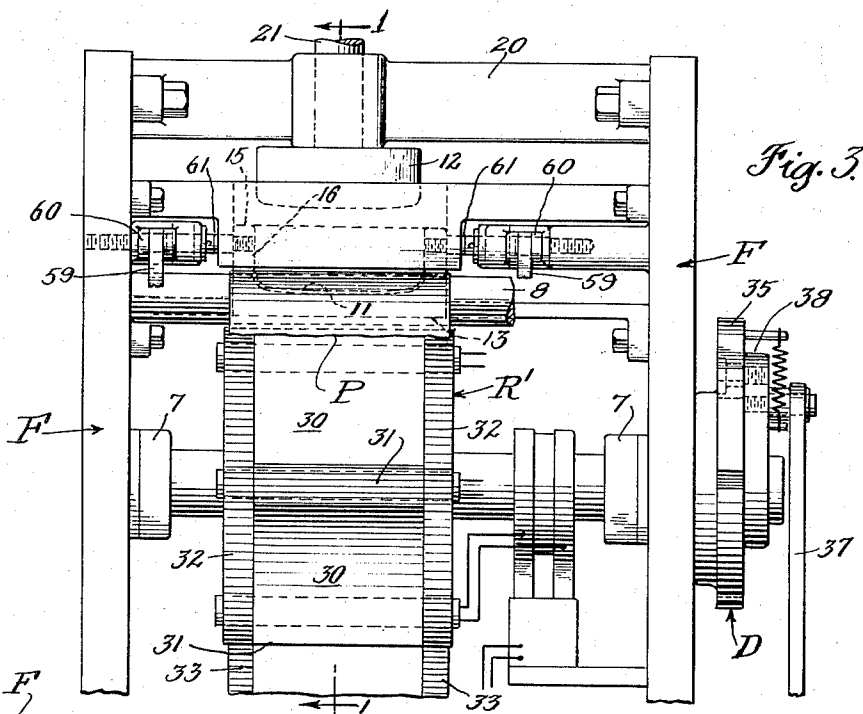
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METHOD AND APPARATUS FOR FORMING AND SEALING PACKAGES

