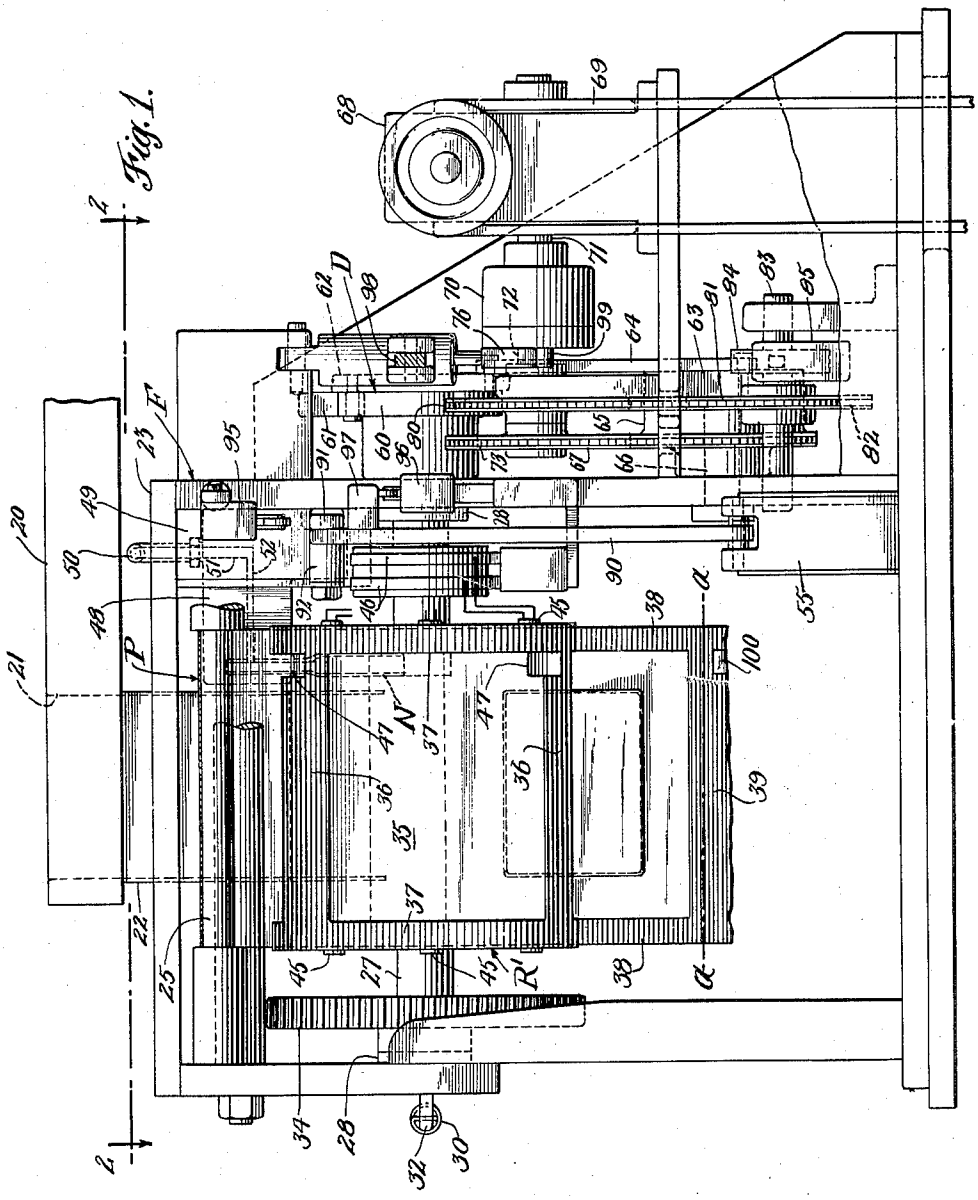
July 1, 1958 B. KARPOWICZ, JR 2,840,961

METHOD AND APPARATUS FOR PRODUCING EVACUATED PACKAGES

Filed July 27, 1955 5 Sheets-Sheet 1

Fig. 1.