Filed Jan. 4, 1956

3 Sheets-Sheet 2



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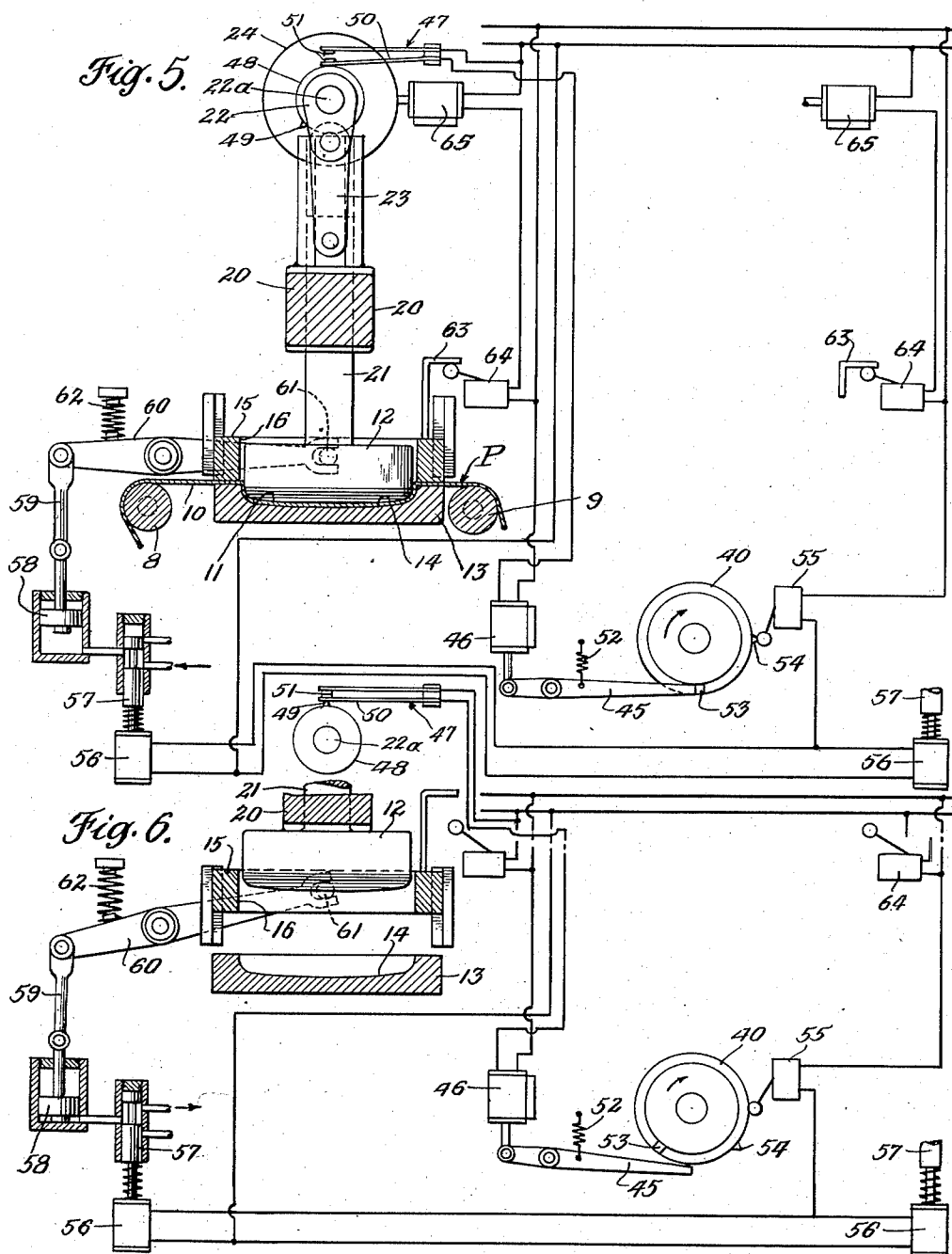
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METHOD AND APPARATUS FOR FORMING AND SEALING PACKAGES

Filed Jan. 4, 1956

3 Sheets-Sheet 3



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2,886,931

METHOD AND APPARATUS FOR FORMING AND SEALING PACKAGES

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Application January 4, 1956, Serial No. 557,314

2 Claims. (Cl. 53—184)

My invention relates to a method and apparatus for packaging relatively large or bulky three dimensional objects between opposed strips of flexible packaging material and has for its primary object the provision of a method of pre-stretching areas of the packaging material to form a pocket to receive the article to be packaged and the provision of apparatus for carrying out the method.

Heretofore difficulty has been encountered in packaging relatively large three dimensional objects between strips of flexible packaging material for the reason that the article tends to stretch the material and exert a "pull" on the marginal seals between the opposed strips forming the package. This "pull" frequently breaks the seal and this is particularly likely to happen immediately after the article has been packaged before the adhesive which forms the seal has had time to set or harden.

I propose to avoid this difficulty by pre-stretching the area of the package which lies within the marginal seals, before the package is formed so that when the article is deposited between the opposed strips of packaging material in that area, there will be little, if any, stretching of the packaging material in order to accommodate the package to the shape and size of the article. I have found that such pre-stretching practically eliminates breaking of the seals when relatively large articles are packaged.

I have illustrated my invention in the accompanying drawings as applied to a "rotary" type packaging machine of the general character as that shown in Lewis Patent No. 2,626,494 but it will be understood that the invention is equally adaptable for use with other types of packaging machines—one example being the "reciprocating" type machine shown in Salfishberg Patent No. 2,162,230.