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METHOD AND APPARATUS FOR PRODUCING EVACUATED PACKAGES

Filed July 27, 1955 5 Sheets-Sheet 2

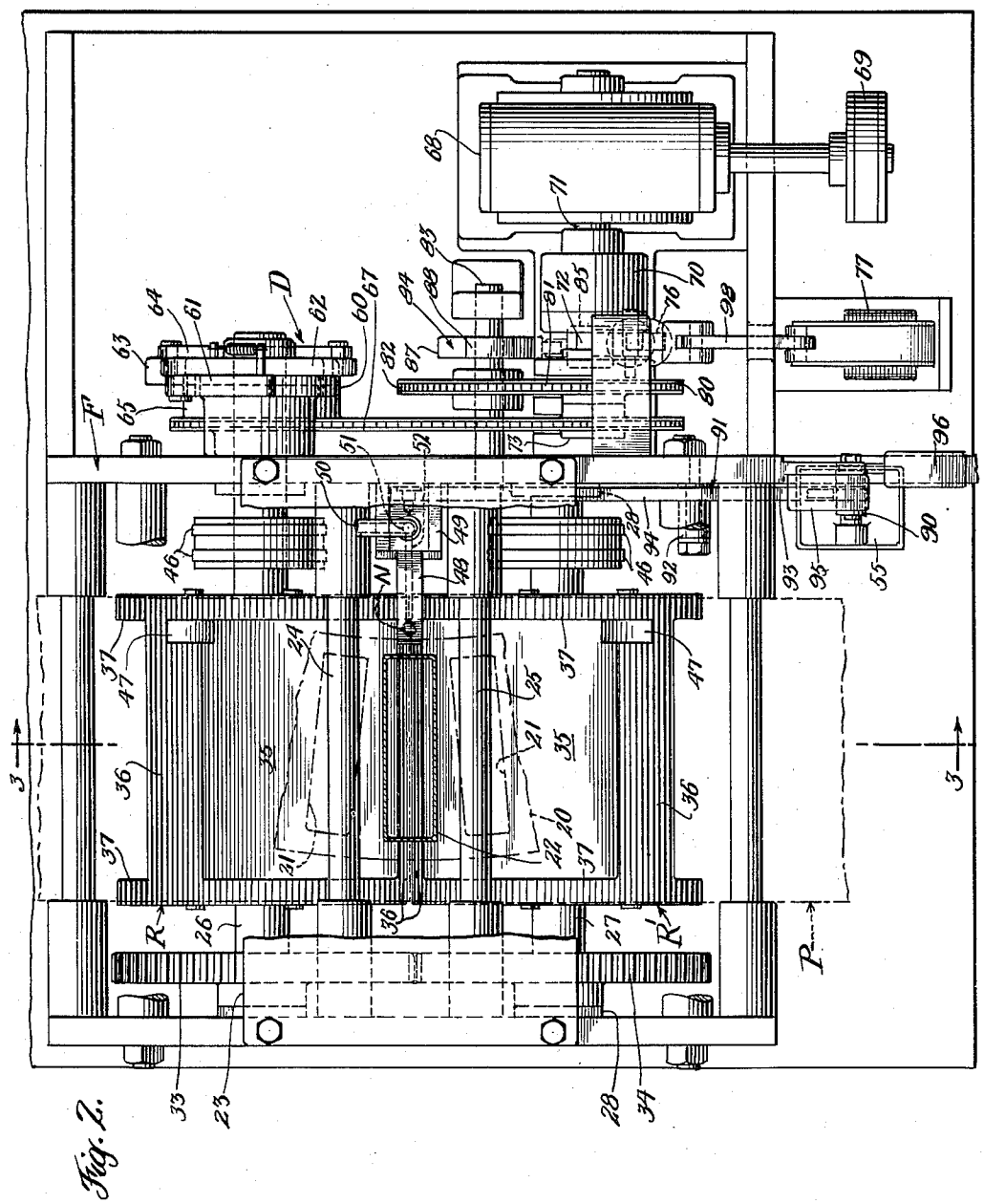

Fig. 2.

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METHOD AND APPARATUS FOR PRODUCING EVACUATED PACKAGES

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Fig. 3.

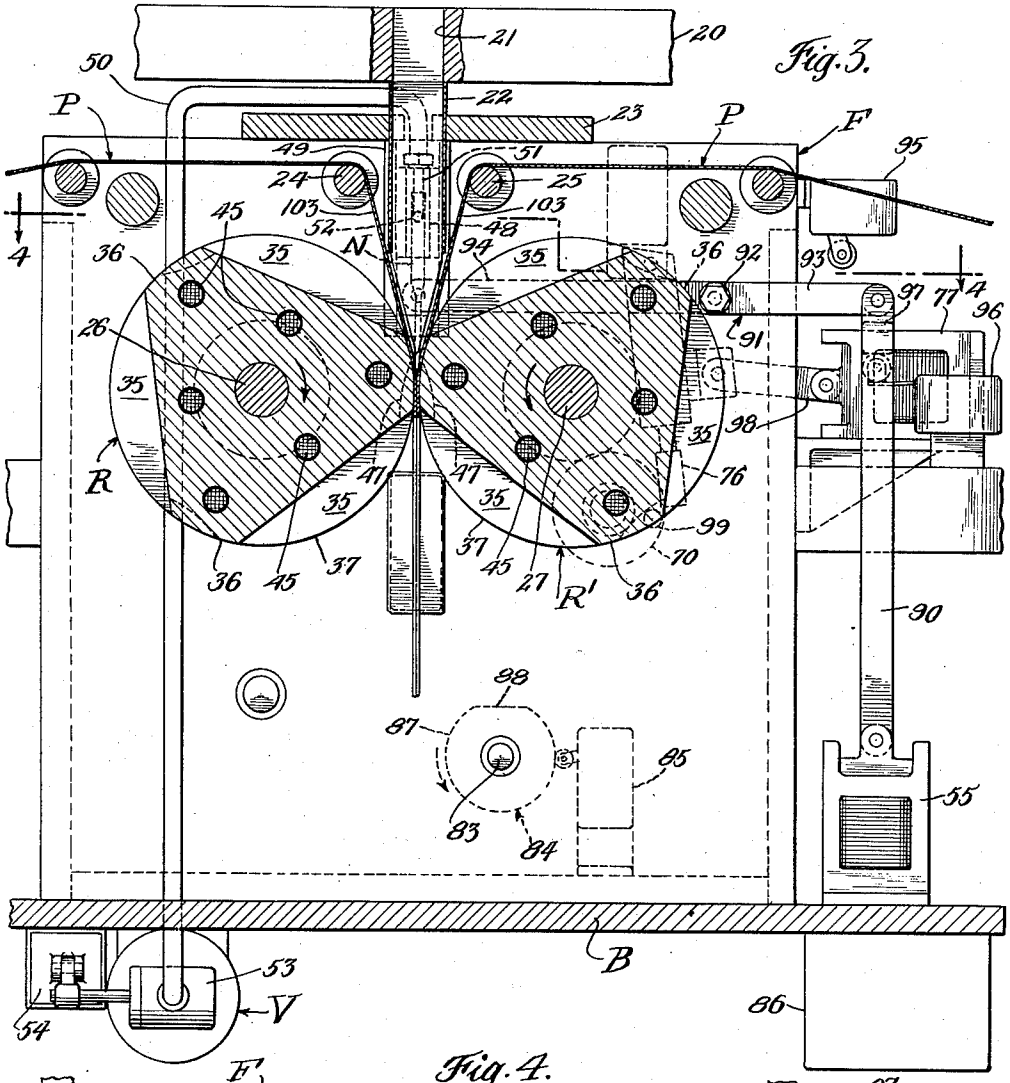
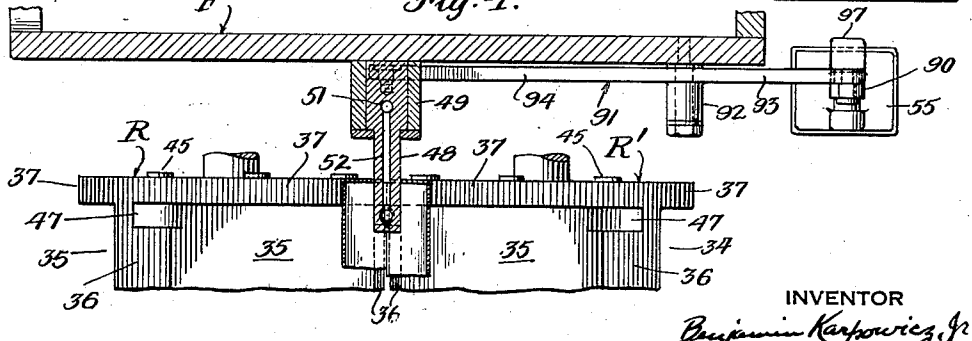


Fig. 4.



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METHOD AND APPARATUS FOR PRODUCING EVACUATED PACKAGES

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Fig. 5.

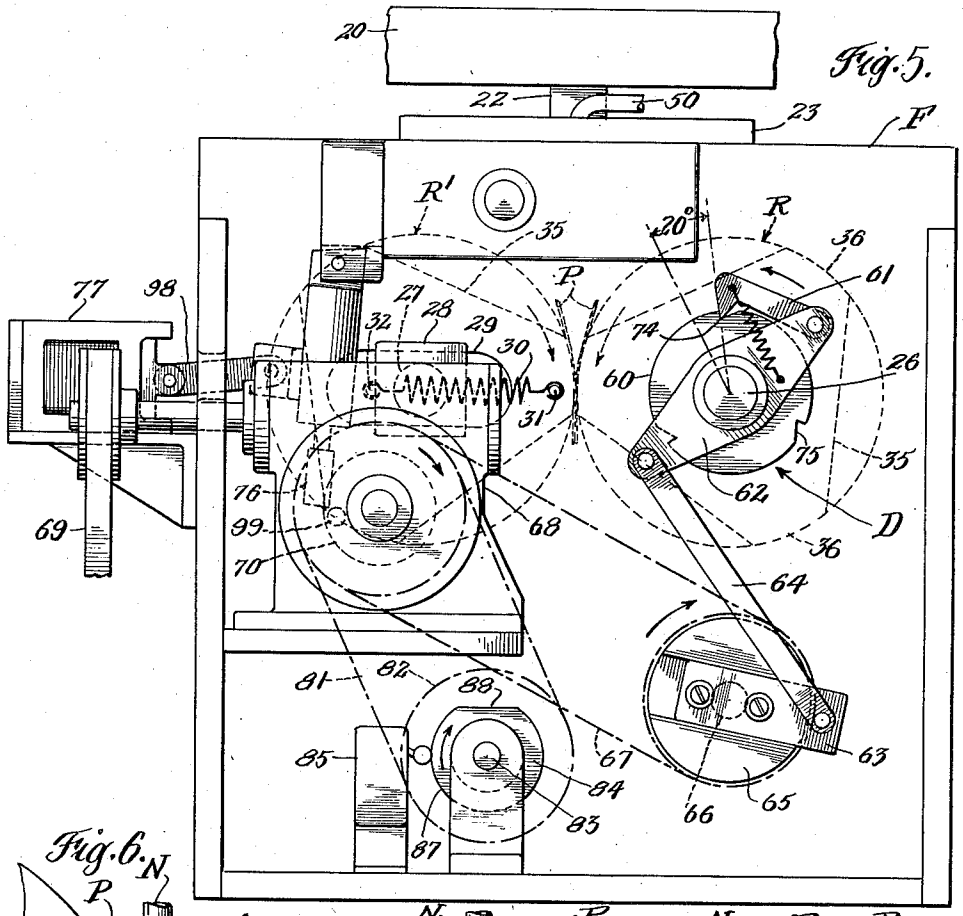


Fig. 6.

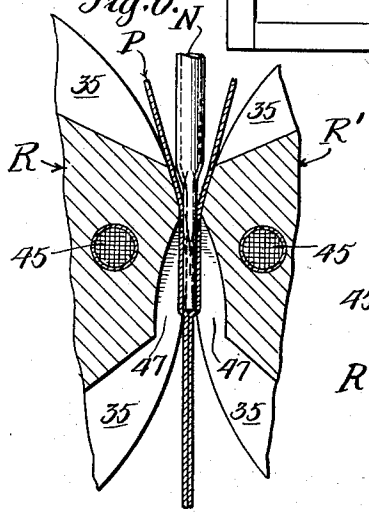


Fig. 7.

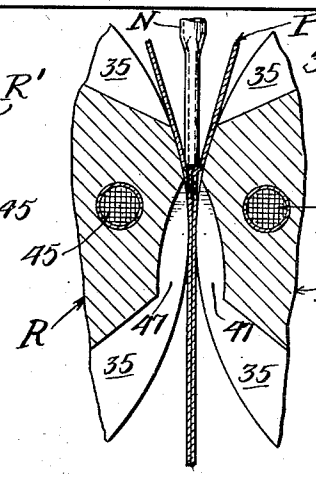
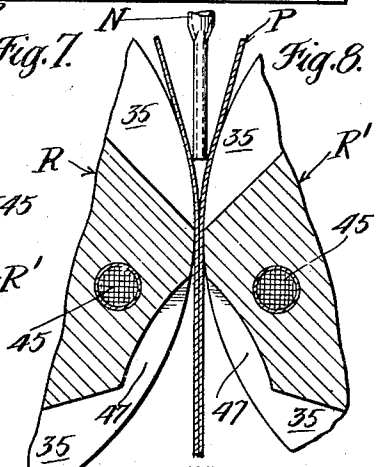


Fig. 8.



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METHOD AND APPARATUS FOR PRODUCING EVACUATED PACKAGES

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Fig. 9.