In the drawings:

Figure 1 is a sectional elevational view of the device as applied to a packaging machine of the intermittent rotary type, the section being taken substantially on the line 1—1 of Figure 3;

Figure 2 is a fragmentary plan view taken as indicated by the line 2—2 of Figure 1;

Figure 3 is an end elevation looking toward the right in Figure 1;

Figure 4 is a fragmentary side elevational view looking toward the left in Figure 3;

Figure 5 is a diagrammatic view illustrating control mechanism employed in the device showing the parts in prestretching position; and

Figure 6 is a similar diagrammatic view illustrating the parts in normal or starting position.

The packaging machine illustrated comprises in general a pair of heated crimping and sealing rolls or dies R and R' to which opposed sheets of pre-stretched packaging material P are fed, a supporting frame F in which the rolls are rotatably supported by suitable bearings 7—7, and driving mechanism D for imparting intermittent rotation to the rolls R, R' to form the package PK.

The packaging material may be any of several materials

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on the market adapted to be heat sealed and to take a set when pre-stretched, an example of such material being polyethylene coated creped kraft.

Referring particularly to Figures 1 and 2, the packaging material is led, from suitably supported rolls of material (not shown), over longitudinally spaced guide rolls 8 and 9 to provide straight runs 10—10 between the guide rolls and then is led downwardly to and between the rolls R and R' to form a substantially V-shaped receiving space 10 between the downward runs 10'—10' for the reception of articles to be packaged, an article A being illustrated in the V-shaped space in Figures 1 and 2. The article may be fed to this receiving space either by hand or by known feeding mechanism.

The packaging material is pre-stretched at the straight runs 10 to form pockets 11 in the material for the reception of the article A in the downward run of the material.

The pre-stretching mechanism comprises a reciprocable ram 12 a fixed mold member 13 having a mold cavity 14 and an intermediate clamping frame 15. The ram 12 and mold member 13 are shaped to provide a pocket 11 in the material of the desired configuration and depth for the particular article being packaged. The clamp member 15 has an opening 16 corresponding to the shape of the ram to permit the ram to pass downwardly through it with clearance. In this instance the ram 12 and mold cavity 14 are of rectangular shape and the clamp member 15 is in the form of a rectangular frame which when in the clamping position shown in Figure 1 clamps the packaging material P between it and the mold member 13 peripherally of the mold cavity 14.

The ram 12 is mounted for reciprocation by means of the ram rod 21 reciprocating in a support 20 secured to the frame F. The ram is reciprocated in a manner similar to the punch of a punch press by means of a power driven crank 22 (see Figure 5) and connecting link 23, a trip clutch 24 of any well known form being provided to control the operation of the ram. It is pointed out that the actuation of the ram 12 and the clamp 15 is in timed relation to the intermittent feed of the packaging material as will appear after the following description of the driving mechanism D and the crimping and sealing rolls R and R'. The location of the rams and molds with relation to the rolls R and R' is such that when the rolls rotate one quarter revolution of the preformed pockets will advance to the proper position for deposit of the article to be packaged above the previously formed transverse seal and in the next quarter revolution will advance to proper position for formation of the next transverse seal enclosing the article to be packaged in the preformed pocket. In other words, as shown in Fig. 1 when a transverse seal is being formed the location of the mold with respect to the opposed seal forming members 31 is such that the length of the path between mold and seal forming members is the length of a completed package. If desired the mold could be moved to a position further in advance of the sealing rolls but in any case the length of the path between the mold and opposed seal forming members 31 will be a multiple of the package length.

These rolls are provided with cavities 30, in this instance four, between which lands 31 extend crosswise of the rolls to constitute cross seal members. The cavities end short of the ends of the rolls to provide circular end webs 32 which constitute side seal members. These circular end webs 32 also engage and draw the packaging material along its path of movement through the packaging machine effecting intermittent stepwise feed of the material. The rolls may be electrically heated in a manner well known in the art and are peripherally serrated so that when the packaging material passes between the rolls crimped side seals 33 and

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cross seals 34 are provided for the packages. The cross seal is of sufficient size to provide a top seal for one package and a bottom seal for the next package when the packages are cut apart at the center of the cross seal.