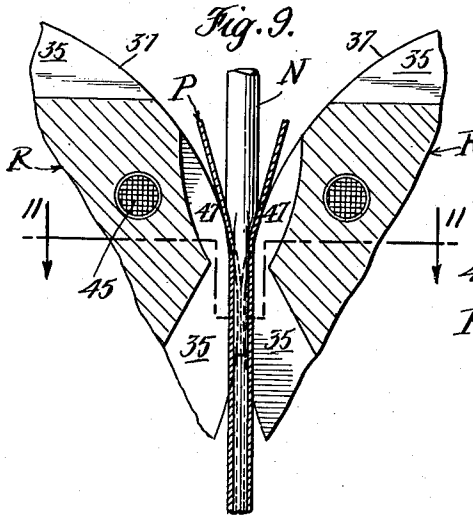


Fig. 10.

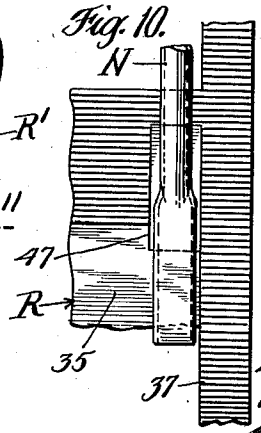
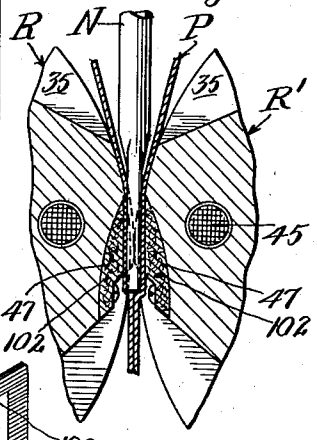


Fig. 13.



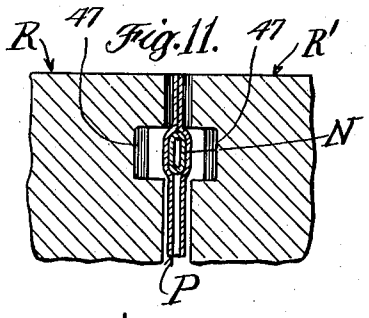


Fig. 11.

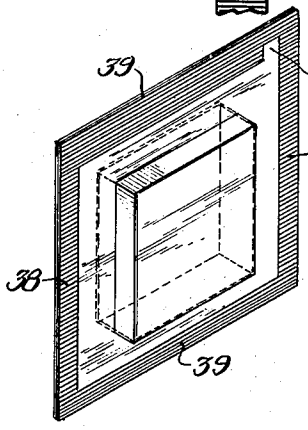


Fig. 12.

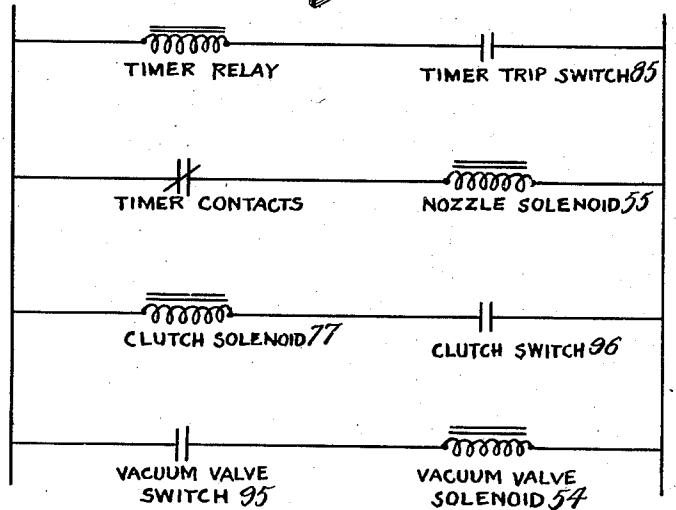


Fig. 14.

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METHOD AND APPARATUS FOR PRODUCING EVACUATED PACKAGES

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Application July 27, 1955, Serial No. 524,750

20 Claims. (Cl. 53—22)

My invention relates to a method of forming, filling, evacuating and sealing packages made from air tight flexible packaging material and to a particular type of apparatus or system to carry out the method.

There are two principal reasons for evacuating the packages, first to prevent deterioration of the packaged products by contact with air in the package and second to reduce the bulk of the packages so that they can be packed in a smaller space than that required for unevacuated packages.

In accordance with my invention opposed strips of packaging material are fed between opposed heat sealing rolls which seal the strips together at the edges and also form transverse or cross seals at intervals to form individual packages (which are later severed from the strip) for products which are deposited between the opposed strips during the formation of the package. Apparatus of this general type is illustrated in Lewis Patent No. 2,626,494 and my invention consists in the improvement in the method and apparatus which provides a system for evacuation of the individual packages just before the package is completely sealed from the atmosphere by the completion of a transverse seal.

For illustration of my improved method and apparatus reference is made to the accompanying drawings wherein:

Figure 1 is a side elevational view of a packaging machine constructed in accordance with the invention;

Figure 2 is a plan view of the machine as indicated by the line 2—2 of Figure 1 with the top plate broken out and with a portion of an article feeding plate shown in dot and dash lines as is also the packaging material;

Figure 3 is a vertical cross section taken on the line 3—3 of Figure 2;

Figure 4 is a fragmentary plan section on the line 4—4 of Figure 3;

Figure 5 is a rear elevational view looking toward the left in Figure 1;

Figures 6, 7, 8 and 9 are enlarged fragmentary sections showing various nozzle and roll positions during a cycle of operation;

Figure 10 is a fragmentary view looking toward the left in Figure 9 with the right hand roll of Figure 9 omitted;

Figure 11 is a plan section on the line 11—11 of Figure 9;

Figure 12 is an isometric view of a completed package;

Figure 13 is a fragmentary section showing a modification of the invention; and

Figure 14 is a schematic control diagram.

The machine comprises in general a pair of heated crimping and sealing rolls or dies R and R' to which opposed sheets of packaging material P are fed from suitably supported rolls of the material (not shown), a supporting frame F for the heated rolls or dies R and R' and for various associated mechanisms to be fully described hereinafter, a base plate B on which the frame F is mounted, driving mechanism D for imparting intermittent rotation to the crimping and sealing rolls, and means for creating a vacuum in the packages including a vacuum nozzle N and a vacuum pump and tank V of any well known form.