The roll R is intermittently rotated by a pawl and ratchet wheel device 35 (see Figs. 3 and 4) which is actuated from a drive disc 36 by a link 37 and crank arm 38. The roll R' is urged toward the roll R by a spring 39 (see Fig. 4) so as to be driven by rotation of the roll R.

A one revolution clutch 40 of any well known form is interposed between the drive disc 36 and a coaxial power sprocket 41. The sprocket 41 is connected by a chain 42 to a driving sprocket 43 which is secured on a drive shaft 44 connected to a suitable source of power such as a well known motor driven gear reduction unit.

Referring to Figure 5 it is pointed out that for purposes of showing the ram in its position of pre-stretching the material, the ram is illustrated in its down or half cycle position. A cam 48 having a cam lobe 49 is secured on the crank shaft 22a of the press and with the ram in its down position, as shown in Figure 5, the lobe is located somewhat past the bottom center position. The cam 48 operates to open and close a switch 47 for controlling the clutch solenoid 46, it being noted that just prior to the time that the crank 22 reaches its top center position the cam lobe 49 engages the switch arm 50 to close the contacts 51 and energize the solenoid 46. This releases the stop latch 45 from the lug 53 of the one revolution clutch 40 as shown in Figure 6.

As the crank shaft continues in its rotation to its top center position the cam lobe 49 leaves the switch arm 50 to open the contacts 51 and de-energize the solenoid 46. By this time the lug 53 has rotated a sufficient distance in the direction of the arrow to allow the latch to be urged by spring 52 into position to be in the path of the lug so as to stop the clutch at the end of one revolution.

It will be noted that in the first half of the revolution of the one revolution clutch the pawl of the pawl and ratchet device 35 is in its back or non-driving stroke and therefore the rolls R and R' remain in dwell position. During the second half revolution of the drive disc 36 of the clutch the rolls R and R' are advanced one quarter revolution and then again dwell to make the next cross seal.

Control of the clutch 40 from the press is advantageous because it enables press operation to suit the particular packaging material being employed, i.e., the press can be operated fast or slow as required by the particular material being run without throwing the clutch out of phase because the clutch is not tripped to effect material feed until the press has completed its stretching operation.

In some instances a press of known form could be employed in which there is a dwell of the ram when it is in its down or material stretching position so as to provide a time element for the pocket being formed in the material to take its shape.

In connection with Figures 5 and 6, it is to be pointed out that since both the left and right hand pre-stretch units of Figure 1 are controlled simultaneously in the same manner only the left hand unit has been illustrated complete with its controls although certain control elements of the right hand unit are also illustrated.

In Figure 5 the parts are shown in the position they assume when the rolls R and R' are in dwell as shown in Figure 4. In Figure 6 the cam 48 has rotated an amount to close the contact 51 and energize the solenoid 46 to release the clutch latch and permit the clutch to rotate.

The clutch 40 is provided with a lobe 54 for actuating a switch 55 which controls a solenoid 56 for activating

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a valve 57. The valve 57 controls a piston 58 for actuating the clamp 15.

In the position of Figure 6 the lobe 54 has moved past the switch 55 so that the switch is open and the solenoid 56 is de-energized with the result that the valve 57 is spring urged to its lower position in which the cylinder of piston 58 is opened to exhaust. The piston 58 is connected by link 59 to one end of a pivoted lever 60. The other end of the lever 60 has a forked connection with a pin 61 carried by the clamp 15 and the lever is moved to the position shown in Figure 6 by a spring 62.

It will be noted that in this position the clamp 15 has been moved upwardly away from the mold 13 so that the packaging material can feed freely over the mold. Also the ram 12 is up in clearance position.

As the cam 48 continues in its rotation from the position of Figure 6, the contacts 51 open to de-energize the solenoid 46 and the spring 52 pulls the stop arm 45 into the path of the clutch lug 53. As the clutch continues in its rotation the lug 53 finally strikes the end of the lever 45 to stop the clutch and cause the rolls R and R' to dwell. This is the position shown in Figure 5, and it will be seen that in this position the lobe 54 has closed the switch 55 to energize the solenoid 56 and move the valve 57 into its position of admitting pressure fluid from a suitable source to the bottom of the piston 58, thus rocking the lever 60 in a direction to move the clamp 15 down into its position of clamping the material between it and the fixed mold 13.

As the clamp 15 is thus moved down the arm 63 carried thereby closes the switch 64 to energize the solenoid 65 which operates the press trip to cause operation of the ram 12 in a down and up stroke.

Since the cam 48 is directly connected to the shaft 22a, it rotates upon release of the trip clutch 24 and upon continued rotation the above cycle is repeated.

It is pointed out that due to the characteristics of the packaging material the pre-stretched or pre-formed pockets 11 in passing over the guide rolls 9 will spring to the opposite side of the plane of the material as indicated at 11'-11' but when they have passed the guide rolls they will readily spring back to their original position upon insertion of the article as is clear from inspection of Figure 2.

Although I have illustrated in my application an apparatus where both of the strips of packaging material which form the package are pre-stretched, it will be appreciated that in many instances it may be sufficient to pre-stretch only one of the strips in order to form a pocket of sufficient dimensions to accommodate the article to be packaged.

By providing such a pre-formed pocket in the package of substantially the width, height and depth of the article to be packaged, articles of substantial size can be packaged without exerting pull on the marginal seals of the package which would tend to loosen them as has been found to be the case where articles are packaged between two flat sheets of material sealed around the edges.

Preferably the amount of pre-stretch of the material in forming the pocket is less than the total stretchability of the material so that the material of the pocket can yield somewhat to the article without pulling on the seals.

In connection with Figures 5 and 6, it will be noted that while only one pocket forming unit is shown the solenoid 56, valve 57, switch 64 and solenoid 65 of the other unit are indicated in order to show their connections into the circuit.

Although the invention is illustrated as applied to one particular type of packaging machine, it will be understood that the advantages of the invention can be realized in association with other types of packaging machines.

I claim:

1. In a package forming and sealing machine adapted for heat sealing opposed strips of packaging material, a

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pair of sealing rolls between which strips of the material are fed and formed into packages, said rolls having axially spaced circular surfaces for forming edge seals for the packages and having a plurality of circumferentially spaced cross members for forming cross seals for the packages, means for intermittently operating said rolls to provide a period of dwell when the cross seal members are in opposed positions intermittently operating molding means comprising a mold member having a mold cavity in the feed path of the packaging material, a clamp adapted to clamp edge and transverse portions of the packaging material to the mold about the margins of the mold cavity when the packaging material is not moving, a reciprocating ram adapted to press the packaging material into the mold cavity while the material is clamped against the mold, mechanism for effecting intermittent stepwise feed of said packaging material through the molding and sealing means and mechanism for inter-relating the operation of the molding means and the sealing means to effect stretching of the packaging material by the molding means while the cross seals of the sealing rolls are in opposed position at a period of dwell.

2. In a package forming and sealing machine adapted for heat sealing opposed strips of packaging material, a pair of sealing rolls between which strips of the material are fed and formed into packages, said rolls having axially spaced circular surfaces for forming edge seals for the packages and having a plurality of circumferentially

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spaced cross members for forming cross seals for the packages, means for intermittently operating said rolls to provide a period of dwell when the cross seal members are in opposed positions intermittently operating molding means comprising a mold member having a mold cavity in the feed path of the packaging material, a clamp adapted to clamp edge and transverse portions of the packaging material to the mold about the margins of the mold cavity when the packaging material is not moving, a reciprocating ram adapted to press the packaging material into the mold cavity while the material is clamped against the mold and mechanism for effecting intermittent stepwise feed of said packaging material through the molding and sealing means, the molding means being located at least one feed step length in advance of the transverse seal forming station, and mechanism for inter-relating the operation of the molding means and the sealing means to effect stretching of the packaging material by the molding means while the cross seals of the sealing rolls are in opposed position at a period of dwell.

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