The packaging material may be any of several materials on the market adapted for the formation of air-tight packages, such as a laminated polyethylene cellophane strip, a laminated kraft paper polyethylene strip, or a saran strip laminated to cellophane or kraft paper. The polyethylene and saran are thermo-plastic and when pressed together by the heated rolls R and R' will form an air-tight bond between the opposed sheets of packaging material.

The products to be packaged are fed into the machine as by means of a rotary index plate 20 having product receiving openings 21, adapted to be brought into registry with a guide chute 22 extending downwardly from the top frame member 23 into the V-shaped space between the runs of packaging material leading to the rolls R and R' from the guide rollers 24 and 25. In the drawings the articles being packaged are of rectangular form but it will be understood that irregularly shaped articles as well as pellets, liquids, etc. can be packaged.

The crimping and sealing rolls R and R' are carried by shafts 26 and 27 mounted in bearings in the frame F, the roll R being the driving roll and the roll R' the driven roll. The bearings 28 for the driven roll are slidably mounted in slots 29 in the frame and the driven roll is urged into firm driving contact with the drive roll by means of springs 30. As seen in Figure 5 one end of the spring 30 is connected to the frame F by a pin 31 and the other end to the bearing 28 by a pin 32. By means of this spring pressure the packaging material is tightly crimp sealed as it passes between the rolls by reason of the heat and pressure of the rolls. In order to prevent the rolls from getting out of phase loosely meshing gears 33 and 34 are provided on the roll shafts.

As clearly seen in Figures 1, 2 and 3, the rolls R and R' are each provided with cavities 35 for clearance of the pocket portions of the packages as the rolls rotate. In the apparatus illustrated each roll is provided with three cavities 35 of such size as to provide three equally spaced circumferential lands extending crosswise of the rolls and constituting cross seal members 36. Lengthwise of the rolls the cavities 35 end short of the sides of the rolls to provide axially arcuate webs or flange portions constituting side seal members 37. There is thus provided axially spaced circular surfaces on the rolls for forming edge seals for the packages and circumferentially spaced cross members for forming cross seals for the packages.

The rolls are peripherally serrated so as to crimp the side seals and cross seals of the packages as they are formed, the side seals of a package being shown at 38, 38 in Figs. 1 and 12 and the cross or end seals at 39. The packages are formed in a strip for later cutting into individual packages at the cross seals as indicated by the line *a—a* in Fig. 1. When cross seal 39 is cut a top seal is provided for one package and a bottom seal is provided for the adjacent package. Automatic knife mechanism of well known form may be employed for making the cut.

The packages may be heat sealed by means of electric heating elements 45 carried by the rolls which are supplied with electric current from a suitable source by means of contact rings 46 mounted on the roll shafts as shown in Figs. 1 and 2.

Referring now to the means for providing for the vacuum packaging of the product, it is to be noted that each of the cross seal members 36 of a pair of rolls has a groove or cut out portion 47 extending partially through the surface of the cross seal adjacent the webs at one side

of the rolls for accommodating the vacuum nozzle N. It will be noted that the grooves of each pair of cross seal members are in opposed position when the cross seals are being formed. Although it is preferable to provide grooves in each pair of cross seal members, it should be pointed out that it would be quite feasible to provide only one of a pair of the opposed cross seal members with the groove, provided such groove is large enough to accommodate the vacuum nozzle N.

The nozzle N is connected to the vacuum tank and pump V by a flexible hose **50** and passages **51** and **52** in the block **48**. A valve **53** of any well known form is provided for controlling the connection to the vacuum tank. The valve **53** is actuated by means of a solenoid **54** and the nozzle N is actuated in its up and down movement by means of a solenoid **55** as will appear hereinafter.

Reverting now to the driving mechanism D for imparting intermittent rotation to the rolls R and R' and with particular reference to Figs. 1, 2, 3 and 5 it will be seen that a ratchet wheel **60** having three teeth is secured on the shaft **26** of the driving roll R and is driven by a pawl **61**. The pawl is carried by one arm of a rock lever **62** mounted on the shaft **26**, the other arm of which is connected to a crank arm **63** by a link **64**. The crank arm **62** is adjustably mounted in a block **65** carried by crank shaft **66**. The crank arm is rotated by means of a chain and sprocket connection **67** with a gear reduction unit **68** of standard form driven as by means of a belt **69** drivingly connected to a suitable source of power such as an electric motor (not shown).

A one revolution clutch **70** of any well known form is disposed between the output shaft **71** of the reduction unit **68** and the driven shaft **72** carrying the sprocket **73** of the chain and sprocket connection **67**. A stop latch **76** operated by a solenoid **77** is associated with the clutch. When the clutch **70** is tripped, one revolution is imparted to the crank arm **63** and this in turn imparts one complete oscillation to the rock lever **62** to effect one third of a revolution to the ratchet wheel **60**. It is to be noted, however, that the clutch trip, the crank arm and the ratchet device are so co-related that when the crank arm is in the stopped position shown in Figure 5 the pawl and ratchet wheel are stopped at a point **74** approximately 20 degrees short of the final driving position of the pawl. Thus when the crank arm **63** makes its next one revolution the pawl first drives the ratchet wheel and the rolls 20 degrees in driving direction and then as the crank arm continues in its rotation the pawl ratchets in non-driving direction and picks up the next tooth **75** of the ratchet wheel **60** to rotate it in driving direction to the point **74** where it again stops until the next release of the clutch. During the period of time that the pawl is in its back or non-driving stroke the rolls R and R' remain stationary and it is during this period of time that the product to be packaged may be delivered to the guide chute **22** for packaging in the next package to be formed.

It will be seen from the foregoing that the rolls have a double stop action for each cycle of the crank, the first stop being when the one revolution clutch completes its revolution and the pawl reaches the point **74** and the second stop being when the pawl reaches the point 20 degrees beyond point **74**.

I provide the double stop action in order to give a period of "dwell" (1) when the package is being evacuated and (2) when the transverse or cross seal is being completed. I believe this to be the preferable method to follow for forming an evacuated package for it takes a brief interval of time before the effective evacuation is completed and it is also desirable that there be a brief interval of time or period of "dwell" when the transverse seal is being formed in order to insure proper heating of the packaged material at the point where the transverse seal is formed by the cross seal members **36**. It should be pointed out, however, that it is not essential that there be a period of "dwell" when the transverse seal is being completed.

It should further be pointed out that it is not necessary that the product to be packaged be delivered between the strips of packaging material during the period of dwell when the transverse seal is being completed and in fact it may be desirable if the product to be packaged is a liquid or in granular or pellet form, that it be delivered when the packaging material is moving during the period when the side seals are being formed.

The driven shaft **72** also carries a sprocket **80** drivingly connected by chain **81** to a sprocket **82** on the cam shaft **83**. The cam shaft **83** carries a cam **84** for actuating a switch **85** which is electrically connected to a timer **86** of known type including a timer mechanism with contacts under control of the time setting of the timer and a momentary contact controlled by the switch **85** for activating the timer.

In the position shown in Figure 5 the switch roller is riding on the high or dwell surface **87** of the cam **84** and the switch is open. It is pointed out that the low surface **88** of the cam is so located that the switch **85** closes when the pawl **61** of the ratchet drive D has moved approximately 20% of its up or driving stroke. Thus the clutch **70** in rotating to the position shown in Figs. 1 to 4 inclusive had closed the switch **85** to actuate the momentary contact of the timer **86** which in turn started the timer in motion for its pre-set time interval. Starting of the timer de-energizes the solenoid **55** to move the nozzle N to its down position and to close the vacuum control switch **95** and open the clutch latch control switch **96**. Closing of the switch **95** opens the vacuum control valve **53** and opening of the switch **96** moves the clutch latch **76** to its stop position.

In this instance the time interval is set to operate the timer contacts to cause energization of the nozzle solenoid **55** a predetermined number of seconds after the clutch **70** has complete its revolution.

In Figs. 1 to 4 the solenoid **55** is shown energized. This solenoid is connected to the nozzle N by a link **90** and a lever **91** pivoted on the frame at **92**. Thus with the solenoid energized the short arm **93** of the lever **91** is pulled down and the long arm **94** moves up to raise the nozzle from its down position shown in Figure 6 to its up position shown in Figs. 7–8 and 1 to 4. The upper switch **95** for controlling the valve **53** of the vacuum pump is associated with the short arm **93** of the lever **91** and the lower switch **96** for controlling the clutch **70** is associated with a lug **97** on the link **90**. When the solenoid **55** is energized the arm **93** leaves the upper switch **95** to open the switch to de-energize the vacuum valve solenoid **54** and close the vacuum valve **53** thus cutting off the suction connection to the nozzle N. Next as the arm **93** moves downwardly the lug **97** of the link **90** engages the roller of the clutch control switch **96** to close it. Closing of this switch energizes the solenoid **77** which is connected by link **98** to the clutch stop latch **76** and moves the stop latch clear of the stop pin **99** of the clutch **70** to permit the clutch to rotate. In Figs. 3 and 5 the latch is shown so released and the clutch is ready to start rotating.

As has been pointed out above the clutch is so co-related to the ratchet drive mechanism D that in the first portion of the clutch rotation the pawl moves through 20 degrees of its up or driving stroke before it starts on its down or idle stroke. In moving this 20 degrees the rolls R and R' are rotated to the position shown in Figure 8 in which the final portion of the cross seal is made. This provides a crimped cross seal across the entire width of the package of such extent that when a completed package is cut off a top seal is provided for that package and a bottom seal is provided for the next package. The cut should be made somewhat above the sealed slot **100** as shown in Figs. 1 and 12.

It is to be observed that since the time interval of the

timer **86** has been set to operate the timer contacts a predetermined number of seconds after the clutch has completed its revolution there will be a dwell of the rolls with the nozzle N in down position and with the suction on to provide ample time for creating a vacuum in the package. In drawing the vacuum, the exterior atmospheric pressure presses the packaging material closely around the nozzle as shown in Figs. 6 and 11 and in so doing the material at the slot is pre-stretched to the shape of the nozzle so that when the nozzle is withdrawn the material tends to take its original flat shape which in addition to the atmospheric pressure acting on the material and the tackiness of the material ensures a tight seal of the slot.

In Figure 13 a modification is illustrated in which silicon sponge rubber inserts **102** are provided in the grooves **47** to further aid in forming the material around the nozzle to provide a tight seal.

It will be seen from the foregoing that because of the particular disposition of the vacuum controlling switch **95** and the clutch latch controlling switch **96** to the solenoid controlled lever **91** a particular and important sequence of nozzle withdrawal, vacuum shut off and clutch release is maintained, namely after initiation of the nozzle withdrawal movement by the timer controlled solenoid **55**, the switch **95** closes to shut off the vacuum and when the nozzle actuating lever **91** reaches the end of its nozzle lifting movement the clutch **70** is released to start rotation of the rolls R and R'. During the withdrawal movement of the nozzle outside atmospheric pressure acts on the material surrounding the nozzle to bring it together under the tip of the nozzle to seal the slot in a follow up action so that by the time the nozzle has reached the up position shown in Figure 7 the slot is fully sealed as shown in that figure. Since the clutch is not released until after the nozzle is withdrawn to its up position it is impossible for the nozzle to be pinched between the rolls when they rotate to their second stop position as will be clearly seen from inspection of Figure 8.

After the clutch has been tripped in the above manner the pawl moves in its driving direction through 20 degrees as above mentioned to similarly rotate the rolls to position to complete the cross seal and then the rolls dwell until the pawl has completed its return stroke and picked up the next tooth of the ratchet wheel **60**. During this period of dwell the index feed plate **20** is rotated to deliver the next article into the chute **22** where it rests on the tapering runs **103—103** of the packaging material P.

As rotation of the crank continues the pawl starts its upward or drive stroke and when it has moved through approximately 20% of the upstroke the low portion **88** of the cam **84** causes the switch **85** to close and start the timer. As pointed out above, starting of the timer de-energizes the solenoid **55** which through means of the link **90** and lever **91** causes the nozzle N to move downwardly into the package being formed to the position shown in Figure 9. When the solenoid is de-energized the link **90** in its upward movement causes the switch **96** to open thus de-energizing the solenoid **77** and moving the stop latch **76** into the path of the clutch pin **99**. Also the short arm **93** of the lever **91** moves upwardly into contact with the roller of the switch **95** to close it. Closing of this switch energizes the electromagnet **54** to open the control valve **53** of the vacuum pump V thus establishing suction in the hose **50** leading to the nozzle and drawing a vacuum in the package. As this is taking place the rolls R and R' continue to rotate until the stop pin **99** of the clutch engages the stop latch to stop rotation of the rolls in the position shown in Figs. 1 to 4 inclusive. This completes a cycle of operation and after the timer has run for its pre-set length of time the solenoid **55** is again energized to repeat the cycle.

The schematic diagram of Figure 14 indicates the timer trip switch **85** for the timer relay, the timer contacts for the nozzle solenoid **55**, the clutch switch **96** for the clutch solenoid **77** and the vacuum valve switch **95** for the vacuum valve solenoid **54**.

By referring to Figure 12 it will be seen that the package is completely sealed around the edges and that with the air removed the packaging material fits the article snugly.

Insofar as the method of forming the evacuated package is concerned, it is not necessary that the movement of the packaging material be brought to a stop when the article to be packaged is delivered between the opposed strips of packaging material or when the cross seal is being formed. It is likewise unnecessary to stop the movement of the packaging material when the package is being evacuated, although in order to insure the most complete evacuation possible, a stoppage or at least a slowing down of movement of the packaging material at that time is preferable. The term "interrupting" movement of the material as used in the claims contemplated such a stoppage or slowing down of movement.

Although I have illustrated my invention as applied to an apparatus wherein there is but a single pair of rolls for forming the side seals and the end seals, it should be pointed out that side seals of strips of packaging material could be formed by separate rolls in advance of the rolls for forming the cross seals and my invention is not limited to an arrangement wherein there is but a single pair of rolls forming both the side and cross seals.

I claim:

1. A system for forming, filling, exhausting and sealing packages of flexible material comprising opposed sealing rolls between which opposed strips of packaging material are fed and formed into packages, said rolls having axially spaced opposed circular surfaces for forming edge seals for the packages and circumferentially spaced opposed cross members for forming cross seals for the packages each cross member of a pair having a groove in a part of the surface thereof opposed to a like groove in the opposed cross member, a nozzle connected to a source of vacuum and adapted to project into said grooves, driving mechanism for said rolls and mechanism for controlling the operation of the rolls and of the nozzle including means providing a period of dwell for the rolls when the grooves of a pair of cross seal members are opposed and for thereafter causing said rolls to resume movement to complete formation of the cross seal and means operating to project said nozzle into the package in the region of said grooves and to withdraw it during said period of dwell, to evacuate the package.

2. A system according to claim 1 wherein the mechanism for controlling the operation of the rolls includes means providing for a second period of dwell of said rolls during the completion of formation of the cross seal.

3. A system for forming, filling, exhausting and sealing packages of flexible material comprising opposed sealing rolls between which opposed strips of packaging material are fed and formed into packages, said rolls having axially spaced opposed circular surfaces for forming edge seals for the packages and circumferentially spaced opposed cross members for forming cross seals for the packages, at least one cross member of a pair having a groove in a part of the surface thereof, a nozzle connected to a source of vacuum and adapted to project into said groove, driving mechanism for said rolls and mechanism for controlling the operation of said rolls and of the nozzle including means providing a period of dwell for the rolls when the cross seal members are opposed and thereafter causing said rolls to resume movement to complete formation of the cross seal and means operating to project said nozzle into the package in the region of said grooves and to withdraw it during said period of dwell, to evacuate the package.

4. A system according to claim 3 wherein the mechanism for controlling the operation of the rolls includes means providing for a second period of dwell of said rolls during the completion of formation of the cross seal.

5. A system for forming, filling, exhausting and sealing packages of flexible material comprising opposed sealing rolls between which opposed strips of packaging material are fed and formed into packages, said rolls having axially spaced opposed circular surfaces for forming edge seals for the packages and circumferentially spaced opposed cross members for forming cross seals for the packages, at least one cross member of a pair having a groove in a part of the surface thereof, a nozzle connected to a source of vacuum and adapted to project into said groove, driving mechanism for said rolls and mechanism for controlling the operation of said rolls and of the nozzle including a clutch for the driving mechanism and a timer controlling operation of said clutch to provide a period of dwell for the rolls when the cross seal members are opposed and thereafter cause said rolls to resume movement to complete formation of the cross seal, and means controlled by said timer to project said nozzle into the package in the region of said grooves and to withdraw it during said period of dwell, to evacuate the package.

6. A system for forming, filling, exhausting and sealing packages of flexible material comprising opposed sealing rolls between which opposed strips of packaging material are fed and formed into packages, said rolls having axially spaced opposed circular surfaces for forming edge seals for the packages and circumferentially spaced opposed cross members for forming cross seals for the packages, at least one cross member of a pair having a groove in a part of the surface thereof, a nozzle connected to a source of vacuum and adapted to project into said groove, driving mechanism for said rolls and mechanism for controlling the operation of said rolls and of the nozzle including a clutch for the driving mechanism and a timer controlling operation of said clutch to provide a period of dwell for the rolls when the cross seal members are opposed and thereafter cause said rolls to resume movement to complete formation of the cross seal, means controlled by said timer to project said nozzle into the package in the region of said grooves and to withdraw it therefrom during said period of dwell, a normally closed valve for said vacuum nozzle and means controlled by said timer to open said valve during said period of dwell.

7. A system according to claim 5 wherein the driving mechanism for the rolls includes means providing a second period of dwell for the rolls during completion of the cross seal.

8. A system according to claim 6 wherein the driving mechanism for the rolls includes means providing a second period of dwell for the rolls during completion of the cross seal.

9. A system for forming, filling, exhausting and sealing packages of flexible material comprising opposed sealing rolls between which opposed strips of packaging material are fed and formed into packages, said rolls having axially spaced opposed circular surfaces for forming edge seals for the packages and circumferentially spaced opposed cross members for forming cross seals for the packages each cross member of a pair having a groove in a part of the surface thereof opposed to a like groove in the opposed cross member, resilient inserts in said grooves, a nozzle connected to a source of vacuum and adapted to project into the package in the region of said grooves, driving means for the rolls and means operating to project said nozzle into the package in the region of said grooves and to withdraw it during the formation of the cross seals, the said resilient inserts pressing the strips together in the region of said grooves as the nozzle is withdrawn.

10. A system according to claim 9 wherein the driving mechanism for the rolls is controlled to provide a period of dwell for the the rolls when the grooves of a pair of cross seal members are opposed.

11. A system for forming, filling, exhausting and sealing packages of flexible material comprising opposed sealing rolls between which opposed strips of packaging material are fed and formed into packages, said rolls having axially spaced opposed circular surfaces for forming edge seals for the packages and circumferentially spaced opposed cross members for forming cross seals for the packages, at least one cross member of a pair having a groove in a part of the surface thereof, and resilient insert in said groove, a nozzle connected to a source of vacuum and adapted to project into the package in the region of said groove, driving mechanism for the rolls and means operating to project said nozzle into the package in the region of said groove and to withdraw it during formation of the cross seal, the said resilient insert pressing the strips together in the region of said groove as the nozzle is withdrawn.

12. A system according to claim 1 wherein the grooves have resilient inserts adapted to press the strips together as the nozzle is withdrawn.

13. A system according to claim 3 wherein the groove has a resilient insert adapted to press one of the strips against the other as the nozzle is withdrawn.

14. In a method of forming, filling and sealing successive packages from opposed strips of packaging material and exhausting the package through a vacuum nozzle, the method which comprises passing said strips between opposed sealing rolls to form edge seals and a first end seal for a package, introducing the material to be packaged, forming a portion of the other end seal of the package leaving an unsealed passage of limited area therein in the region of said nozzle, exhausting the package through said passage by said nozzle and thereafter passing the said strips further between said rolls to close said passage and complete formation of said other end seal and to form a first end seal for the succeeding package.

15. In a method of forming, filling and sealing successive packages from opposed strips of packaging material and exhausting the package through a vacuum nozzle, the method which comprises passing said strips between opposed sealing rolls to form edge seals and a first end seal for a package, introducing the material to be packaged, forming a portion of the other end seal of the package leaving a passage of limited area therein in the region of said nozzle, exhausting the package through said passage by said nozzle, withdrawing said nozzle while continuing to apply suction, and thereafter passing the said strips further between said rolls to close said passage and complete formation of said other end seal and to form a first end seal for the succeeding package.

16. In a method of forming, filling and sealing successive packages from opposed strips of packaging material and exhausting the package through a vacuum nozzle, the method which comprises passing said strips between opposed sealing rolls to form edge seals and a first end seal for a package, introducing the material to be packaged, forming a portion of the other end seal of the package leaving a passage of limited area therein in the region of said nozzle, interrupting movement of said strips, exhausting the package through said passage by said nozzle while movement of the strips is interrupted and thereafter passing said strips further between said rolls to close said passage and complete the formation of the other end seal and to form a first end seal for the succeeding package.

17. In a method of forming, filling and sealing successive packages from opposed strips of packaging material and exhausting the package through a vacuum nozzle, the method which comprises passing said strips be-

tween opposed sealing rolls to form edge seals and a first end seal for a package, introducing the material to be packaged, forming a portion of the other end seal of the package leaving a passage of limited area therein in the region of said nozzle, interrupting movement of said strips and exhausting the package through said passage by said nozzle while movement of the strips is interrupted and thereafter withdrawing said nozzle from the package and passing said strips further between said rolls to close said passage and complete formation of said other end seal and to form a first end seal for the succeeding package.

18. In a method of forming, filling and sealing successive packages from opposed strips of packaging material and exhausting the package through a vacuum nozzle, the method which comprises passing said strips between opposed sealing rolls to form edge seals and a first end seal for a package, introducing the material to be packaged, forming a portion of the other end seal of the package leaving an unsealed passage of limited area therein in the region of said nozzle, exhausting the package through said passage by said nozzle and thereafter withdrawing said nozzle and pressing the strips together in the region of said passage as the nozzle is withdrawn, completing formation of the other end seal and forming a first end seal for the succeeding package.

19. In a method of forming, filling and sealing successive packages from opposed strips of packaging material and exhausting the package through a vacuum nozzle, the method which comprises passing said strips between opposed sealing rolls to form edge seals and a first end seal for a package, introducing the material to be packaged, forming a portion of the other end seal of the

package leaving a passage of limited area therein in the region of said nozzle, exhausting the package through said passage by said nozzle, withdrawing said nozzle and pressing said strips together in the area of the passage while continuing to apply suction and thereafter passing the said strips further between said rolls to complete the closing of said passage and formation of the other end seal and to form a first end seal for the succeeding package.

20. In a method of forming, filling and sealing successive packages from opposed strips of packaging material and exhausting the package through a vacuum nozzle, the method which comprises passing said strips between opposed sealing rolls to form edge seals and a first end seal for a package, introducing the material to be packaged, forming a portion of the other end seal of the package leaving a passage of limited area therein in the region of said nozzle, interrupting movement of said strips, exhausting the package through said passage by said nozzle while movement of the strips is interrupted and thereafter withdrawing said nozzle and pressing the strips together in the region of said passage as the nozzle is withdrawn, completing formation of the other end seal and forming a first end seal for the succeeding package.

References Cited in the file of this patent

UNITED STATES PATENTS

2,387,812	Sonneborn	Oct. 30, 1945
2,468,517	Salfisberg	Apr. 26, 1949
2,565,444	Waters	Aug. 21, 1951
2,626,494	Lewis	Jan. 27, 1953